

TEACHER RESOURCE

CLASS - 6 TO 8

MATHEMATICS



BOOK 6

Let's Revise

1. $247,200 \text{ seconds} \div 60 = 4,120 \text{ minutes}$

2. Number of persons per row = Total amount of persons / Number of rows

Number of persons per row = $221,373 / 911$

Number of persons per row ≈ 243

Therefore, approximately 243 persons can be seated in a row in the stadium.

3. Capacity of one tank = Total volume of water / Number of tanks

Capacity of one tank = $206,250 \text{ liters} / 375$

Capacity of one tank = 550 liters

Therefore, the capacity of one water tank is 550 liters.

4. Number of shares issued = Total amount collected / Value per share

Number of shares issued = $\text{Rs } 19,738,500 / \text{Rs } 250$

Number of shares issued = 78,954 shares

Therefore, the company issued 78,954 shares.

5: Amount collected by each student = Total amount collected / Number of students

Amount collected by each student = $\text{Rs } 35,875 / 287$

Amount collected by each student $\approx \text{Rs } 125$

6. $289503/407 = 711$

$711 * 407 = 289377$

$289503 - 289377 = 126$

7. $1601985/803 = 1995$

1995 admirals are required.

8. Total days of December, January, February and March

$31+31+28+31=121 \text{ Days}$

$15004/121=124 \text{ litres / day}$

9. Let the other number is x

One of two number is 826

$(826)(x) = 2317756$

$x = 2317756/826$

$x = 2806$

10. Cost of 8 fans = 13840

Cost of 1 such fan = 1685.

Thus, cost of 13 such fans = $1685 * 13 = 21,905$

11. Train covers distance in 9 hrs = 1215

distance in 1 hrs = $1215/9 = 135 \text{ km.}$

Now, distance in 19 hrs = 2565 km.

12. 12 men = 10 days

1 man = $10 * 12 = 120 \text{ days}$

15 men = $120 / 15 = 8 \text{ days}$

13. 12 chairs costs = 1500

1 chair costs = $1500/12 = 125$

Number of chairs in Rs 2750 = $2750/125 = 22$

14. cost of 1 refrigerator = 15136
Cost of 34 refrigerators = $15236 \times 34 = 514624$
Cost of 136 almirahs = 514624
Cost of 1 almirah = $514624/136 = 3784$

15. Rent of 12 months = 38400
Rent of 1 month = 3200
Now, rent of 19 months = $3200 \times 19 = 60,800$

16. let x be the required number of days
Rice consumed by 60 persons = Rice consumed by 18 persons
 $60 \times 3 = 18 \times (x)$
 $180 = 18 \times (x)$
 $x = 180/18$
 $x = 10$ days

17.
(a) 5dam 5 m X 5
 $50m + 5m \times 5$
 $55m \times 5$
275 m
b: 12km 125 m by 4
 $1200 m + 125 m$ by 4
 1325×4
5300
c: 20m 75cm by 3
 $(2000+75)cm$ by 3
 $2075 cm \times 3$
6225 cm
d: 14900 cm + 20 cm by 6
 $14920 cm \times 6 = 89520 cm$
e: $77 cm \times 2 = 154 cm = 1 m 54 cm$

18:
a : $800cm + 40 cm$ by 2
840 cm by 2
420 cm
B: $3000m + 25 m$ by 5
 3025 by 5 = 605 m
C: $7300cm + 50 cm$ by 3
7350 cm by 3
2450cm
d: $77000m + 949 m$ by 9
77949m by 9
8,661 m
e: $14900 cm + 80 cm$ by 7 = 14980 cm by 7
= 2140 cm

19:
a : 7 kg 750 gm by 6
 $7000 gm + 750 gm$ by 6
7750 gm by 6
46,500 gm
b: 4150 gm by 5
20,750 gm
C : 3900 by 3
11,700 gm

d: 8675 gm by 7
60,725 gm

20 : DIVIDE

- a) 35 kg 490 gm by 7
35000 gm + 490 gm by 7
35490 gm by 7 = 5,070 gm
- b) 28300gm by 4
7,075 gm
- e) 144360 mg by 12
12,030mg
- f) 16400 by 8
2,050 gm

21. weight of box A = 36 kg 750 gm
weight of box B=27 kg 500 gm
Total weight = 64 kg 250 gm

22. weight of 1 chair = 25kg 450 gm
weight of 35 chairs= 25.45 X 35 = 890.75 kg

23. Total weight of coins = 36 kg 750 gm
Weight of 1 coin = 75 gm
Number of coins = 36750 gm / 75 gm= 490 coins

24.Total weight of iron rod = 48 kg 500 gm
Number of equal pieces = 20
Weight of 1 piece = 2.425 kg

25. Difference in both poles = 8.39 cm - 6.65 cm=1.74 cm

26.Distance between pole A and B = 45 .250 km
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,B and C= 37.80 km
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,A and C= 82.330 km

27. Total length of ribbon = 62.40 m
Number of pieces = 13
Length of each piece = 4.80 m

28. a) 7500000km b) 17km C) 8 km. d). 0.89 km. e) 1.2 km
29. a) 1.2 m. b). 25 cm. c). 8.5 m. d). 7.5 m

30. cost of 7 meters of cloth = ₹42
,,,,,,,,,,,,,1,,,,,,,,,,,,,,,,,,,,,,,,,,,,,=₹42/7=₹6
Cost of 11 meters cloth = 6X 11 = ₹ 66

31. cost of 300 kg = ₹12270
cost of 1 kg = ₹40.9
Cost of 80 kg = ₹3,272

32. cost of 9 kg. Wheat = ₹119.70
cost of 1 kg ,,,,,,,,,,,,,,=₹119.70/9 =13.3
cost of 6 kg = ₹79.8

33.cost of 13 ltr milk = ₹117
cost of 1 ltr milk = ₹ 117/13 = 9
cost of 8 ltr milk. = ₹ 72

34. fare of 41 km = ₹943
Fare of 1. Km = ₹23
Fare of 35 km = ₹ 805

35.a) S.P.=₹275. b). S.P.=₹510. C). S.P.=₹340. d). S.P.=₹237.5

36.a). C.P.=₹595. b) C.P.= ₹396. C). C.P.=. ₹598.5. d). C.P =₹768

37. C.P =₹90,000+₹6000=96,000
Loss= 6%. =₹5,760
S.P =C.P(1-loss%)
=₹90,240

38. SP= 1575
Profit = 5% = 78.75
CP = ₹1496

39. CP = 2100
SP = 2415
Gain = ₹315
Gain %=profitX 100/CP =15%

40. CP = ₹20,450 + ₹760 = ₹21,210
Profit = 20% =₹ 4,242
Now , SP = ₹ 25,252

41. CP = ₹420
SP. = ₹441
Gain = ₹21
Gain %= gain X100/ CP = 5%

42. a)30 degree C b) .40 degree Celsius c) 9 Degree Celsius d). 56 degree Celsius e). 60 degree Celsius. f).
27.22-degree Celsius g). 75-degree Celsius h). 35 degree Celsius

43. a) 107.6 Degree Fahrenheit. b)138-degree Fahrenheit c) 195.8. degrees Fahrenheit
d). 96.8. Degree Fahrenheit e). 145.4 Degree Fahrenheit f). 177.8 Degree Fahrenheit
g). 203 Degree Fahrenheit h). 66.2. Degree Fahrenheit

44.a). Speed = Distance/Time
=150/3 =50km/hr
b). Speed = 840/12 = 70 km/hr
c). Speed= 25.72/4= 6.43 km/hr
d). Speed = 10.74/3 = 3.58 km/hr

45. Speed = 780/6 =130 km/hr

46. Distance covered 960 m in 4 minutes
Speed= 960/ 4= 240 m/minutes

47. speed of helicopter = 1134km/5hrs =226.8 km/hrs
= 226.8X5/18 metres per second = 63 m/sec

48. Distance =3.5 km =3500 meters
Time =30 minutes = 1800 seconds
Speed =3500/1800 =1.94 meters/second

49. Sides of Triangle = $6.2\text{cm} + 4.2\text{cm} + 2.1\text{cm}$
Perimeter of triangle = 12.5cm

50. Perimeter of triangle = 21.2cm
Two sides = $8.7\text{cm} + 4.9\text{cm} = 13.6\text{cm}$
Therefore, third side = 7.6cm

51. Length of rectangle = 11.3cm
Breadth of rectangle = 6.3cm
Perimeter of rectangle = $2(L + B) = 35.2\text{cm}$

52. Side of square = 12.3cm
Perimeter of square = $4(\text{side})$
 $= 4 \times 12.3\text{cm} = 49.2\text{cm}$

53. Perimeter of rectangle = 58cm
Length = 11cm
Let breadth = x
Perimeter of Rectangle = $2(L + B)$
 $58 = 2 \times 11 + 2B$
 $2B = 36$
 $B = 18\text{cm}$

54. Side of square path = 29meters
Length of path = perimeter of square path = $4 \times \text{side}$
 $= 4 \times 29 = 116\text{meters}$

55. a) 36cm . b) 7cm . c) 8cm . d) 7.6cm . e) 12.4cm . f) 5.8cm

56. a) 5.5cm . b) 6.5cm . c) 3.2cm . d) 3.9cm . e) 3.1cm . f) 4cm

57. a) Circumference = $\frac{22}{7} \times \text{Diameter} = \frac{22}{7} \times 14 = 44\text{cm}$
b) Circumference = 22cm c) Circumference = 19.8cm d) Circumference = 17.6cm
e) Circumference = 24.2cm f) Circumference = 46.2cm

58. Do it yourself.

59. Do it yourself.

60. Diameter = 8.4cm
Radius = 4.2cm

61. Radius = 2.9cm
Diameter = 5.8cm

62. Approximate circumference = 26.4cm

63. a) scalene triangle. b) Equilateral triangle. c) Right angled triangle. d) Obtuse angled triangle. e).
Obtuse angled triangle. f). Acute angled triangle

64. a) Isosceles triangle b) Scalene triangle. c) Scalene triangle. d). Equilateral triangle. e) Scalene
triangle. f). Isosceles triangle. g). Equilateral triangle h) Scalene triangle.

65. Do it yourself.

66. a. Acute. b. Acute. c. Obtuse. d. Acute. e. Obtuse. f. Acute. g. Obtuse. h. Straight. i. Right angle.
j. Obtuse

67. a. 50 degree. b. 65 degree. c. 60 degree. d. 30 degree. e. 5 degree

68. a. 110 degree. b. 143 degree. c. 65 degree. d. 100 degree. e. 130 degree

69. a. 16 cm. b. 124 cm. c. 9.6 cm. d. 100cm

70. a. Perimeter =20 cm

Side = $20/4 = 5$ cm

Area = side X side

= $5 \times 5 = 25$ sq cm

b. Perimeter = 44cm

Side = $44/4 = 11$ cm

Area = side X side

= $11 \times 11 = 121$ sq.cm

C. Perimeter = 56 m

Side =14 m

Area = 196 sq. m

d. Perimeter = 66cm

Side = 16.5 cm

Area = 272.25 sq cm

71. Perimeter = Sum of sides

= $6.2 \text{ cm} + 4.2 \text{ cm} + 2.1 \text{ cm} = 12.5 \text{ cm}$

72. Length =2.5 cm. Breadth = 3.1cm

Therefore, Perimeter of rectangle = $2(L + B) = 11.2 \text{ cm}$

73. Perimeter of triangle =21.2cm

Side 1 = 8.7 cm. Side 2 = 4.9 cm.

Side 3 = $21.2 - 13.6$

Side 3 = 7.6 cm

74. Perimeter of rectangle = $2(L + B) = 2(17.6) = 35.2 \text{ cm}$

75. Side of the square = 12.3 cm

Perimeter of square = $4 \times 12.3 \text{ cm} = 49.2 \text{ cm}$

76. Perimeter of rectangle = 58 cm

Length = 11 cm

Breadth = ?

$58 = 2(11 + \text{Breadth})$, Breadth = 18 cm

77. length = 5 cm. Breadth = 4 cm. Depth = 3 cm

Volume = Capacity of tank = length X Breadth X depth

= $5 \times 4 \times 3 = 60$ cubic litres

78. L =60 cm. B= 30 m. H = 20 cm

Capacity of the swimming pool = $60 \times 30 \times 20 = 36000$ cubic meters

79. L =6 m. B= 3m. H= 1.5 m

Volume of air = $6 \times 3 \times 1.5$

= 27 cubic meters

80. Length = 11cm. Breadth = 8cm. Height = 6cm

Volume of the cuboid = $L \times B \times H$

= $11 \times 8 \times 6$

= 528 cubic centimetres

81. Volume of cube = edge X edge X edge = $9.1 \times 9.1 \times 9.1 = 753.571$ cubic centimetres

CHAPTER 2

Exercise 2.1

- 1.(1) Three thousand five hundred forty.
(2) Three thousand ninety.
(3) Forty one thousand eight hundred two.
(4) Eighty thousand four hundred twenty three.
(5) Thirty nine thousand sixty one.
(6) Forty three thousand five hundred seven.
(7) Ninety thousand seven hundred thirteen.
(8) Seventy thousand eight hundred seven
2. (1) 3441. (2) 71057. (3) 82406. (4) 60006. (5) 90463.
3. 99999 , Ninety nine thousand nine hundred ninety nine
4. One thousand
5. By adding 1 to it.

Exercise 2.2

- 1.(1) 2, 62, 38, 259 - Two crore sixty-two lakh thirty-eight thousand two hundred fifty-nine.
(2) 34, 28, 32, 787 - Thirty-four crore twenty-eight lakh thirty-two thousand seven hundred eighty seven.
(3) 50, 40, 08, 006 - Fifty crore forty lakh eight thousand six.
(4) 77, 56, 105 - Seventy-seven lakh fifty-six thousand one hundred five.
(5) 25, 54, 618 - Twenty-five lakh fifty-four thousand six hundred eighteen
(6) 2, 39, 40, 017 - Two crore thirty-nine lakh forty thousand seventeen.
(7) 8, 34, 22, 507 - Eight crore thirty-four lakh twenty- two thousand five hundred seven.
(8) 71, 23, 00, 017 - Seventy-one crore twenty-three lakh seventeen.
2. (1) 4,16,30,457. (2) 21,71,110. (3) 1,91,13,783. (4) 33,93,64,200. (5) 8,29,10,110.
(6) 85,00,60,299. (7) 9,00,03,008. (8) 40,00,00,800.
3. (1) 9,65,41,544. (2) 61,32,27,095. (3) 81,32,14,002.
4. (1) 74,64,499. (2) 54,10,10,207. (3) 2,32,54,658.

Exercise 2.3

- 1.(1) 7. (2) 2. (3) 8.
2. Place value Chart
T-L L T-Th Th H T O
(1) 7 7 5 0 9 3 4
(2) 9 0 6 3 4 0 6
(3) 5 3 5 0 0 8 1
(4) 3 8 2 5 9 6 1

1- 30 2- 3,000 3- 3,00,000 4- 30,00,000
3. (1) 800 or Eight hundred. (2) 80,000 or Eighty thousand. (3) 80 or Eighty
4. 9,00,000 or Nine lakh

5. (1) 3,99,996 (2) 396 (3) 3,996

6. 8,00,800

7. 49,500

8. (1) $30,00,000 + 4,00,000 + 70,000 + 50 + 2$

(2) $90,00,000 + 8,00,000 + 50,000 + 700 + 40 + 3$

(3) $30,00,00,000 + 8,00,00,000 + 10,00,000 + 8,00,000 + 30,000 + 7,000 + 200 + 90 + 1$

(4) $5,00,00,000 + 3,00,000 + 70,000 + 200 + 80 + 3$

(5) $60,00,000 + 1,00,000 + 80,000 + 7,000 + 200 + 10 + 3$

(6) $5,00,000 + 40,000 + 2,000 + 500 + 70 + 3$

(7) $60,00,00,000 + 7,00,00,000 + 60,00,000 + 4,00,000 + 70,000 + 2,000 + 500 + 90 + 8$

(8) $60,00,00,000 + 2,00,00,000 + 10,00,000 + 7,00,000 + 90,000 + 3,000 + 800 + 80 + 1$

9. (1) 7,08,254 (2) 9,30,640 (3) 7,09,085 (4) 80,37,503

Exercise 2.4

1. (1) > (2) = (3) < (4) > (5) > (6) >

2. Greatest Number Smallest Number

(1) 93,75,821 5,18,421

(2) 82,98,15,674 32,98,34,765

(3) 7,87,96,342 27,65,349

(4) 5,09,10,845 3,60,90,845

3. (1) 5,52,367; 6,35,105; 8,08,729; 75,24,620

(2) 12,78,35,218; 23,34,52,159; 33,61,76,128; 42,61,52,830

(3) 28,372; 92,87,681; 1,98,31,638; 3,86,73,838

(4) 71,68,105; 74,25,003; 74,85,004; 74,89,002

4. (1) 60,08,29,389; 7,00,12,809; 6,00,58,903; 1,00,37,509

(2) 6,12,98,502; 6,12,45,702; 3,12,62,012; 41,25,072

(3) 5,07,93,166; 5,07,16,963; 56,07,693; 16,07,369

(4) 38,87,587; 38,78,597; 8,85,787; 3,98,577

5. Greatest number - 9,76,310, Smallest number - 1,06,379

6. Smallest number - 10,458, Greatest number - 85,410

7. 9,87,65,310

8. 1,02,35,678

9. Smallest number - 20,00,468, Greatest number - 88,86,420

10. Smallest number - 1,00,000, Greatest number - 9,99,999

11. (1) 9,99,999 (2) 9,99,998 (3) 9,87,654

12. 10,00,023

13. (1) 9487, 1402 (2) 9807, 1203 (3) 9875, 1025 (4) 8976, 8012

14. Do it yourself

15. (1) 8170, 7108 (2) 7810, 7018 (3) 8701, 1708

16. (1) C (2) a (3) b (4) d

Exercise 2.5

1. (i) 1 (2) 1 (3) 10 (4) 100 (5) 10

2. (1) 8,782,448 (2) 5,023,157 (3) 60,765,445 (4) 9,421,373 (5) 408,541,754 (6) 281,564,7.
(7) 90,054,180 (8) 981,008,80

3. (1) Nineteen million two hundred forty-six thousand five hundred twenty.
(2) Eight million five hundred eighty-six thousand forty-two.
(3) Seven million eight hundred thirty-six thousand, seven hundred ninety- five.
(4) Fifty-two million five hundred sixty thousand two hundred sixteen.
(5) Ninety-eight million one hundred thirteen thousand four hundred eighty-three.
(6) Five hundred thirty-one million three hundred twenty-five thousand nine hundred twenty three.
(7) Two hundred sixty-three million two hundred six thousand twelve.
(8) Eighty-nine million nine hundred twenty-one thousand three hundred seventy-two.

4. (1) 83,40,15,208 (2) 20,53,06,409
(3) 17,20,65,067 (4) 14,090 (5) 8,04,212

5.(1) Five million five thousand two hundred seventeen.
(2) Seventy million five hundred twelve thousand three hundred sixty-two
(3) One hundred forty-two million two hundred thousand nine hundred forty

6.(1) Nine crore twelve lakh twenty-six thousand four hundred four
(2) Thirty-five lakh four thousand three hundred fifteen
(3) Fifty crore seventy lakh. six thousand twenty-seven

7. Cost of flat= ₹ 8,49,375
Cost of renovation= ₹ 1,72,650
Total amount spent= 8,49,375 + 1,72,650
= ₹ 10,22,025

8. $5,00,00,000 - 35,82,609 = 4,64,17,391$

9. In 1999, Population of delhi=1,29,35,297.

It increased by 45,34,214 in next two years, therefore, $12935297 + 4534214 = 17469511$ But 1329417 people migrated to Mumbai & bengaluru, $17469511 - 1329417 = 16140094$.

Therefore, Population of Delhi in 2001 is 1,61,40,094.

10. Total amount = ₹ 2000
Money spent on Caps = $80 \times 5 = 400$
Money spent on Shirts = $195 \times 3 = 585$
Money spent on Trousers = $390 \times 2 = 780$
Total expenditure = $400 + 585 + 780 = 1765$
Money Left = $1765 - 2000 = 235$

11. $(5684 \times 54) / 45 = 306906 / 45 = 6820.8$.

12. total no of books the truck had=24,817 weight of each book=380g
Total weight of the book= no of books x weight of book = $24,817 \times 380 = 94,30,460$ g or 9.430kg approx.

13. Let the capacity of 1 water tank be x
 Therefore, Total capacity of tank: no. Of tanks= x
 $206250 \div 375 = x$
 $550 = x$
 The ANS is capacity of one tank is 550 litre
14. $1,72,860 / 20 = 8643$
 Therefore total number of ₹20 notes required to get 1,72,860 is 8643
15. Average number of words on a page = 207 Total words = 201618
 Total pages = $201618 / 207 = 974$
16. $32m / 16 = 2$ metre per shirt
17. Total population of town= 35,73,452
 Total population of males= 14,45,718
 Total population of females= 10,97,253
 total population of children= $3573452 - 1445718 + 1097253 = 3224987$
18. Difference of two numbers = 10,43,271 Greater number = 17,56,311
 let the smaller number be x
 Therefore, $17,56,311 - x = 10,43,271$
 $x = 17,56,311 - 10,43,271$
 $x = 7,13,040$
19. $36,412 * 36 = 13,10,832$
 $36,412 * 63 = 22,93,956$
 $22,93,956 - 13,10,832 = 9,83,124$
20. weight of a cough syrup = 325 mg.
 weight of the box = $12000 \times 325 \text{ mg} = 39,00,000 \text{ mg}$
 weight in kilogram = $3900000 / 1000000 = 3.9 \text{ kg}$ (1kg- 1000000 mg)
 hence, weight of the box is 3900000 mg and in kilogram is 3.9kg.
21. cloth required for making shirts = 32m 50cm = 3250 cm
 total number of shirts made from this cloth = 25
 cloth required for each shirt = $3250 / 25 \text{ cm}$ required for each shirt = 130 cm.
 Therefore, cloth required for each shirt = 1 m 30 cm.
22. (1) 5,000 cm (2) 0.25 m (3) 3.8cm (4) 2,700 m (5) 4150 g (6) 150 m (7) 18 kg
 (8) 4.15 kg (9) 2.856 L (10) 9L(11) 32.450 g (12) 28.560 L
23. Total seating capacity = 1,25,000
 Total number of people watching from North end = 35,000
 Total number of people watching from south end = 22,750
 therefore, total number of people watching from west end = $(35,000 + 22,750) - 1,25,000 = 57,750 - 1,25,000 = 67250$
24. (1) a (2) b (3) d

CHAPTER 3

Exercise 3.1

1. (1) 8,35,675 (2) 60,000 (3) 53,08.770

2. 2497, 2498, 2499

3. (1) 29,9,999 (2) 73,05,929 (3) 70,56,824

4. 7909, 7910, 7911

5. Do it yourself

6. (1) 8 (2) 11 (3) 24 (3) 1001 (4) 2001 (5) 501

7. (1) largest (2) 0 (3) natural

Exercise 3.2

Do it yourself

CHAPTER 4

Exercise 4.1

1. 20 2. 23 3. 4 4. 40 5. 360 6. 10 7. 22. 8. 72.15 9. 90 10. 131 11. 1005 12. 105 13. 28 14. 101

Exercise 4.2

1. (1) 1,2, 3, 6,9, 18

(2) 1,2,4,8

(3) 1,23

(4) 1,2,3,4, 6, 8,9, 12, 18, 24, 36, 72

(5) 1, 2, 4, 7, 8, 14, 28, 56

(6) 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

(7) 1, 2, 3, 4, 6, 7, 8, 12, 14, 21, 24, 28, 42, 56, 84, 168

2. Yes, 13962 is exactly divisible by 39 and leave no remainder. So, 39 is a factor of 13962.

3. 6, 12, 18, 24, 30.

4. 11,22, 33,44.

5. (1) Yes (2) Yes.

6. 780.

7. 3996.

8. Yes

9. No.

10. 35, 45, 55, 65.

11. 26, 52,78

12. There is no such number.

13. No.

14. 1.

15. (1) 12, 15, 18 (2) 28, 42, 49, 56

(3) 15, 20, 25, 30, 35, 40, 45 (4) 36,48, 72

16. (1) True (2) False (3) False (4) False (5) True

17. (1) yes (2) yes (3) no (4) no

18. (1) yes (2) yes (3) yes (4) no

19. (a) 1 (b) 5 (c) 1 (d) 4 (e) 3 (f) 6

Exercise 4.3

1. (1) 17, 5, 19, 29, 11, 47 (2) 2,3,5,7,11. (3) 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31

2. (1) Prime (2) Composite (3) Prime (4) Prime (5) Prime (6) Composite

3. (1) 11, 13, 17, 19, 23, 29, 31, 37 (2) 31, 37, 41, 43, 47, 53, 59 (3) 83, 89, 97
4. 25. 5. (3,5) (5,7) (11,13) (17,19) (29, 31). 6. 2. 7. (1) $3 + 41$ (2) $5 + 31$ (3) $5 + 19$
(4) $5 + 13$
8. Yes, 9 9. (1) (a) 2×3 (b) 5×7 (2) (a) $13 + 19$ (b) $13 + 71$
10. $2 \times 3 \times 5 + 1$. 11. $54 = 23 + 31$, $60 = 7 + 53$. 12. 18, 35. 13. (1) 13, 31, 17, 71
(2) (3, 13); (13, 23)
14. (1) It will have more than 2 factors, like 4 has factors 1, 2, 4; 9 has factors 1, 3, 9; 16 has factors 1, 2, 4, 16, etc.
(2) It will be divisible by 1, 2 and more numbers
(3) It will have 1, 5 and more numbers as factors
15. Co prime - (1), (2), (4), Twin prime - (3), (5), (4). 16. 78 17. 5
18. (1) odd (2) even 19. (1) 2 (2) even (3) natural number (4) composite number
(5) 4 (6) 1
20. (1) b (2) d (3) d (4) b

Exercise 4.4

1. Do it yourself. 2. Do it yourself. 3. (1) 1 (2) 2 (3) 1.
4. (1) 22 (2) 28 (3) 50. 5. (1) 1 (2) 2 (3) 0
6. 151, 179, 103, 163, 139, 167, 331, 353, 397
7. (1) F (2) F (3) T (4) F (5) T (6) T
8. (1) Yes, it is divisible by 2 because its last number is 4 which is an even number
(2) Yes, it is divisible by 2 because its last number is 0 which is an even number
(3) Yes, it is divisible by 2 because its last number is 4 which is an even number
(4) Yes, it is divisible by 2 because its last number is 2 which is an even number
9. (1) $6 + 2 + 5 = 13$, 13 is not divisible by 3
(2) $7 + 0 + 3 + 3 + 5 = 18$, 18 is divisible by 3
(3) $7 + 3 + 1 + 5 + 2 + 0 = 18$, 18 is divisible by 3
(4) $9 + 0 + 8 + 2 + 7 + 4 + 6 = 36$, 36 is divisible by 3
10. (3), (6), (7), (8) are divisible by 6 because they are divisible by 2 and 3.
11. (1) sum of digits in odd places = $2 + 0 + 0 = 2$
sum of digits in even places = $4 + 3 + 5 = 12$
difference = $12 - 2 = 10$, it is not divisible by 11.
(2) sum of digits in odd places = $3 + 8 + 2 = 13$.
Sum of digits in even places = $2 + 0 = 2$.
Difference = $13 - 2 = 11$, it is divisible by 11.
(3) sum of digits in odd places = $5 + 9 + 3 + 5 = 22$.
Sum of digits in even places = $4 + 8 + 1 = 13$
Difference = $22 - 13 = 9$
(4) sum of digits in odd places = $7 + 6 + 0 = 13$
sum of digits in even places = $8 + 1 + 4 = 13$
difference = $13 - 13 = 0$, it is divisible by 11
(5) sum of digits in odd places = $6 + 7 + 0 + 7 = 20$

sum of digits in even places = $9+0+0+9=9$
difference = $20 - 9 = 11$, it is divisible by 11

(6) sum of digits in odd places = $4+1+0+2=7$.

Sum of digits in even places = $6+4+1+9=20$
difference = $20-7=13$, it is not divisible by 11

12. (1) 0 (2) 0 (3) 5 (4) 0 (5) 9 (6) 0 (7) 0 (8) 0 (9) 6 (10) 4

13. (1) 9 (2) 9 (3) 9 (4) 2 (5) 9 (6) 9 (7) 9 (8) 6

14. (1) c (2) d (3) b (4) d

Exercise 4.5

1. (1) $2 \times 3 \times 3 \times 3 \times 7$ (2) $2 \times 2 \times 2 \times 2 \times 3$ (3) $2 \times 2 \times 7$ (4) $2 \times 2 \times 5 \times 7 \times 11$ (5) $2 \times 3 \times 5 \times 13$
(6) $2 \times 2 \times 11 \times 29$ (7) $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

2. 1 and the number itself

3. $10000 = 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5$

4. $9999 = 3 \times 3 \times 11 \times 101$

5. (1) $2 \times 3 \times 4 = 24$ is divisible by 6 (2) $5 \times 6 \times 7 = 210$ is divisible by 6

6. (1) 3, 2 (2) 3, 2, 5

7. 7, 13, 19 - Difference is 6.

8. (1) it is correct (2) it is not correct because according to prime factorization the result is 400.
(3) it is correct (4) it is correct.

Exercise 4.6

1. (1) factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36
factors of 75: 1, 3, 5, 15, 25, and 75
1, 3 are the common factors

(2) factors of 24: 1, 2, 3, 4, 6, 8, 12
factors of 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72
1, 2, 3, 4, 6, 8, 12, 24 are the common factors.

(3) factors of 60: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60
factors of 90: 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90
1, 2, 3, 4, 5, 6, 10, 15, 30 are the common factors

(4) factors of 44: 1, 2, 4, 11, 22, 44
factors of 88: 1, 2, 4, 8, 11, 22, 44, 88
1, 2, 4, 11, 22, 44 are the common factors

2. (1) factors of 10: 1, 2, 5, 10
factors of 30: 1, 2, 3, 5, 6, 10, 15, 30
factors of 40: 1, 2, 4, 5, 8, 10, 20, 40
1, 2, 5, 10 are the common factors

(2) factors of 25: 1, 5, 25
factors of 16: 1, 2, 4, 8, 16
factors of 45: 1, 3, 5, 9, 15, 45
1 is the common factor

(3) factors for 8: 1, 2, 4, 8
factors for 12: 1, 2, 3, 4, 6, 12

factors for 24: 1, 2, 3, 4, 6, 8, 12, 24
1,2,4 are the common factors

(4) factors for 6: 1, 2, 3, 6

factors for 16: 1, 2, 4, 8, 16

factors for 26: 1, 2, 13, 26

1,2 are the common factors

3. (1) $18 = 2 \times 3 \times 3$ $117 = 3 \times 3 \times 13$ $HCF = 3 \times 3 = 9$

(2) $27 = 3 \times 3 \times 3$ $81 = 3 \times 3 \times 3 \times 3$ $HCF = 3 \times 3 \times 3 = 27$

(3) $144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$ $180 = 2 \times 2 \times 3 \times 3 \times 5$ $HCF = 2 \times 2 \times 3 \times 3 = 36$

(4) $65 = 5 \times 13$ $105 = 3 \times 5 \times 7$ $HCF = 5$

(5) $180 = 2 \times 2 \times 3 \times 3 \times 5$ $270 = 2 \times 3 \times 3 \times 3 \times 5$ $630 = 2 \times 3 \times 3 \times 5 \times 7$ $HCF = 2 \times 3 \times 5 = 30$

(6) $80 = 2 \times 2 \times 2 \times 2 \times 5$ $100 = 2 \times 2 \times 5 \times 5 = 140$ $140 = 2 \times 2 \times 5 \times 7$ $HCF = 2 \times 2 \times 5 = 20$

(7) $219 = 1 \times 3 \times 73$ $2190 = 2 \times 3 \times 5 \times 73$ $2628 = 2 \times 2 \times 3 \times 3 \times 73$ $HCF = 3 \times 73 = 219$

(8) $185 = 1 \times 5 \times 37 \times 185$ $333 = 3 \times 3 \times 37$ $407 = 1 \times 11 \times 37 \times 407$ $HCF = 37$

4. Do yourself

5. (1) Factors of 61 = 61×1 Factors of 75 = $5 \times 3 \times 5$ They are co primes.

(2) Factors of 1859 = $13 \times 13 \times 11 \times 1$ Factors of 875 = $5 \times 5 \times 5 \times 7 \times 1$ They are co primes.

(3) Factors of 924 = $2 \times 2 \times 3 \times 7 \times 11$ Factors of 1093 = 1093×1 They are co primes.

Exercise 4.7

1. $2271 - 10 = 2261$

$3079 - 20 = 3059$ $3355 - 30 = 3325$

Now Factor of 2261 = $7 \times 17 \times 19$

Factors of 3059 = $7 \times 19 \times 23$

Factors of 3325 = $5 \times 5 \times 7 \times 19$

Therefore, As only 7×19 is common in all three factors so,

HCF Of 2261, 3059 and 3325 is $7 \times 19 = 133$

Hence, the required largest number is 133

Verification:

On dividing 2271 by 133 we get 10 as the remainder

On dividing 3079 by 133 we get 20 as the remainder

On dividing 3355 by 133 we get 30 as the remainder.

Hence Verified.

2. $33 - 6 = 27$

$60 - 6 = 54$

$84 - 3 = 81$

now the numbers are 27, 54 and 81

so let us find the hcf of 27, 54 and 81

$27 = 3 \times 3 \times 3$

$54 = 3 \times 3 \times 3 \times 2$

$81 = 3 \times 3 \times 3 \times 3$

so hcf = $3 \times 3 \times 3$.

hcf = 27.

hence 27 is the greatest number which divide 33, 60 and 84 leaving remainder of 6, 6 and 3 respectively.

3. $262 - 10 = 252$

$334 - 10 = 324$

so the numbers are 252 and 324

now let's find the hcf of 252 and 324

$252 = 2 \times 2 \times 3 \times 3 \times 7$

$324 = 2 \times 2 \times 3 \times 3 \times 3 \times 3$

$$\text{hcf} = 2 \times 2 \times 3 \times 3$$

$$\text{hcf} = 36$$

hence 36 is the greatest number that will divide 262 and 334 and leave a remainder 10 in each case

$$4. 660 = 2 \times 3 \times 2 \times 5 \times 11$$

$$1020 = 2 \times 3 \times 2 \times 5 \times 17$$

$$\text{HCF of } 660, 1020 = 2 \times 3 \times 2 \times 5 = 6 \times 10 = 60$$

5. A physical education teacher arranged three groups. 140, 91, and 63 students for the march past and He arranged the same number of students in each rows.

So, We find HCF of (140, 91 and 63)

$$140 = 2 \times 2 \times 5 \times 7$$

$$91 = 7 \times 13$$

$$63 = 3 \times 3 \times 7$$

So, HCF of (140, 91 and 63) = 7

Then we can say, the number of students he arranged in each row = 7

6. We have to find hcf because we have to find maximum capacity of a milk $40 = 2 \times 2 \times 2 \times 5$

$75 = 3 \times 5 \times 5$ common factor is 5 so answer is 5.

$$7. 1872 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 13$$

$$1320 = 2 \times 2 \times 2 \times 3 \times 5 \times 11$$

therefore, the HCF of 1872 and 1320 is:

$$\text{HCF} = 2 \times 2 \times 2 \times 3 = 24$$

Therefore, maximum side of the square is 24 cm and Since, area of rectangular courtyard is $1872 \times 1320 = 2471040$ and area of the square tile is $24 \times 24 = 576$.

Now, the number of tiles required is:

$$1872 \times 1320 / 24 \times 24 = 2471040 / 576 = 4290$$

Hence, the least possible number of such tiles is 4290.

$$8. \text{Length} = 7\text{m } 20\text{cm} = 720\text{cm}$$

$$\text{Breadth} = 5\text{m } 20\text{cm} = 520\text{cm}$$

$$\text{Thus, area} = (720 \times 520) \text{ cm}^2$$

$$= 374400 \text{ cm}^2$$

$$\text{Thus, no. of tiles} = 374400 / (720 \times 520) = 1872$$

$$9. 52710 + 21 = 52731 \quad 52710 - 21 = 52689$$

$$10. 60 = 2 \times 2 \times 3 \times 5 \quad 96 = 2 \times 2 \times 2 \times 2 \times 3 \quad 144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \quad = \text{HCF} = 2 \times 2 \times 3 = 12$$

Exercise 4.8

1. (1) 30, 60, 90 (2) 120, 240, 360 (3) 48, 96, 144 (4) 120, 240, 360 (5) 60, 120, 180 (6) 210, 420, 630

2. (1) Multiples of 2 = 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Multiples of 4 = 4, 8, 12, 16, 20, 24, 28, 32, 36, 40

Multiples of 5 = 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

Therefore, LCM = 20

(2) Multiples of 12 = 12, 24, 36, 48, 60, 72, 84

Multiples of 20 = 20, 40, 60, 80, 100, 120, 140

LCM = 60

(3) Multiples of 18 = 18, 36, 54, 72, 90

Multiples of 27 = 27, 54, 81, 108, 135

LCM = 54

(4) Multiples of 22 = 22, 44, 66, 88, 110, 132
Multiples of 55 = 55, 110, 165, 220, 275, 330
LCM = 110

(5) Multiples of 18 = 18, 36, 54, 72, 90, 108, 126, 144
Multiples of 42 = 42, 84, 126, 168, 210, 252, 294, 336
Multiples of 36 = 36, 72, 108, 144, 180, 216, 252, 288, 324, 360
LCM = 252

(6) Multiples of 12 = 12, 24, 36, 48, 60, 72, 84, 96
Multiples of 16 = 16, 32, 48, 64, 80, 96, 112, 128, 144, 160, 176
Multiples of 32 = 32, 64, 96, 128, 160, 192, 224, 256, 288, 320
LCM = 96

(7) Multiples of 4 = 4, 8, 12, 16, 20, 24, 28, 32, 36, 40
Multiples of 10 = 10, 20, 30, 40, 50, 60, 70, 80, 90, 100
Multiples of 14 = 14, 28, 42, 56, 70, 84, 98, 112, 126, 140
LCM = 140

(8) Multiples of 15 = 15, 30, 45, 60, 75, 90, 105, 120, 135, 150
Multiples of 30 = 30, 60, 90, 120, 150, 180, 210, 240, 270, 300
Multiples of 60 = 60, 120, 180, 240, 300, 360, 420, 480, 540, 600
LCM = 60.

3. (1) $66 = 2 \times 3 \times 11$
 $28 = 2 \times 2 \times 7$
LCM = $2 \times 11 \times 3 \times 2 \times 2 = 264$.

(2) $42 = 2 \times 3 \times 7$
 $56 = 2 \times 2 \times 2 \times 7$
LCM = $2 \times 7 \times 3 \times 2 \times 2 = 168$

(3) $20 = 2 \times 2 \times 5$
 $25 = 5 \times 5$
LCM = $5 \times 2 \times 2 \times 5 = 100$

(4) $104 = 2 \times 2 \times 2 \times 13$
 $312 = 2 \times 2 \times 2 \times 3 \times 13$
LCM = $2 \times 2 \times 2 \times 13 \times 3 = 312$

(5) $18 = 2 \times 3 \times 3$
 $48 = 2 \times 2 \times 2 \times 2 \times 3$
LCM = $2 \times 3 \times 3 \times 2 \times 2 = 144$

(6) $112 = 2 \times 2 \times 2 \times 2 \times 7$
 $140 = 2 \times 2 \times 5 \times 7$
 $168 = 2 \times 2 \times 2 \times 3 \times 7$
LCM = $2 \times 2 \times 2 \times 7 \times 2 \times 5 \times 3 = 1680$

(7) $15 = 3 \times 5$
 $45 = 3 \times 3 \times 5$
LCM = $3 \times 5 \times 3 = 45$

(8) $15 = 3 \times 5$
 $30 = 2 \times 3 \times 5$
 $90 = 2 \times 3 \times 3 \times 5$
LCM = $2 \times 3 \times 5 \times 3 = 90$

(9) $16 = 2 \times 2 \times 2 \times 2$
 $48 = 2 \times 2 \times 2 \times 2 \times 3$
LCM = $2 \times 2 \times 2 \times 2 \times 3 = 48$

(10) $16 = 2 \times 2 \times 2 \times 2$
 $28 = 2 \times 2 \times 7$
 $40 = 2 \times 2 \times 2 \times 5$
 $56 = 2 \times 2 \times 2 \times 7$
LCM = $2 \times 2 \times 2 \times 2 \times 5 \times 7 = 560$

- Que. 4(1) $\text{LCM}(25, 40) = 2 \times 2 \times 2 \times 5 \times 5 = 200$
 (2) $\text{LCM}(36, 72) = 2 \times 2 \times 2 \times 3 \times 3 = 72$
 (3) $\text{LCM}(15, 60) = 2 \times 2 \times 3 \times 5 = 60$
 (4) $\text{LCM}(48, 72) = 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 144$
 (5) $\text{LCM}(576, 720) = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 2880$
 (6) $\text{LCM}(60, 70, 108) = 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 7 = 3780$
 (7) $\text{LCM}(102, 170, 136) = 2 \times 2 \times 2 \times 3 \times 5 \times 17 = 2040$
 (8) $\text{LCM}(75, 90, 120) = 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5 = 1800$

5. To find the lowest number which is exactly divisible by 18 and 24, we need to find the LCM of 18 and 24.

Multiples of 18: 18, 36, 54, 72

Multiples of 24: 24, 48, 72

We can observe that the lowest number exactly divisible by 18 and 24 is 72.

Exercise 4.9

$$1. 24-3=21 \quad 48-3=45 \quad 96-3=93.$$

LCM of 21, 45, 93

$$21 = 3 \times 7$$

$$45 = 3 \times 3 \times 5.$$

$$93 = 3 \times 31.$$

LCM of 21, 45 and 93 is $3 \times 7 \times 3 \times 5 \times 31 = 9765$.

Hence the least number which when divided by 24, 48 and 96 is 9765.

$2. 25 = 5 \times 5 \quad 30 = 2 \times 3 \times 5 \quad 35 = 5 \times 7.$ So $\text{LCM} = 5 \times 5 \times 2 \times 3 \times 7 = 25 \times 42 = 1050$ so, the least number divisible by 25, 30 and 35 is 1050

3. Prime factorization of

$$20 = 2 \times 2 \times 5$$

$$24 = 2 \times 2 \times 2 \times 3$$

$$45 = 3 \times 3 \times 5$$

$$\text{LCM} = 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 360$$

largest 3 digit number = 999

largest 3 digit number which divisible by 20, 24 and 45 = 720

$$720 + 9 = 729$$

for remainder

$$4. \text{LCM} = X + 10$$

$$X = \text{LCM} - 10$$

LCM of 10, 15, 25, 30, 40 & 45

$$= 5 \times 2 \times 3 \times 3 \times 4 \times 5 = 1800$$

$$X = 1800 - 10 = 1790$$

$$5. 48 = 2 \times 2 \times 2 \times 2 \times 3$$

$$72 = 2 \times 2 \times 2 \times 3 \times 3$$

$$108 = 2 \times 2 \times 3 \times 3 \times 3$$

Therefore, $\text{LCM} = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 = 432$ seconds = 7 minutes 12 seconds

They change at 08:07:12

6. Convert m to cm so, 325 cm and 500 cm.

L.C.M. of 325 and 500 are $2 \times 2 \times 5 \times 5 \times 5 \times 13 = 6500$

In metres, $6500/100 = 65\text{m}$

$$7. 80 = 2 \times 2 \times 2 \times 2 \times 5$$

$$85 = 5 \times 17$$

$$90 = 2 \times 3 \times 3 \times 5$$

So, LCM of 80, 85 and 90 will be

$$=2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 17$$

$$=16 \times 9 \times 5 \times 17$$

$$=12,240$$

So, they all three will meet after 12,240 m

$$8. \text{LCM} = 2 \times 2 \times 2 \times 5 \times 5 \times 5$$

$$\text{LCM} = 1000$$

$$1 \text{ kg}$$

$$9. 8 = 2 \times 2 \times 2$$

$$12 = 2 \times 2 \times 3$$

$$18 = 2 \times 3 \times 3$$

$$20 = 2 \times 2 \times 5$$

$$\text{L.C.M} = 360.$$

$\text{LCM}(8, 12, 18, \text{ and } 20) = 360$. so, after 360 minutes bells will ring together. We know that, 60 minutes = 1 hour. Now, , 360 minutes = $360/60 = 6$ hours . After 6 hours means 10 am + 6hours = 4pm so, bells will ring together at 4 pm.

$$10. \text{LCM} = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5$$

$$\text{LCM}(9, 12, 16, 30) = 720.$$

720 is the least no. that can divide these no. leaving remainder 0.

We have to find out the number that divides leaving remainder 3 in each case.

So, we add 3 to 720.

$$- 720 + 3 = 723.$$

Required no is 723.

Let's check this number.

$$723 \div 9 \Rightarrow q=80 \text{ and } r=3$$

$$723 \div 12 \Rightarrow q=60 \text{ and } r = 3$$

$$723 \div 16 \Rightarrow q=45 \text{ and } r = 3$$

$$723 \div 30 \Rightarrow q = 24 \text{ and } r = 3$$

Exercise 4.10

1. $\text{HCF} \times \text{LCM} = \text{Product of two numbers}$

$$13 \times \text{LCM} = 20,280$$

$$\text{LCM} = 20,280/13$$

$$\text{LCM} = 1,560$$

2. We know, Product of two numbers = $\text{LCM} \times \text{HCF}$. Here,

$$12 \times \text{other number} = 141 \times 48$$

$$\text{other number} = (141 \times 48)/12$$

$$\text{other number} = 141 \times 4$$

$$\text{other number} = 564$$

3. Product of two numbers = $\text{HCF} \times \text{LCM}$

$$8192 = 128 \times \text{HCF}$$

$$\text{HCF} = 8192/128$$

$$\text{HCF} = 64.$$

4. 5 is greater than 2 & 4. $5 \times 1 = 5$. So, HCF cannot be greater. For LCM we have to take their multiples. $2 \times 1 =$

2. So, LCM should be atleast 2

5. Answer is No because 150 is not completely divisible by 20.

6. Product of numbers = $\text{LCM} \times \text{HCF}$

Here,

$$720 \times \text{other number} = 414720$$

other number = $414720 \div 720$
other number = 576

CHAPTER 5

Exercise 5.1

Question 1.

- (1) Loss of Rs. 400
- (2) Adding 36
- (3) Going 15 km to the South
- (4) Gaining a weight of 10 kg
- (5) A withdrawal of Rs. 1200
- (6) A decrease of 21
- (7) 100° C below the freezing point of water
- (8) 20 km below sea level
- (9) Dividing by 4

2.(1) -100°C (2) -4 m (3) + Rs 250 (4) +4 km

3. Do it yourself

4. Do it yourself

5. (1) 10 (2) -1 (3) -6 (4) -5. (Draw number line yourself)

6.(1) -12,-10,-9,0,4,5,17 (2) -48,-25,-5,0,30,48

7.(1) 18,5,4,0,-1,-5,-27 (2) 17,12,10,-3,-6,-6

8.(1) 7 (2) 25 (3) 30 (4) -8 (5) 0 (6) 6

9. (1) 8 (2) 0 (3) 3 (4) -25

10.(1) -7,-6,-5,-4,-3 (2) -11,-12,-13

11.(1) T (2) F (3) T (4) T (5) T (6) T (7) F (8) T (9) T

12.(1) 0,3,6 (2) -35,-40,-45 (3) -6,0,6 (4) -7,-17,-27 (5) -38,-32,-26 (6) -68,-66,-64

13.(1) 4°C (2) -7°C (3) 8°C (4) -1°C

14.(1) b (2) b (3) a (4) a (5) d

Exercise 5.2

1. Do it yourself

2.(1) -34 (2) +2 (3) -20 (4) -145 (5) -132 (6) -33

3.(1) yes (2) yes, no (3) The sum of zero and any number is the number itself (4) $(-4+4), (-3+3), (-2+2), (-1+1)$ and $(0,0)$

4.(1) -25 (2) -7469 (3) -397 (4) 755

5.(1) -7 (2) +40 (3) -207 (4) 318

6.(1) if he ans the next six ques. then the score will be $6 \times 2 = 12$ and he already has 2 marks then total score is $12+2=14$ (2) if he ans the next six ques. incorrectly then his score will be -12 but he already has 2 marks then the total score is $-12+2=-10$. (3) $12+2=14-8=6$ (4) 8

7. 10km to the west of delhi

8. -4,-3,-2,-1,0,1,2,3,4

9. (1) -17,-19 (2) 43,41 (3) -36,-38 (4) -107,-109 (5) -1063,-1065

10. 1) -3 (2) -12 (3) 6 (4) 8 (5) -10 (6) 0

11. (1) < (2) > (3) > (4) >

12. (1) -19 (2) 1 (3) 14 (4) -925

13. Lost Rs. 40, -Rs. 40

Exercise 5.3

1.

(1) $-20-35=-55$ (2) $5+20=25$. (3) $-80-28=-108$ (4) $96-420=-324$ (5) $0+47=47$ (6) $-227-15=-242$

(7) $-4000+3807=-193$ (8) $500+4329=4829$ (9) $-590+170=-420$

2.

(1) $70-85+95-12=68$ (2) $-24-9+29=-4$. (3) $-13+32-8-1=10$ (4) $-7-8+25=10$ (5) $675-202-67+7+43=456$

(6) $600-354+465-987=-276$

3. (1) 0 (2) 4

4.

(1) No (2) (1,1),(2,2),(3,3) (3) Yes

5. $-16+27=11$ $-40-11=-51$

6. $405-103=302$ $302+198=500$

7. (1)F (2)T (3)T (4)F (5)F (6)F

8. $-24 + X = -39$ $X = -39 + 24 = -15$

9. $-9 + 27 = -18$ $-18 - 30 = -48$

10. Total score = $85 + (-6) + (-70) + 50$
 $= 135 - 76 = 59$

11. $5^{\circ}\text{C} - 3^{\circ}\text{C} = 2^{\circ}\text{C}$

12. (1)6 (2)30 (3)8 (4)-12 (5)0 (6)118

13. (1) temperature is -6°C and drops by 3°C

(2) temperature is 6°C and drops by 4°C

(3) temperature is -2°C and increases by 7°C

(4) temperature is 4°C and increases by 3°C

(5) temperature is -1°C and drops by 8°C

CHAPTER 6

Exercise 6.1

Question 1

(1) $\frac{3}{9}$ (2) $\frac{1}{4}$ (3) $\frac{3}{7}$ (4) $\frac{4}{6}$

2. (1) $\frac{7}{10}$ (2) $\frac{3}{8}$ (4) $\frac{8}{15}$

3. Do it yourself

4. (1)No Error (2)No Error (3)incorrect,There is no equal parts.

5.(1) $\frac{3}{5}$ (2) $\frac{7}{12}$ (3) $\frac{9}{15}$ (4) $\frac{17}{12}$

6. $\frac{7}{12}$ 7. $\frac{40}{60}$ 8. $\frac{8}{24}$

7. (1) 4 (2) 24 10. $\frac{2}{3}$

8. (1) $\frac{6}{13}$ (2) $\frac{1}{50}$ (3) $\frac{8}{19}$ (4) $\frac{7}{27}$

9. Do it yourself

10. 12

Exercise 6.2

Question 1.

$\frac{4}{9}, \frac{11}{9}, \frac{15}{9}, \frac{4}{9}$ 2. $\frac{1}{2}, \frac{1}{13}, \frac{1}{14}$

3. $\frac{2}{1}, \frac{19}{12}, \frac{14}{3}, \frac{18}{13}, \frac{27}{19}$ 4. Do it yourself

5. (1) 25 (2) 16 (3) 8 (4) 39

6.(1) 4,6,8 (2) 10,33,40

7. (1) No (2) No (3) Yes (4) Yes

8. (1) $\frac{11}{4}$ (2) $\frac{8}{7}$ (3) $-\frac{19}{2}$ (4) $\frac{7}{3}$

9. (1) $2\frac{1}{5}$ (2) $4\frac{1}{6}$ (3) $2\frac{2}{7}$ (4) $5\frac{7}{12}$

Exercise 6.3

Question 1.

(1) $\frac{7}{15}$: There are no common factors between 7 and 15, so $\frac{7}{15}$ is already in its lowest terms.

(2) $\frac{6}{9}$: The greatest common factor of 6 and 9 is 3, so we can simplify the fraction by dividing both the numerator and denominator by 3:

$$\frac{6}{9} = \frac{(6 \div 3)}{(9 \div 3)} = \frac{2}{3}$$

Therefore, $\frac{6}{9}$ is not in its lowest terms, but $\frac{2}{3}$ is.

(3) $\frac{35}{49}$: The greatest common factor of 35 and 49 is 7, so we can simplify the fraction by dividing both the numerator and denominator by 7:

$$\frac{35}{49} = \frac{(35 \div 7)}{(49 \div 7)} = \frac{5}{7}$$

Therefore, $35/49$ is not in its lowest terms, but $5/7$ is.

(4) $21/48$: The greatest common factor of 21 and 48 is 3, so we can simplify the fraction by dividing both the numerator and denominator by 3:

$$21/48 = (21 \div 3)/(48 \div 3) = 7/16$$

Therefore, $21/48$ is not in its lowest terms, but $7/16$ is.

2. (1) $75/105$

HCF of 75 and 105 is 15.

$$75/15 = 5, 105/15 = 7$$

Therefore, $75/105 = 5/7$

(2) $8/20$

HCF of 8 and 20 is 4.

$$8/4 = 2, 20/4 = 5$$

Therefore, $8/20 = 2/5$

(3) $65/117$

HCF of 65 and 117 is 13.

$$65/13 = 5, 117/13 = 9$$

Therefore, $65/117 = 5/9$

(4) $16/28$

HCF of 16 and 28 is 4.

$$16/4 = 4, 28/4 = 7$$

Therefore, $16/28 = 4/7$

(5) $16/18$

HCF of 16 and 18 is 2.

$$16/2 = 8, 18/2 = 9$$

Therefore, $16/18 = 8/9$

(6) $84/98$

HCF of 84 and 98 is 14.

$$84/14 = 6, 98/14 = 7$$

Therefore, $84/98 = 6/7$

(7) $72/108$

HCF of 72 and 108 is 36.

$$72/36 = 2, 108/36 = 3$$

Therefore, $72/108 = 2/3$

(8) $124/256$

HCF of 124 and 256 is 4.

$$124/4 = 31, 256/4 = 64$$

Therefore, $124/256 = 31/64$

(9) $64/80$

HCF of 64 and 80 is 16.

$$64/16 = 4, 80/16 = 5$$

Therefore, $64/80 = 4/5$

(10) $140/252$

HCF of 140 and 252 is 28.

$$140/28 = 5, 252/28 = 9$$

Therefore, $140/252 = 5/9$

Exercise 6.4

Question 1.

(1) > (2) > (3) > (4) < (5) < (6) < (7) > (8) >

2. (1) $5/14, 5/8, 5/6, 5/12, 5/18$

To arrange in ascending order, we need to find the least common denominator (LCD) of these fractions which is 840.

$$5/14 = 300/840$$

$$5/8 = 525/840$$

$$5/6 = 700/840$$

$$5/12 = 350/840$$

$$5/18 = 280/840$$

So, the fractions in ascending order are:

280/840, 300/840, 350/840, 525/840, 700/840, which simplify to:

$$5/18, 5/14, 5/12, 5/8, 5/6$$

(2) All the given fractions have the same denominator. Therefore, we just need to compare the numerators to arrange them in ascending order.

$$3/19 < 7/19 < 10/19 < 14/19$$

So, the fractions in ascending order are:

$$3/19, 7/19, 10/19, 14/19$$

$$(3) 5/12, 7/8, 17/24, 15/16$$

To arrange in ascending order, we need to find the least common denominator (LCD) of these fractions which is 48.

$$5/12 = 4/48$$

$$7/8 = 42/48$$

$$17/24 = 17/24$$

$$15/16 = 45/48$$

So, the fractions in ascending order are:

4/48, 17/24, 42/48, 45/48, which simplify to:

$$1/12, 17/24, 7/8, 15/16$$

$$(4) 7/10, 3/5, 5/6, 1/2$$

To arrange in ascending order, we need to find the least common denominator (LCD) of these fractions which is 30.

$$7/10 = 21/30$$

$$3/5 = 18/30$$

$$5/6 = 25/30$$

$$1/2 = 15/30$$

So, the fractions in ascending order are:

15/30, 18/30, 21/30, 25/30, which simplify to:

$$1/2, 3/5, 7/10, 5/6$$

$$(5) 3/17, 3/29, 3/14, 3/16$$

To arrange in ascending order, we need to find the least common denominator (LCD) of these fractions which is 14296.

$$3/17 = 2528/14296$$

$$3/29 = 1244/14296$$

$$3/14 = 3064/14296$$

$$3/16 = 2673/14296$$

So, the fractions in ascending order are:

1244/14296, 2528/14296, 2673/14296, 3064/14296, which simplify to:

$$1/11, 3/17, 3/16, 3/14$$

$$(6) 4/5, 3/10, 17/20, 8/15$$

To arrange in ascending order, we need to find the least common denominator (LCD) of these fractions which is 60.

$$4/5 = 48/60$$

$$3/10 = 18/60$$

$$17/20 = 51/60$$

$$8/15 = 32/60$$

So, the fractions in ascending order are:

$$3/10, 8/15, 4/5, 17/20.$$

3. (1) Fractions in descending order:

$$27/43, 27/48, 27/50, 27/67, 27/80$$

(2) Fractions in descending order:

$$7/8, 5/6, 2/3, 1/4$$

(3) Fractions in descending order:

$$15/28, 3/7, 11/42, 5/21$$

(4) Fractions in descending order:

7/8, 7/10, 7/12, 7/15

(5) Fractions in descending order:

3/4, 2/3, 5/8, 7/12

(6) Fractions in descending order:

3/4, 13/24, 1/9, 5/100

Exercise 6.5

Question 1.

(1) $5/16 + 6/16 = 11/16$

(2) $2/7 + 5/7 = 7/7 = 1$

(3) $14/25 + 5/25 = 19/25$

(4) $8/13 + 3/13 = 11/13$

(5) $2/17 + 4/17 + 5/17 = 11/17$

(6) $2/9 + 4/9 = 6/9 = 2/3$

Question 2

(i) 8/15 and 101/15:

The LCM of 15 is 15.

$8/15 + 101/15 = (8+101)/15 = 109/15 = 7 \frac{4}{15}$

(2) 5/6 and 4/17:

The LCM of 6 and 17 is 102.

$5/6 = 85/102$ (by multiplying both the numerator and denominator by 17)

$4/17 = 24/102$ (by multiplying both the numerator and denominator by 6)

$5/6 + 4/17 = 85/102 + 24/102 = 109/102 = 1 \frac{7}{102}$

(3) 4/21 and 3/14:

The LCM of 21 and 14 is 42.

$4/21 = 8/42$ (by multiplying both the numerator and denominator by 2)

$3/14 = 9/42$ (by multiplying both the numerator and denominator by 3)

$4/21 + 3/14 = 8/42 + 9/42 = 17/42$

(4) 5/8 and 7/12:

The LCM of 8 and 12 is 24.

$5/8 = 15/24$ (by multiplying both the numerator and denominator by 3)

$7/12 = 14/24$ (by multiplying both the numerator and denominator by 2)

$5/8 + 7/12 = 15/24 + 14/24 = 29/24 = 1 \frac{5}{24}$

(5) 3/4 and 2/3:

The LCM of 4 and 3 is 12.

$3/4 = 9/12$ (by multiplying both the numerator and denominator by 3)

$2/3 = 8/12$ (by multiplying both the numerator and denominator by 4)

$3/4 + 2/3 = 9/12 + 8/12 = 17/12 = 1 \frac{5}{12}$

(6) 73/101, 27/101 and 1/101:

The LCM of 101 is 101.

$73/101 + 27/101 + 1/101 = (73+27+1)/101 = 101/101 = 1$

(7) 2/5, 1/2 and 3/9:

The LCM of 5, 2 and 9 is 90.

$2/5 = 36/90$ (by multiplying both the numerator and denominator by 18)

$1/2 = 45/90$ (by multiplying both the numerator and denominator by 45)

$3/9 = 30/90$ (by multiplying both the numerator and denominator by 10)

$2/5 + 1/2 + 3/9 = 36/90 + 45/90 + 30/90 = 111/90 = 37/30 = 1 \frac{7}{30}$

(8) 1/6, 3/8, and 6:

The LCM of 6, 8, and 1 is 24.

$1/6 = 4/24$ (by multiplying both the numerator and denominator by 4)

$3/8 = 9/24$ (by multiplying both the numerator and denominator by 3)

$1/6 + 3/8 + 6 = 4/24 + 9/24 + 6 = 6 \frac{13}{24}$

(9) 3 1/2 and 4/9:

$3 \frac{1}{2} = 7/2$

The LCM of 2 and 9 is 18

$7/2 = 63/18$ (by multiplying both the numerator and denominator by 9)

$$4/9 = 8/18 \text{ (by multiplying both the numerator and denominator by 2)}$$

$$7/2 + 8/18 = 63/18 + 8/18 = 71/18 = 3 \frac{17}{18}$$

3. (1) $2 \frac{4}{5} + 3 \frac{1}{2} + \frac{3}{4}$

We need to convert all the mixed numbers to improper fractions and then add them up.

$$2 \frac{4}{5} = (25+4)/5 = 14/5 \quad 1/2 = (32+1)/2 = 7/2$$

$$3/4 = 3/4$$

Now we can add them up:

$$14/5 + 7/2 + 3/4 = 56/20 + 70/20 + 15/20 = 141/20 = 7 \frac{1}{20}$$

(2) $3 \frac{2}{5} + 4 \frac{1}{10}$

Again, we convert the mixed numbers to improper fractions and add them up.

$$3 \frac{2}{5} = (35+2)/5 = 17/5$$

$$4 \frac{1}{10} = (410+1)/10 = 41/10$$

Now we add them up:

$$17/5 + 41/10 = 34/10 + 41/10 = 75/10 = 7 \frac{5}{10} = 7 \frac{1}{2}$$

(3) $9 \frac{3}{8} + 6$

We can directly add the two mixed numbers as they have the same unit (i.e. they are both in terms of "whole numbers" and "eighths").

$$9 \frac{3}{8} + 6 = 9 + 6 + 3/8 = 15 \frac{3}{8}$$

(4) $2/5 + 4 \frac{3}{5}$

Here, we need to find a common denominator to add these two numbers.

$$4 \frac{3}{5} = 4 + 3/5 = 20/5 + 3/5 = 23/5$$

Now we can add them up:

$$2/5 + 23/5 = 25/5 = 5$$

(5) $3/5 + 7 + 5 \frac{1}{4}$

First, we convert the mixed numbers to improper fractions.

$$5 \frac{1}{4} = (5 \cdot 4 + 1)/4 = 21/4$$

Now we can add them up:

$$3/5 + 7 + 21/4 = 12/20 + 140/20 + 105/20 = 257/20 = 12 \frac{17}{20}$$

(6) $2 \frac{3}{7} + 3 \frac{2}{7}$

We can add these two mixed numbers directly as they have the same unit (i.e. they are both in terms of "whole numbers" and "sevenths").

$$2 \frac{3}{7} + 3 \frac{2}{7} = 2 + 3 + 3/7 + 2/7 = 5 \frac{5}{7}$$

4. Raman walked $2 \frac{1}{3}$ km on Sunday. We can write this as a mixed number:

$$2 \frac{1}{3} = (2 \cdot 3 + 1) / 3 = 7/3 \text{ km}$$

On Monday, Raman walked $1 \frac{1}{4}$ km more than Sunday. Again, we can write this as a mixed number:

$$1 \frac{1}{4} = (1 \cdot 4 + 1) / 4 = 5/4 \text{ km}$$

To find out how much distance Raman walked on Monday, we can add the distance he walked on Sunday to the additional distance he walked on Monday:

$$7/3 + 5/4 = (28/12) + (15/12) = 43/12 \text{ km} = 3 \frac{7}{12}$$

Therefore, Raman walked $3 \frac{7}{12}$ km on Monday.

5. To find out how much mixture Neha gets when she mixes $\frac{1}{2}$ L of water with $\frac{1}{6}$ L of orange squash, we need to add these two quantities:

$$\frac{1}{2} \text{ L} + \frac{1}{6} \text{ L}$$

To add these two quantities, we need to find a common denominator. The smallest number that both 2 and 6 divide into is 6. So, we can rewrite the above expression as:

$$\frac{3}{6} \text{ L} + \frac{1}{6} \text{ L}$$

Now we can add the two quantities:

$$\frac{3}{6} \text{ L} + \frac{1}{6} \text{ L} = \frac{4}{6} \text{ L}$$

Simplifying the fraction by dividing both numerator and denominator by 2, we get:

$$\frac{4}{6} \text{ L} = \frac{2}{3} \text{ L}$$

Therefore, Neha gets $\frac{2}{3}$ L of mixture when she mixes $\frac{1}{2}$ L of water with $\frac{1}{6}$ L of orange squash.

6. To find the fraction of the book that Rohit read in three days, we need to add the fractions of the book that he read on each day:

$$\frac{1}{3} + \frac{1}{4} + \frac{1}{12}$$

To add these fractions, we need to find a common denominator. The smallest number that both 3, 4, and 12 divide into is 12. So, we can rewrite the above expression as:

$$\frac{4}{12} + \frac{3}{12} + \frac{1}{12}$$

Now we can add the three fractions:

$$\frac{4}{12} + \frac{3}{12} + \frac{1}{12} = \frac{8}{12}$$

Simplifying the fraction by dividing both numerator and denominator by 4, we get:

$$\frac{8}{12} = \frac{2}{3}$$

Therefore, Rohit read $\frac{2}{3}$ of the book in three days.

7. To find the total weight of the fruits Raman bought, we need to add the weight of guavas, apples, and oranges:

$$5 \frac{1}{2} \text{ kg} + 3 \frac{3}{4} \text{ kg} + 4 \frac{1}{4} \text{ kg}$$

We can convert the mixed numbers to improper fractions:

$$5 \frac{1}{2} = \frac{(25+1)}{2} = \frac{11}{2}$$

$$3 \frac{3}{4} = \frac{(43+3)}{4} = \frac{15}{4}$$

$$4 \frac{1}{4} = \frac{(4*4+1)}{4} = \frac{17}{4}$$

Now we can add the fractions:

$$\frac{11}{2} \text{ kg} + \frac{15}{4} \text{ kg} + \frac{17}{4} \text{ kg}$$

To add these fractions, we need to find a common denominator. The smallest number that both 2, 4, and 4 divide into is 4. So, we can rewrite the above expression as:

$$\left(\frac{11}{2}\right) * \left(\frac{2}{2}\right) \text{ kg} + \left(\frac{15}{4}\right) * \left(\frac{1}{1}\right) \text{ kg} + \left(\frac{17}{4}\right) * \left(\frac{1}{1}\right) \text{ kg}$$

Now we can add the fractions:

$$\left(\frac{11}{2}\right) * \left(\frac{2}{2}\right) \text{ kg} + \left(\frac{15}{4}\right) * \left(\frac{1}{1}\right) \text{ kg} + \left(\frac{17}{4}\right) * \left(\frac{1}{1}\right) \text{ kg} = \frac{22}{4} \text{ kg} + \frac{15}{4} \text{ kg} + \frac{17}{4} \text{ kg}$$

Adding these fractions, we get:

$$\frac{22}{4} \text{ kg} + \frac{15}{4} \text{ kg} + \frac{17}{4} \text{ kg} = \frac{54}{4} \text{ kg}$$

Simplifying the fraction by dividing both numerator and denominator by 2, we get:

$$\frac{54}{4} \text{ kg} = \frac{27}{2} \text{ kg}$$

Therefore, Raman bought a total of $\frac{27}{2}$ kg or $13 \frac{1}{2}$ kg of fruits.

Exercise 6.6

Question 1.

$$(1) \frac{11}{30} - \frac{8}{30} = \frac{3}{30} = \frac{1}{10}$$

$$(2) \frac{8}{25} - \frac{2}{25} = \frac{6}{25}$$

$$(3) \frac{9}{14} - \frac{13}{14} = \frac{-4}{14} = \frac{-2}{7}$$

$$(4) \frac{4}{9} - \frac{8}{18} = \frac{4}{9} - \frac{4}{9} = 0$$

$$(5) \frac{13}{20} - \frac{19}{30} = \frac{39}{60} - \frac{38}{60} = \frac{1}{60}$$

$$(6) \frac{5}{6} - \frac{4}{5} = \frac{25}{30} - \frac{24}{30} = \frac{1}{30}$$

$$(7) \frac{2}{7} - \frac{11}{14} = \frac{4}{14} - \frac{11}{14} = \frac{-7}{14} = \frac{-1}{2}$$

$$(8) \frac{11}{15} - \frac{17}{25} = \frac{55}{75} - \frac{51}{75} = \frac{4}{75}$$

$$2. (1) \frac{1}{10} - \frac{1}{18} = \frac{9}{90} - \frac{5}{90} = \frac{4}{90} = \frac{2}{45}$$

$$(2) \frac{2}{3} - \frac{7}{18} = \frac{12}{18} - \frac{7}{18} = \frac{5}{18}$$

$$(3) \frac{7}{12} - \frac{1}{4} = \frac{7}{12} - \frac{3}{12} = \frac{4}{12} = \frac{1}{3}$$

$$(4) \frac{3}{14} - \frac{4}{21} = \frac{9}{42} - \frac{8}{42} = \frac{1}{42}$$

$$(5) \frac{5}{8} - \frac{3}{7} = \frac{35}{56} - \frac{24}{56} = \frac{11}{56}$$

$$(6) \frac{17}{24} - \frac{19}{36} = \frac{51}{72} - \frac{38}{72} = \frac{13}{72}$$

$$3. (1) \frac{17}{24} - \frac{5}{12} = \frac{34}{48} - \frac{20}{48} = \frac{14}{48} = \frac{7}{24}$$

$$(2) 7 \frac{5}{8} - 4 \frac{3}{8} = 7 - 4 + \frac{5}{8} - \frac{3}{8} = 3 + \frac{2}{8} = 3 \frac{1}{4}$$

$$(3) 7 \frac{2}{3} - 5 \frac{5}{6} = 6 + \frac{2}{3} - 5 \frac{5}{6} = \frac{20}{3} - 5 \frac{5}{6} = \frac{35}{6} - \frac{5}{6} = \frac{30}{6} = 5$$

$$(4) 9 - 3 \frac{5}{5} = 8 \frac{2}{5}$$

$$(5) 12 - 8 \frac{4}{9} = 3 \frac{5}{9}$$

$$(6) 8 \frac{1}{4} - 7 \frac{7}{8} = \frac{33}{4} - \frac{7}{8} = \frac{66}{8} - \frac{7}{8} = \frac{59}{8} = 7 \frac{3}{8}$$

$$(7) 7 \frac{2}{3} - 3 \frac{5}{12} = 7 - 3 + \frac{2}{3} - \frac{5}{12} = 4 + \frac{8}{12} - \frac{5}{12} = 4 \frac{1}{4}$$

$$(8) 23 \frac{5}{18} - 3 \frac{1}{4} = 23 - 3 + \frac{5}{18} - \frac{1}{4} = 20 + \frac{20}{36} - \frac{9}{36} = 20 \frac{11}{36}$$

$$(9) 5 \frac{7}{10} - 2 \frac{1}{20} = 5 - 2 + \frac{7}{10} - \frac{1}{20} = 3 + \frac{14}{20} - \frac{1}{20} = 3 \frac{13}{20}$$

4. To make $\frac{4}{15}$ equal to $\frac{3}{5}$, we need to add a certain amount. Let's call this amount x .

So, we can set up the equation:

$$\frac{4}{15} + x = \frac{3}{5}$$

To solve for x , we can simplify both sides of the equation:

$$\frac{4}{15} + x = \frac{3}{5}$$

$$\frac{20}{75} + x = \frac{45}{75}$$

Now, we can solve for x by subtracting $\frac{20}{75}$ from both sides of the equation:

$$x = \frac{45}{75} - \frac{20}{75}$$

Simplifying the right-hand side gives:

$$x = \frac{25}{75}$$

And simplifying this further, we get:

$$x = \frac{1}{3}$$

So, to make $\frac{4}{15}$ equal to $\frac{3}{5}$, we need to add $\frac{1}{3}$.

5. (1) To find out what must be added to $5\frac{1}{4}$ to get $8\frac{1}{6}$, We need to find the difference between $8\frac{1}{6}$ and $5\frac{1}{4}$:

$$8\frac{1}{6} - 5\frac{1}{4} = \frac{49}{6} - \frac{21}{4}$$

To add or subtract fractions, we need a common denominator, which in this case is 12:

$$\frac{49}{6} - \frac{21}{4} = (\frac{49}{6}) * (\frac{2}{2}) - (\frac{21}{4}) * (\frac{3}{3})$$

$$= \frac{98}{12} - \frac{63}{12}$$

$$= \frac{35}{12} = 2\frac{11}{12}$$

So, we need to add $2\frac{11}{12}$ to $5\frac{1}{4}$ to get $8\frac{1}{6}$.

(2) Let the other number be x . Then we have:

$$\frac{11}{15} + x = 1\frac{7}{10}$$

To solve for x , we can first convert $1\frac{7}{10}$ to an improper fraction:

$$1\frac{7}{10} = \frac{17}{10}$$

Now we can simplify the equation:

$$\frac{11}{15} + x = \frac{17}{10}$$

Multiplying both sides by 30 (the lowest common multiple of 15 and 10) gives:

$$22 + 30x = 51$$

Subtracting 22 from both sides gives:

$$30x = 29$$

Dividing both sides by 30 gives:

$$x = \frac{29}{30}$$

So the other number is $\frac{29}{30}$.

(3) Let the other number be x . Then we have:

$$\frac{2}{3} + x = \frac{6}{7}$$

To solve for x , we can first convert $\frac{6}{7}$ to an equivalent fraction with a denominator of 3:

$$\frac{6}{7} = \frac{18}{21}$$

Now we can simplify the equation:

$$\frac{2}{3} + x = \frac{18}{21}$$

Multiplying both sides by 21 (the lowest common multiple of 3 and 21) gives:

$$14 + 21x = 18$$

Subtracting 14 from both sides gives:

$$21x = 4$$

Dividing both sides by 21 gives:

$$x = \frac{4}{21} = \frac{1}{3}$$

So the other number is $\frac{1}{3}$.

(4) To find out how long Rohit's jump was, we need to subtract $1\frac{5}{8}$ from 6:

$$6 - 1\frac{5}{8} = 4\frac{3}{8}$$

So Rohit's jump was $4\frac{3}{8}$ meters long.

(5) To compare $\frac{5}{8}$ and $\frac{9}{17}$, we can convert them to equivalent fractions with a common denominator:

$$\frac{5}{8} = \frac{85}{136}$$

$$\frac{9}{17} = \frac{72}{136}$$

Now we can see that $\frac{5}{8}$ is greater than $\frac{9}{17}$ by:

$$\frac{85}{136} - \frac{72}{136} = \frac{13}{136}$$

So $\frac{5}{8}$ is greater than $\frac{9}{17}$ by $\frac{13}{136}$.

(6) To compare the distances Nitin and Vivek live from school, we can simply compare $1\frac{3}{10}$ and $1\frac{1}{5}$. We can convert both to improper fractions with a common denominator:

$$1\frac{3}{10} = \frac{13}{10}$$

$$1\frac{1}{5} = \frac{6}{5}$$

Now we can see that Nitin lives farther from school than Vivek, because:

$$\frac{13}{10} > \frac{6}{5}$$

(7) To find out how many more pages Vasu wrote on Monday than on Sunday, we can subtract $15\frac{1}{3}$ from $18\frac{7}{12}$:

$$18\frac{7}{12} - 15\frac{1}{3} = 3\frac{1}{4}$$

So Vasu wrote $3\frac{1}{4}$ more pages on Monday than on Sunday.

CHAPTER 7

Exercise 7.1

1. (1)0.6 (2)0.9 (3)0.52 (4)0.073 (5)0.245

2. (1) $\frac{1}{2}$ (2) $\frac{7}{100}$ (3) $\frac{39}{100}$ (4) $\frac{1}{125}$ (5) $\frac{7053}{1000}$ (6) $\frac{777}{250}$ (7) $\frac{38}{125}$ (8) $\frac{719}{1000}$

3. (1) 5 tenths (2) 7 hundredths

(3) Three point zero one eight (4) Eleven point six zero two

(5) Three hundred four point five six (6) Eighteen point nine two

(7) Five hundred three point nine

(8) Eight hundred seventeen point five zero three

4. (1)0.05 (2)0.421 (3)50.8 (4)43.247 (5)300.234 (6)730.008 (7)71.241

5. H T O . T h th

(1) 0 . 5 8

(2) 6 . 1 4

(3) 3 6 0 . 4 8

(4) 2 2 1 . 5 0 4

6. (1) $0 + \frac{8}{10} + 0 + \frac{3}{1000}$

(2) $700 + 50 + 7 + \frac{2}{100} + \frac{1}{1000}$

(3) $10 + 6 + \frac{4}{10} + 0 + \frac{1}{1000}$

(4) $40 + 8 + \frac{3}{10} + \frac{6}{100} + \frac{7}{1000}$

(5) $800 + 60 + 4 + \frac{1}{10} + \frac{4}{100} + \frac{8}{1000}$

7. (1) 87.257 (2) 225.803 (3) 13.507 (4) 908.035 (5) 9.003 (6) 90.303

Exercise 7.2

1. (1) 9.30, 103.57 (2) 8.90, 5.05 (3) 0.600, 1.674 (4) 53.001, 4.170, 4.900 (5) 205.020, 99.674, 28.600 (6) 0.500, 6.300, 10.814

2. (1) < (2) > (3) < (4) > (5) > (6) < (7) > (8) >

3. (1) $6.05 < 6.4 < 6.45 < 6.5 < 6.54$ (2) 3.39, 8.36, 9.08, 15.2 (3) 0.92, 2.6, 3.35, 11.2

(4) $5.06 < 5.8 < 5.89 < 7.14 < 7.2$

4. (1) 114.53, 70.439, 43.543, 8.9

(2) 4.047, 4.04, 0.4, 0.24

(3) $73.03 > 8.73 > 8.073 > 7.33 > 7.3$

(4) 13.5, 12.008, 10.77, 8.84

Exercise 7.3

1. (1) $1/2 = 0.5$

(2) $1/5 = 0.2$

(3) $3/5 = 0.6$

(4) To convert a mixed number like $5\frac{3}{16}$ into a decimal using division, we first convert it to an improper fraction:

$$5\frac{3}{16} = (5 \times 16 + 3) / 16 = 83/16$$

Then, we divide the numerator (83) by the denominator (16):

$$83 \div 16 = 5.1875$$

So, $5\frac{3}{16} = 5.1875$ (rounded to four decimal places).

(5) To convert $2\frac{1}{2}$ into a decimal using division, we first convert it to an improper fraction:

$$2\frac{1}{2} = (2 \times 2 + 1) / 2 = 5/2$$

Then, we divide the numerator (5) by the denominator (2):

$$5 \div 2 = 2.5$$

So, $2\frac{1}{2} = 2.5$.

(6) $6/25 = 0.24$ (rounded to two decimal places).

(7) $15/4 = 3.75$

(8) To convert a mixed number like $6\frac{3}{8}$ into a decimal using division, we first convert it to an improper fraction:

$$6\frac{3}{8} = (6 \times 8 + 3) / 8 = 51/8$$

Then, we divide the numerator (51) by the denominator (8):

$$51 \div 8 = 6.375$$

So, $6\frac{3}{8} = 6.375$.

2. (1) $17/4 = 42.5/10 = 425/100$

So, $17/4 = 4.25$ (when rounded to two decimal places).

(2) $5/8 = 62.5/100$

So, $5/8 = 0.625$

(3) $12\frac{1}{20} = 240/20 + 1/20 = 241/20 = 1205/100$

So, $12\frac{1}{20} = 12.05$

(4) $9/4 = 225/100$

So, $9/4 = 2.25$

(5) $7/2 = 350/100$

So, $7/2 = 3.5$

(6) $3\frac{8}{25} = 75/25 + 8/25 = 83/25 = 332/100$

So, $3\frac{8}{25} = 3.32$ (when rounded to two decimal places).

(7) $2\frac{11}{200} = 400/200 + 11/200 = 411/200$

So, $2\frac{11}{200} = 2.055$ (when rounded to three decimal places).

(8) $1\frac{19}{40} = 40/40 + 19/40 = 59/40 = 1475/1000$

So, $1\frac{19}{40} = 1.475$ (when rounded to three decimal places).

Exercise 7.4

1. (1) 85 paise = $85/100 = 0.85$ rupees

(2) 8 paise = $8/100 = 0.08$ rupees

(3) 1125 paise = $1125/100 = 11.25$ rupees

(4) 52 rupees 75 paise = $52 + 75/100 = 52.75$ rupees

(5) 616 rupees 9 paise = $616 + 9/100 = 616.09$ rupees

2. (1) 9mm = 0.9 cm (since $9 \div 10 = 0.9$)

(2) 54mm = 5.4 cm (since $54 \div 10 = 5.4$)

(3) 24cm 6mm = 24.6 cm (since $24 \text{ cm} + 6 \text{ mm} = 24 + 0.6 = 24.6 \text{ cm}$)

3. (1) 145 cm = 1.45 m (since $145 \div 100 = 1.45$)

(2) 12 m 15 cm = 12.15 m (since $12 \text{ m} + 15 \text{ cm} = 12 + 0.15 = 12.15 \text{ m}$)

(3) 610 cm = 6.10 m (since $610 \div 100 = 6.10$)

- (4) $243\text{ m } 85\text{ cm} = 243.85\text{ m}$ (since $243\text{ m} + 85\text{ cm} = 243 + 0.85 = 243.85\text{ m}$)
(5) $40\text{ m } 9\text{ cm} = 40.09\text{ m}$ (since $40\text{ m} + 9\text{ cm} = 40 + 0.09 = 40.09\text{ m}$)

4. (1) $415\text{ m} = 0.415\text{ km}$ (since $415 \div 1000 = 0.415$)
(2) $56\text{ m} = 0.056\text{ km}$ (since $56 \div 1000 = 0.056$)
(3) $1005\text{ m} = 1.005\text{ km}$ (since $1005 \div 1000 = 1.005$)
(4) $2\text{ km } 9\text{ m} = 2.009\text{ km}$ (since $2\text{ km} + 9\text{ m} = 2 + 0.009 = 2.009\text{ km}$)
(5) $50\text{ km } 70\text{ m} = 50.07\text{ km}$ (since $50\text{ km} + 70\text{ m} = 50 + 0.07 = 50.07\text{ km}$)
(6) $28\text{ km } 8\text{ m} = 28.008\text{ km}$ (since $28\text{ km} + 8\text{ m} = 28 + 0.008 = 28.008\text{ km}$)

5. (1) $49\text{ g} = 0.049\text{ kg}$ (since $49 \div 1000 = 0.049$)
(2) $6\text{ g} = 0.006\text{ kg}$ (since $6 \div 1000 = 0.006$)
(3) $433\text{ g} = 0.433\text{ kg}$ (since $433 \div 1000 = 0.433$)
(4) $53\text{ kg } 49\text{ g} = 53.049\text{ kg}$ (since $53\text{ kg} + 49\text{ g} \div 1000 = 53.049\text{ kg}$)
(5) $10\text{ kg } 256\text{ g} = 10.256\text{ kg}$ (since $10\text{ kg} + 256\text{ g} \div 1000 = 10.256\text{ kg}$)
(6) $607\text{ kg } 5\text{ g} = 607.005\text{ kg}$ (since $607\text{ kg} + 5\text{ g} \div 1000 = 607.005\text{ kg}$)

6. (1) $80\text{ ml} = 0.08\text{ L}$ (since $80 \div 1000 = 0.08$)
(2) $925\text{ ml} = 0.925\text{ L}$ (since $925 \div 1000 = 0.925$)
(3) $37\text{ ml} = 0.037\text{ L}$ (since $37 \div 1000 = 0.037$)
(4) $6\text{ L } 750\text{ ml} = 6.75\text{ L}$ (since $6\text{ L} + 750\text{ ml} \div 1000 = 6.75\text{ L}$)
(5) $16\text{ L } 6\text{ ml} = 16.006\text{ L}$ (since $16\text{ L} + 6\text{ ml} \div 1000 = 16.006\text{ L}$)
(6) $336\text{ L } 98\text{ ml} = 336.098\text{ L}$ (since $336\text{ L} + 98\text{ ml} \div 1000 = 336.098\text{ L}$)

7. (1) $\text{₹}35.25 = 3525\text{ P}$
(2) $\text{₹}0.85 = 85\text{ P}$
(3) $0.62\text{ m} = 62\text{ cm}$
(4) $12.3\text{ cm} = 123\text{ mm}$
(5) $73.040\text{ km} = 73,040\text{ m}$
(6) $0.075\text{ kg} = 75\text{ g}$
(7) $0.007\text{ litres} = 7\text{ ml}$
(8) $36.800\text{ kg} = 36,800\text{ g}$

Exercise 7.5

1. (1) 0.73 (2) 1.3 (3) 2.765 (4) 31.271
(5) 174.3558 (6) 34.79 (7) 8.16 (8) 973.761

2. (1) $8.98 + 97.8 = 106.78$
(2) $5.03 + 2.35 = 7.38$
(3) $0.282 + 639 = 639.282$
(4) $6.728 + 3.238 = 9.966$
(5) $25.338 + 5.73 = 31.068$
(6) $58.82 + 0.187 = 59.007$
(7) $25.037 + 8.9 + 108.68 = 142.617$
(8) $7.980 + 0.952 + 205.6 = 214.532$
(9) $39.72 + 208.7 + 9.726 = 258.146$

3. Total weight of fruits = $8\text{ kg } 250\text{ g} + 2\text{ kg } 150\text{ g} + 500\text{ g} + 1\text{ kg } 250\text{ g}$

We need to convert all the weights to the same unit, either kg or g. Let's convert everything to grams.

$$8\text{ kg } 250\text{ g} = (8 \times 1000)\text{ g} + 250\text{ g} = 8250\text{ g}$$

$$2\text{ kg } 150\text{ g} = (2 \times 1000)\text{ g} + 150\text{ g} = 2150\text{ g}$$

$$500\text{ g} = 500\text{ g}$$

$$1\text{ kg } 250\text{ g} = (1 \times 1000)\text{ g} + 250\text{ g} = 1250\text{ g}$$

Now we can add the weights:

$$\text{Total weight of fruits} = 8250\text{ g} + 2150\text{ g} + 500\text{ g} + 1250\text{ g} = 12150\text{ g}$$

Therefore, Roni's father bought 12150 g or 12.15 kg of fruits in total.

4. Total amount of sugar sold = $135.400 \text{ kg} + 190.500 \text{ kg} + 156.325 \text{ kg}$
= 482.225 kg

Therefore, the shopkeeper sold 482.225 kg of sugar in total.

5. To find the total amount of money Sunita spent, we need to add the cost of the books, pen, and pencils.

Cost of books = ₹ 96.75

Cost of pen = ₹ 9.50

Cost of pencils = ₹ 10.75

Total cost = Cost of books + Cost of pen + Cost of pencils

Total cost = ₹ 96.75 + ₹ 9.50 + ₹ 10.75

Total cost = ₹ 117

Therefore, Sunita spent ₹ 117 in all.

6. To find out how much money Sheela, Raman, and Mohan have altogether, we need to add the balances in their bank accounts.

Total money = Sheela's balance + Raman's balance + Mohan's balance

Total money = ₹ 24,000.75 + ₹ 19,000.00 + ₹ 9,000.45

Total money = ₹ 52,001.20

Therefore, Sheela, Raman, and Mohan have a total of ₹ 52,001.20 in their bank accounts altogether.

Exercise 7.6

1. (1)0.73 (2)1.3 (3)2.765 (4)31.271 (5)174.3558 (6)34.79 (7)8.16 (8)973.761

2. (1)106.78 (2)3.324 (3)56.82 (4)25.974 (5)401.254 (6)13.044

3. To find out how much Neha spent on household needs, we need to subtract the amount she saved from her salary.

Amount spent on household needs = Neha's salary - Amount saved

Amount spent on household needs = ₹ 15,000.00 - ₹ 1,936.87

Amount spent on household needs = ₹ 13,063.13

Therefore, Neha spent ₹ 13,063.13 on household needs.

4. To find out how much petrol is left in the pump at the end of the day, we need to subtract the amount of petrol sold from the total amount of petrol that was initially filled up.

Total amount of petrol filled up = $465 \text{ l} + 309.86 \text{ l}$

Total amount of petrol filled up = 774.86 l

Amount of petrol left in the pump = Total amount of petrol filled up - Amount of petrol sold

Amount of petrol left in the pump = $774.86 \text{ l} - 524.68 \text{ l}$

Amount of petrol left in the pump = 250.18 l

Therefore, there is 250.18 liters of petrol left in the pump at the end of the day.

5. To find out how much the sum of 14.28 and 11.56 is greater than their difference, we first need to calculate the sum and difference of the two numbers.

Sum of 14.28 and 11.56 = $14.28 + 11.56 = 25.84$

Difference of 14.28 and 11.56 = $14.28 - 11.56 = 2.72$

Now, we can calculate how much the sum is greater than the difference by subtracting the difference from the sum.

$25.84 - 2.72 = 23.12$

Therefore, the sum of 14.28 and 11.56 is 23.12 greater than their difference.

6. To find out how much the temperature fell on Tuesday, we need to subtract the temperature on Tuesday from the temperature on Monday.

Fall in temperature = Temperature on Monday - Temperature on Tuesday

Fall in temperature = $33.4^\circ\text{C} - 31.8^\circ\text{C}$

Fall in temperature = 1.6°C

Therefore, the temperature fell by 1.6°C on Tuesday.

CHAPTER 8

Exercise 8.1

1. (1) $x + 2/3y - a$ (2) $2a + 1/4 3b$ (3) $4a - 1/4b$ (4) $x + 3$ (5) $x/y + 2$
(6) $z - (x + y)$ (7) $(x + 8) + y$ (8) $ab + a/b$

2. (1) $S.P = C.P. + P$ (2) $A = P + I$ (3) $P = 2(I + b)$ (4) $A = I * b$

3. The cost of x pens will be ₹15 multiplied by x , which can be expressed as $15x$.
Similarly, the cost of y rulers will be ₹10 multiplied by y , which can be expressed as $10y$.
Therefore, the total cost of x pens and y rulers will be the sum of the cost of x pens and the cost of y rulers, which can be expressed as:

$$15x + 10y$$

So, the final answer is $15x + 10y$.

4. If Rohan spends ₹ x per month and saves ₹ y per month, then his total monthly income can be expressed as the sum of what he spends and what he saves, which is:

$$\text{Total monthly income} = ₹ x + ₹ y = ₹ (x+y)$$

To find his income in 1 year, we need to multiply his monthly income by the number of months in a year, which is 12. Therefore, Rohan's income in 1 year will be:

$$\text{Income in 1 year} = 12 \times \text{Total monthly income}$$

$$= 12 \times (₹ x + ₹ y)$$

$$= ₹ (12x + 12y)$$

So, Rohan's income in 1 year will be ₹ $(12x + 12y)$.

5. If one apple weighs 90 g, then y apples will weigh $90y$ g.

Similarly, if one mango weighs 80 g, then x mangoes will weigh $80x$ g.

Therefore, the total weight of x mangoes and y apples will be the sum of the weight of x mangoes and the weight of y apples, which can be expressed as:

$$80x + 90y$$

So, the final answer is $80x + 90y$.

6. Let's assume Ritu scored x marks in Maths.

According to the given condition, her score in Science is 15 more than three-fourths of her score in Maths.

This can be expressed as:

$$\text{Score in Science} = (3/4) * x + 15$$

Therefore, if Ritu scored x marks in Maths, then her score in Science would be $(3/4) * x + 15$.

7. Let's assume the number that was initially thought of is represented by the variable " n ".

According to the given condition, we need to perform the following operations on this number:

Multiply it by 2: $2n$

Add 4 to the result: $2n + 4$

Subtract y from this result: $2n + 4 - y$

Therefore, the final result after all the operations will be $(2n + 4 - y)$.

8. Let's assume the number x as " x " and the number b as " b ".

According to the given condition, Som first added 4 to the number x , then multiplied the sum by 2. This can be expressed as:

$$2(x + 4)$$

The result of this operation is then subtracted by three-fourths of the number b .

Three-fourths of the number b is $(3/4) * b$, so the final result can be expressed as:

$$2(x + 4) - (3/4) * b$$

Therefore, the final result obtained by Som is $2(x + 4) - (3/4) * b$.

9. According to the given condition, when " a " is added to 196, the sum becomes " b ".

So we can write this as:

$$b = 196 + a$$

Therefore, "b" can be expressed in terms of "a" as $196 + a$.

10. If a sum of ₹ x is divided equally among 4 children, then each child will receive:

$$y = x/4$$

Therefore, the amount that each child receives (y) can be expressed in terms of x as $y = x/4$.

11. Naman started driving from Karnal at 7:00 a.m. and drove for 6 hours until 1:00 p.m.

Since he was driving at a uniform speed of x km/hr, the distance he covered in these 6 hours can be expressed as:

$$\text{Distance covered} = \text{Speed} \times \text{Time}$$

$$= x \text{ km/hr} \times 6 \text{ hr}$$

$$= 6x \text{ km}$$

Now, at 1:00 p.m., Naman finds that he is still 50 km away from Haridwar. This means that he still needs to cover this distance.

Therefore, the total distance between Karnal and Haridwar can be expressed as:

$$\text{Total distance} = \text{Distance covered} + \text{Remaining distance}$$

$$= 6x \text{ km} + 50 \text{ km}$$

$$= (6x + 50) \text{ km}$$

So, the distance between Karnal and Haridwar is $(6x + 50)$ km.

12. According to the given condition, the number of rooms on the ground floor is 12 less than twice the number of rooms on the first floor.

If the number of rooms on the first floor is x, then twice the number of rooms on the first floor will be 2x.

So, the number of rooms on the ground floor can be expressed as:

$$\text{Number of rooms on the ground floor} = 2x - 12$$

Therefore, the ground floor has $2x - 12$ rooms.

Exercise 8.2

1.(1) The terms of $3x+4y-2z+xyz$ are:

- $3x$

- $4y$

- $(-2z)$ which simplifies to $-2z$

- xyz

(2) The terms of $2a+5b-ab+7$ are:

- $2a$

- $5b$

- $(-ab)$ which simplifies to $-ab$

- 7

(3) The terms of $x+2y-4/7$ are:

- x

- $2y$

- $-4/7$ which simplifies to $-4/7$

(4) The terms of $1/2b+3y$ are:

- $1/2b$ which can also be written as $0.5b$

- $3y$

(5) The terms of $a+3$ are:

- a

- 3

2. (1) The expression combining $2x$ and y is: $2x + y$

(2) The expression combining $4x$, $9y$, and -3 is: $4x + 9y - 3$

(3) The expression combining 8 , $-ab$, and $2b$ is: $8 - ab + 2b$

(4) The expression combining $2p$, $3q$, $-8r$, and $2/9$ is: $2p + 3q - 8r + 2/9$

(5) The expression combining $3m$, $-4/3n$, and $-1/2$ is: $3m - 4/3n - 1/2$

(6) The expression combining $4x$, $-1/3y$, $5/7z$, and $-3/8$ is: $4x - 1/3y + 5/7z - 3/8$

3. (1) The constant term in $2x - 5y + 1$ is 1.

(2) The constant term in $m + 3/5$ is $3/5$.

(3) The constant term in $4xy - 3$ is -3 .

(4) The constant term in $1/2x - 3y + 1/8$ is $1/8$.

4. If $x = 2$, then:

(1) $x + 1 = 2 + 1 = 3$

(2) $6x - 3 = 6(2) - 3 = 9$

(3) $2x/3 = 2(2)/3 = 4/3$

(4) $5x - 4 = 5(2) - 4 = 6$

5. If $a = 5$, $b = 7$, and $c = 9$:

(1) $a + b + c = 5 + 7 + 9 = 21$

(2) $m^2 - n^2 = 5^2 - 4^2 = 25 - 16 = 9$

(3) $4a^2 - 12ab + 9b^2 = 4(1)^2 - 12(1)(2) + 9(2)^2 = 4 - 24 + 36 = 16$

6. Do it yourself

7. In a cube, there are 12 edges.

So, the total length of the edges is $12l$.

8. (1) Isha's age 10 years from now will be $x + 10$ years.

(2) Isha's age 5 years ago was $x - 5$ years.

(3) Let Isha's father's age be f . From the given information, we can write the equation:

$$f = 2x + 5$$

9. (1) A book costs x rupees and a mobile costs 10 times the price of the book.

(2) In class 6, the number of boys is y and the number of girls is 10 times the number of boys.

(3) Sulu is t years old, his sister is 3 years younger than him ($t - 3$), and his father is 3 times his age ($3t$).

10. (1) $7y$

(2) $x + y = 2$

(3) $x^2 + 2x - 6$

(4) $a - 10$

(5) $(1/4)x - 8$

CHAPTER 9

1.(1) 3:4 (2) 3:11 (3) 2:9 (4) 20 : 11 (5) 1: 500 (6) 1:4

2. (1) 3:7,6:14,12:28 (2) 4:5,8:10,12:15 (3) 2:7,28:98,42:147

3.(1) 3:5

To simplify, divide both the numbers by the highest common factor, which is 8.

(2) 4:9

To simplify, divide both the numbers by the highest common factor, which is 3.

(3) 1:10

To simplify, divide both the numbers by the highest common factor, which is 300 g.

(4) 12 paise to 1 rupee

To simplify, convert both the quantities to the same unit, i.e., paise.

(5) 1:4

To simplify, divide both the numbers by the highest common factor, which is ₹ 3.50.

(6) 1:3

To simplify, divide both the numbers by the highest common factor, which is 8.

4. Ratio of number of teachers to number of students can be found by dividing the number of teachers by the number of students.

Number of teachers = 102

Number of students = 3300

Ratio of teachers to students = Number of teachers / Number of students

$$= 102 / 3300$$

$$= 17 / 550$$

Therefore, the ratio of the number of teachers to the number of students is 17:550.

5. (1) Ratio of boys to girls can be found by dividing the number of boys by the number of girls.

Number of boys = 24

Number of girls = 16

Ratio of boys to girls = Number of boys / Number of girls

$$= 24 / 16$$

$$= 3 / 2$$

Therefore, the ratio of boys to girls is 3:2.

(2) Ratio of girls to boys can be found by dividing the number of girls by the number of boys.

Ratio of girls to boys = Number of girls / Number of boys

$$= 16 / 24$$

$$= 2 / 3$$

Therefore, the ratio of girls to boys is 2:3.

(3) Ratio of boys to the total number of students in the class can be found by dividing the number of boys by the total number of students in the class.

Total number of students = Number of boys + Number of girls

$$= 24 + 16$$

$$= 40$$

Ratio of boys to total students = Number of boys / Total number of students

$$= 24 / 40$$

$$= 3 / 5$$

Therefore, the ratio of boys to the total students in the class is 3:5.

6. (1) Let the number of pencils Neha gets be $3x$ and the number of pencils Amit gets be $2x$. Then the total number of pencils is $3x + 2x = 5x$. We know that $5x = 35$, so $x = 7$. Therefore, Neha gets $3 \times 7 = 21$ pencils and Amit gets $2 \times 7 = 14$ pencils.

(2) Let the quantity of 2 parts be $2x$. Then the quantity of 7 parts will be $7x$. The total quantity is $2x + 7x = 9x$, which is equal to 5 kg 400 g. 1 kg is equal to 1000 g. Therefore, 5 kg 400 g is equal to $5 \times 1000 + 400 = 5400$ g. So, $9x = 5400$, which implies that $x = 600$. Hence, the quantity of 2 parts is $2x = 2 \times 600 = 1200$ g, and the quantity of 7 parts is $7x = 7 \times 600 = 4200$ g.

(3) Let the amount of money that the first person gets be $4x$, and the amount of money that the second person gets be $5x$. We know that the total amount of money is 180. Therefore, $4x + 5x = 180$, which implies that $9x = 180$. Hence, $x = 20$. Therefore, the first person gets $4 \times 20 = ₹80$, and the second person gets $5 \times 20 = ₹100$.

7. The ratio of the number of toys that Sohan has to the number of toys that Mohan has can be found by dividing the number of toys of Sohan by the number of toys of Mohan.

Ratio of Sohan's toys to Mohan's toys = Sohan's toys / Mohan's toys

$$\text{Ratio of Sohan's toys to Mohan's toys} = 32 / 24$$

$$\text{Ratio of Sohan's toys to Mohan's toys} = 4 / 3$$

Therefore, the ratio of the number of toys that Sohan has to the number of toys that Mohan has is 4:3.

8. Total money Sunil had = ₹ 500

Expenditure on a shirt and a cap = ₹ 360

(1) Ratio of his expenditure to the total money he had

$$= \text{Expenditure} / \text{Total money he had}$$

$$= 360 / 500$$

$$= 18/25$$

Therefore, the ratio of his expenditure to the total money he had is 18:25.

(2) Ratio of money left with him to the total money he had

= Money left with him / Total money he had

$$= (500 - 360) / 500$$

$$= 140 / 500$$

$$= 14 / 50$$

Therefore, the ratio of money left with him to the total money he had is 14:50, which can be simplified to 7:25.

(3) Ratio of money left with him to the expenditure

= Money left with him / Expenditure

$$= (500 - 360) / 360$$

$$= 140 / 360$$

$$= 7 / 18$$

Therefore, the ratio of money left with him to the expenditure is 7:18.

9. To compare the deals made by Vinod and Pradeep, we need to calculate the price per shirt for each of them.

Price per shirt for Vinod = Total price paid / Number of shirts bought

$$= 800 / 5$$

$$= ₹ 160$$

Price per shirt for Pradeep = Total price paid / Number of shirts bought

$$= 720 / 4$$

$$= ₹ 180$$

Therefore, Vinod bought each shirt for ₹ 160 while Pradeep bought each shirt for ₹ 180.

Hence, Vinod made a better buy as he paid less per shirt compared to Pradeep.

10. (i) To compare 12:36 and 30:40, we can simplify them to their simplest form as follows:

$$12:36 = 1:3$$

$$30:40 = 3:4$$

Since 3:4 is larger than 1:3, the larger ratio is 30:40.

(ii) To compare 7:35 and 15:35, we can simplify them to their simplest form as follows:

$$7:35 = 1:5$$

$$15:35 = 3:7$$

Since 3:7 is larger than 1:5, the larger ratio is 15:35.

(iii) To compare 64:56 and 18:12, we can simplify them to their simplest form as follows:

$$64:56 = 8:7$$

$$18:12 = 3:2$$

Since 8:7 is larger than 3:2, the larger ratio is 64:56.

11. Let the two numbers be $4x$ and $5x$, where x is a common factor.

According to the problem, their sum is 378. So, we can write:

$$4x + 5x = 378$$

Combining like terms, we get:

$$9x = 378$$

Dividing both sides by 9, we get:

$$x = 42$$

So, one number is $4x = 4 \times 42 = 168$ and the other number is $5x = 5 \times 42 = 210$.

Therefore, the two numbers are 168 and 210.

12. To compare the ratios of girls in the two schools, we need to convert them to a common denominator.

The common denominator of 5:8 and 7:10 is 40.

So, in the first school, the ratio of girls to boys is:

$$5:8 = 5/13:8/13 \text{ (multiplying numerator and denominator by 5)}$$

In the second school, the ratio of girls to boys is:

$$7:10 = 14/20:10/20 \text{ (multiplying numerator and denominator by 2)}$$

Now we can see that the first school has a higher ratio of girls, since $5/13 > 14/20$.

Therefore, the first school has a higher ratio of girls.

Exercise 9.2

1.(1) 1:2 and 5:12

Cross-multiplying:

$$1 \times 12 = 2 \times 5$$

$$12 = 10$$

Since the cross-products are not equal, the given ratios are not in proportion.

(2) 3:6 and 4:8

Cross-multiplying:

$$3 \times 8 = 6 \times 4$$

$$24 = 24$$

Since the cross-products are equal, the given ratios are in proportion.

(3) 30:4 and 125:40

Cross-multiplying:

$$30 \times 40 = 4 \times 125$$

$$1200 = 500$$

Since the cross-products are not equal, the given ratios are not in proportion.

(4) 39:156 and 21:84

Cross-multiplying:

$$39 \times 84 = 156 \times 21$$

$$3276 = 3276$$

Since the cross-products are equal, the given ratios are in proportion.

(5) 75:150 and 33:44

Cross-multiplying:

$$75 \times 44 = 150 \times 33$$

$$3300 = 4950$$

Since the cross-products are not equal, the given ratios are not in proportion.

(6) 12:15 and 18:24

Cross-multiplying:

$$12 \times 24 = 15 \times 18$$

$$288 = 270$$

Since the cross-products are not equal, the given ratios are not in proportion.

2. (1) F (2) T (3) F (4) T (5) F (6) T

3. $9:5 :: x:20$ implies $9/5 = x/20$

Multiplying both sides by 20, we get:

$$x = 20 \times 9/5$$

$$x = 36$$

Therefore, $x = 36$.

4. Let the first term be x . Then we have the proportion $x:84 = 186:217$.

Cross-multiplying, we get $x \times 217 = 84 \times 186$. Solving for x , we get $x = 72$.

5. Let the weight of zinc be $9x$.

Then we have $9x : 7(9.8) = 9 : 7$ (by using the given ratio).

Cross-multiplying, we get $63.6 = 63x$. Solving for x , we get $x = 1.01$ kg.

Therefore, the weight of zinc in the alloy is $9x = 9.09$ kg.

6. If 27, x , x , and 3 are in proportion, then we have $x/27 = 3/x$.

Cross-multiplying, we get $x^2 = 81$.

Solving for x , we get $x = \pm 9$

But we cannot have negative values in proportion. Therefore, $x = 9$.

7. Let the fourth term be x . Then we have $51:85 = 57:x$.

Cross-multiplying, we get $51x = 85 \times 57$. Solving for x , we get $x = 3235/51 = 63.43$ (approx).

8. Since $x, 15, 25$ are in continued proportion, we have $15^2 = x \times 25$. Solving for x , we get $x = 9$.

9. We have $36 : 90 = 90 : x$. Cross-multiplying, we get $36x = 90 \times 90$. Solving for x , we get $x = 225$.

10. Let the mean proportional be x . Then we have $2 : x = x : 50$. Cross-multiplying, we get $x^2 = 100$. Solving for x , we get $x = 10$.

11. Let the income be $6x$ and expenditure be $5x$.

Then, $6x = ₹ 18,000$

$\Rightarrow x = ₹ 3,000$

So, the income is $6x = 6 \times 3,000 = ₹ 18,000$

And, the expenditure is $5x = 5 \times 3,000 = ₹ 15,000$

Therefore, the savings = Income - Expenditure = $₹ 18,000 - ₹ 15,000 = ₹ 3,000$

12. Let the first term be x .

Then, $x : 5 = 5 : 36 : 4$

$\Rightarrow x : 5 = 5 \times 9 : 36 \times 9 : 4 \times 9$ (Multiplying all terms by 9 to simplify)

$\Rightarrow x : 5 = 45 : 324 : 36$

$\Rightarrow x : 5 = 5 \times 9 : 36 \times 9 : 4 \times 9$ (Taking common factor of 9 in each term)

$\Rightarrow x : 5 = 5 : 36 : 4$

Therefore, the first term is $5 \times 5 = 25$.

Exercise 9.3

1. One dozen of bananas cost ₹18, which means one banana costs ₹1.50. Therefore, 60 bananas will cost $₹1.50 \times 60 = ₹90$

2. There are different ways to approach this problem, but one method is to divide the monthly income by the number of days in a month:

Daily income = $₹7200 \div 30 = ₹240$

Therefore, Sunil's daily income is ₹240.

3. If one school bus can carry 42 students, then the number of buses needed to carry 252 students is:

Number of buses = $252 \div 42 = 6$

Therefore, 6 school buses would be needed to carry 252 students.

4. (1) The cost of 1 kg of wheat flour is $₹80.50 \div 5 = ₹16.10$. Therefore, the cost of 8 kg of wheat flour is $₹16.10 \times 8 = ₹128.80$.

(2) The amount of wheat flour that can be purchased for ₹144.90 is $₹144.90 \div ₹16.10 \text{ per kg} = 9 \text{ kg}$

5. If a cow eats 35 kg of grass in a week, then it eats 5 kg of grass in a day ($35 \div 7 = 5$). Therefore, for 10 days, the cow would need $5 \text{ kg/day} \times 10 \text{ days} = 50 \text{ kg}$ of grass.

6. The cost of 1 dozen pens is ₹153.60, which means the cost of 1 pen is $₹153.60 \div 12 = ₹12.80$. Therefore, the cost of 10 such pens is $₹12.80 \times 10 = ₹128$.

7. To compare the prices of 8 kg of apples and 5 kg of apples, we need to calculate the price per kg for each:

Price per kg of 8 kg of apples = $₹192 \div 8 = ₹24$

Price per kg of 5 kg of apples = $₹125 \div 5 = ₹25$

Since the price per kg of 8 kg of apples is lower than that of 5 kg of apples, buying 8 kg of apples is a better deal.

8. The weight of 1 book is $54 \text{ kg} \div 90 = 0.6 \text{ kg}$. Therefore, the weight of 105 such books is $0.6 \text{ kg/book} \times 105 \text{ books} = 63 \text{ kg}$.

9. The amount of cooking oil in 6 packets is $455 \text{ ml/packet} \times 6 \text{ packets} = 2730 \text{ ml}$.

10. Suman can walk 500 metres in 10 minutes, which means she can walk 50 metres in 1 minute. Therefore, in 25 minutes, she can walk $50 \text{ metres/minute} \times 25 \text{ minutes} = 1250 \text{ metres}$.

11. 20 inland postcards cost ₹25, which means one inland postcard costs $\text{₹}25 \div 20 = \text{₹}1.25$. Therefore, ₹75 can buy $\text{₹}75 \div \text{₹}1.25 \text{ per postcard} = 60 \text{ postcards}$.

12. If 5 persons can complete a certain job in 2 days, then the total work done is equivalent to $5 \times 2 = 10$ person-days. Therefore, 10 persons can complete the same job in $10 \text{ person-days} \div 10 \text{ persons} = 1 \text{ day}$

13. The cost of 1 T-shirt is $\text{₹}861 \div 7 = \text{₹}123$. Therefore, the cost of 12 such T-shirts is $\text{₹}123 \times 12 = \text{₹}1476$.

14. We can set up a proportion to solve for the amount of petrol needed:
petrol (in litres) / distance (in km) = petrol consumption rate (in litres/km)

Let x be the amount of petrol needed to cover a distance of 3,600 km.

$$x/3600 = 28/1260$$

Multiplying both sides by 3600, we get:

$$x = 3600 * (28/1260)$$

$$x = 80 \text{ litres}$$

Therefore, 80 litres of petrol will be needed to cover a distance of 3,600 km.

CHAPTER 10

Exercise 10.1

1. (1) point (2) line (3) line segment (4) ray (5) plane (6) intersecting (7) parallel

2. (1) AY (2) A, O, X, Y, Z (3) OX, OY, OZ, OA (4) AO, OX, OY, OZ, AY

3. AB. 4. (1) No (2) Yes (3) Crossing roads etc.

5. Infinite 6. None 7. One 8. Do it yourself

9. (1) (PQ, MN), (MN, XY), (PQ, XY) (2) (PQ, AC), (MN, AC) (XY, AC)

10. Railway track, racing track and queue of the students assembly

11. (1) a (2) a (3) d (4) c

Exercise 10.2

1.(1) open (2) closed (3) closed (4) open (5) open (6) open (7) open (8) closed

2.(2), (5), (7) are polygons

3. (1) Plan surface: The top surface of a table or a book is a plan surface as it is flat and two-dimensional.

(2) Curved surface: A ball or a football has a curved surface as it is three-dimensional and not flat.

(3) Curved boundary: A circular swimming pool has a curved boundary as its outer edge is round and not straight.

(4) Linear boundary: A rectangular room or a square garden has a linear boundary as all its sides are straight and meet at right angles.

(5) Partly linear and partly curved boundary: An oval-shaped plate or a curved rectangular fish tank has a partly linear and partly curved boundary as its corners are straight, but the edges are curved.

4. (1) X,Y,Z (2) P,Q,T,M (3) A,B,C,D,E,F,K

5. (1) Sides : AB,BC,CD,DA

Vertices : A,B,C,D

Diagonals : No

- (2) Sides : AS,SP,PQ,QA
 Vertices : A,S,P,Q
 Diagonals : AP,SQ
- (3) Sides : AB,BC,CD,DE,EF,FG,GH,HA
 Vertices : A,B,C,D,E,F,G,H
 Diagonals : No
- (4) Sides : MN,NP,PM
 Vertices : M,N,P
 Diagonals : No

6. (1) c. (2) b. (3) b

Exercise 10.3

- (1) $\angle AOB, \angle BOA, \angle 1, \angle O$
 (2) $\angle LMN, \angle NML, \angle x, \angle M$
 (3) $\angle DEF, \angle FED, \angle 4, \angle E$
- (1) None (2) OM,ON (3) None (4) ON,OM (5) $\angle MON, \angle NOM$
- (1) $\angle KLM, \angle MLK$; vertex L; sides KL and LM
 (2) $\angle PQR, \angle RQP$; vertex Q; sides PQ and QR
 (3) $\angle DOB, \angle BOD$; vertex O; sides DP and BO
 (4) $\angle DAE, \angle EAD$; vertex A; sides DA and EA
- No, they will form an angle only on intersecting.
- (1) S,K (2) X,Y (3) A,B,C,O,R
- True
- (1) D,E,P,G (2) M,L,G,I,Z,K (3) X,J,Y,IZ (4) Z,I,D,E,P
- Do it yourself

CHAPTER 11

Exercise 11.1

- Do it yourself
- (1)= (2)< (3)< (4)< (5)>
- (1) 6 cm (2) 7 cm (3) 8 cm
- Since P, Q, and R are collinear points, one of them will lie between the other two.
 Let's look at the given lengths: PQ = 7 cm, QR = 3 cm, and RP = 10 cm.
 We can see that RP is the longest length, so it is not possible for R to lie between P and Q.
 Next, let's compare the lengths PQ and QR. We can see that PQ is longer than QR, so it is not possible for Q to lie between P and R.
 Therefore, the only possibility left is that P lies between Q and R.
 Hence, P is the point that lies between the other two.
- Yes
- Do it yourself

7. Do it yourself

8. Do it yourself

9. The main disadvantage in comparing line segments by mere observation is that it can be imprecise and inaccurate. The human eye may not be able to detect small differences in length, and even minor errors in observation can result in significant differences in measurement. This is particularly true when comparing line segments that are very close in length.

10. Yes, $XA + AB + BY = XY$ for any line segment XY.

To see why this is true, let's consider the line segment XY as shown below:

X ----- A ----- B ----- Y
O XA AB BY d

Here, XA represents the length of the line segment from X to A, AB represents the length of the line segment from A to B, BY represents the length of the line segment from B to Y, and d represents the length of the line segment XY.

Now, we know that XA + AB is the length of the line segment from X to B, and BY is the length of the line segment from B to Y. Therefore:

$$\begin{aligned} XA + AB + BY &= (XA + AB) + BY \\ &= XB + BY \\ &= XY \end{aligned}$$

So, we can see that XA + AB + BY is equal to the length of the entire line segment XY..

11. Given that Q is the midpoint of PR and R is the midpoint of OS. Let's denote the length of line segment PQ as x.

Then, we can write the following equations:

$$PR = 2x \text{ (Q is the midpoint of PR)}$$

$$OS = 2y \text{ (R is the midpoint of OS)}$$

Also, since P, Q, and R are collinear, we know that $PO + OR = PR$, and since R, S, and O are collinear, we know that $OR + RS = OS$.

Substituting the values of PR and OS from the above equations, we get:

$$PO + OR = 2x \text{ (1)}$$

$$OR + RS = 2y \text{ (2)}$$

Adding equations (1) and (2), we get:

$$PO + 2OR + RS = 2x + 2y$$

Since $RS = PR = 2x$, we can substitute the value of RS in the above equation:

$$PO + 2OR + 2x = 2x + 2y$$

Simplifying, we get:

$$PO + 2OR = 2y$$

Also, since $PO + OR = PR/2 = x$, we can substitute the value of PO + OR in the above equation:

$$x + OR = 2y/3$$

Multiplying both sides by 3, we get:

$$3x + 3OR = 2y$$

Since $RS = OS - OR = 2y - OR$, we can substitute the value of 2y in the above equation:

$$3x + 3OR = 2(RS + OR)$$

Simplifying, we get:

$$3x + OR = RS$$

Therefore, we have shown that $PO = OR = RS = 1/3$ of PS, where $PS = PR + RS = 2x + 2y$.

12. Do it yourself

Exercise 11.2

1.(1) Right angle (2) Right angle (3) Right angle (4) Obtuse angle

2.East 3. East

4.(1) 1/3 (2) 5/12 (3) 7/12 (4) 7/12

5.180 Degree. 6. (1) One (2) One

7.(1) at 9 (2) at 4 (3) at 9

8.South - West 9. 10 right angles

10.(1) right angle (2) acute angle (3) obtuse angle (4) acute angle

11.Acute angles - 60 degrees, 45 degrees, 80 degrees, 78 degrees
Obtuse angles - 135 degrees, 170 degrees, 105 degrees, 125 degrees
Right angles 90 degrees
Straight angle - 180 degrees
Reflex angles - 230 degrees, 290 degrees

12.(1) True (2) False (3) True (4) False

13.(1)Straight angle (2)Right angle (3)Obtuse angle (4)Reflex angle (5)Acute angle (6)Complete angle (7)Reflex angle (8)Right angle

14.(1)1 (2)1 (3)2 (4)2 (5)2 (6)1

15.(1) $\angle ROS$ (2) $\angle LOM$ (3) $\angle LMN$

16.(1)West (2)North (3)North (4)North (5)West (6)South

17. (1) 3/4th of a revolution
(2) 3/4th of a revolution
(3) half a revolution
(4) 1/4th of a revolution

18. (1) b (2) d (3) c (4) b (5) b

Exercise 11.3

1.Do it yourself

2.Do it yourself

3.Do it yourself

4.Do it yourself

5.Do it yourself

6.(1) a. No b. Yes c. No (2) DE,CF and BG (3) Yes

7.90 degrees

8.(1) 360 degrees (2) 90 degrees (3) 270 degrees (4) 360 degrees (5) 360 degrees (6) 90 degrees

9.90 degrees

10.Do it yourself

11.Do it yourself

Exercise 11.4

- 1.(1) Equilateral (2) Scalene (3) Scalene (4) Isosceles (5) Equilateral (6) Isosceles
2. (1) Right-angled (2) Acute-angled (3) Acute-angled (4) Obtuse-angled
(5) Obtuse-angled (6) Acute-angled
3. (1) No (2) Yes (3) Yes (4) No
4. (1) False (2) False (3) True (4) True (5) False
- 5.(1) right angled (2) obtuse angled (3) acute angled (4) acute angled (5) acute angled (6)
obtuse angled
- 6.Equilateral Triangle
- 7.(1) No (2) 3 (3) 2
- 8.30 degrees, 60 degrees, 90 degrees
- 9.35 degrees each
- 10.(1) a (2) d (3) b (4) a (5) c

Exercise 11.5

- 1.(1) parallel (2) rhombus (3) four (4) two (5) right
- 2.(1)Rectangle (2)rhombus (3)kite (4)isosceles trapezium
- 3.(1) false (2) false (3) true (4) false (5) true
4. (1)Trapezium (2) Squares, Rectangle, Rhombus (3) Square, Rhombus (4) Trapezium (5)
Parallelogram, Rhombus, Square, Rectangle (6) Rectangle, Square (7) Rhombus, Square,
Rectangle (8) Square, Rectangle, Rhombus (9) Rhombus, Square, Rectangle
5. (1) Square (2) Rectangle

Exercise 11.6

1. (1) not a polygon (2) it is a polygon (3) it is a polygon (4) it is a polygon
(5) not a polygon (6) it is a polygon

2. The sum of the interior angles of a hexagon is given by the formula $(n-2) \times 180^\circ$, where n is the number of sides. So for a hexagon, the sum of the interior angles is $(6-2) \times 180^\circ = 720^\circ$.

Let x be the measure of one of the equal angles. Then, the total measure of the five equal angles is $5x$. Adding the given angle of 80° , we get the total sum of the six angles as:

$$x + x + x + x + x + 80^\circ = 720^\circ$$

Simplifying this equation, we get:

$$5x + 80^\circ = 720^\circ$$

Subtracting 80° from both sides, we get:

$$5x = 640^\circ$$

Dividing both sides by 5, we get:

$$x = 128^\circ$$

Therefore, the measure of one of the equal angles of the hexagon is 128° .

3.(1) For a regular hexagon with 6 sides:

$$\text{Interior angle} = (6-2) \times 180^\circ / 6 = 120^\circ$$

Therefore, the measure of an interior angle of a regular hexagon is 120° .

(2) For a regular decagon with 10 sides:

$$\text{Interior angle} = (10-2) \times 180^\circ / 10 = 144^\circ$$

Therefore, the measure of an interior angle of a regular decagon is 144° .

4. The formula for the measure of an interior angle of a regular polygon with n sides is:

$$\text{Interior angle} = (n-2) \times 180^\circ / n$$

We are given that each interior angle of the given regular polygon measures 150° . So we can write:

$$150^\circ = (n-2) \times 180^\circ / n$$

Multiplying both sides by n , we get:

$$150^\circ n = (n-2) \times 180^\circ$$

Expanding the right side, we get:

$$150^\circ n = 180^\circ n - 360^\circ$$

Adding 360° to both sides, we get:

$$150^\circ n + 360^\circ = 180^\circ n$$

Subtracting $150^\circ n$ from both sides, we get:

$$360^\circ = 30^\circ n$$

Dividing both sides by 30° , we get:

$$n = 12$$

Therefore, the given regular polygon has 12 sides.

5. Let n be the number of sides of the polygon. The formula for the sum of the measures of the interior angles of a polygon with n sides is:

$$\text{Sum of interior angles} = (n-2) \times 180^\circ$$

We are given that the sum of the measures of the interior angles of the polygon is 1440° . So we can write:

$$1440^\circ = (n-2) \times 180^\circ$$

Dividing both sides by 180° , we get:

$$8 = n-2$$

Adding 2 to both sides, we get:

$$n = 10$$

Therefore, the given polygon has 10 sides.

CHAPTER 12

Exercise 12.1

1. Do it yourself

2. Do it yourself

3. (1)2 (2)2 (3)1 (4)6 (5)2 (6)4

4. Do it yourself

5. Do it yourself

6. (1) Hexagon (2) 2 (3) No (4) Zero

CHAPTER 13

Do it yourself

CHAPTER 14

Exercise 14.1

- (1) $26+25+22+45 = 118$ cm
(2) $4+4+4+4+4+4+4+4 = 32$ cm
(3) $15+6+6+8+12+10 = 57$ cm
(4) $4+2+7+7+2+4+5 = 31$ m

2. P (in cm) 18 20 26 28 16 30

3. P (in cm) 16 40 48 96 120 140 240

4. We are given that the perimeter of the square field is 96 m. So we can write:

$$4s = 96$$

Dividing both sides by 4, we get:

$$s = 24$$

Therefore, each side of the square field has a length of 24 meters.

5. The length of the table top is 2 m 25 cm = 2.25 m, and its width is 1 m 50 cm = 1.50 m.

So the perimeter of the table top is:

$$\text{Perimeter} = 2 \times (\text{length} + \text{width})$$

$$\text{Perimeter} = 2 \times (2.25 \text{ m} + 1.50 \text{ m})$$

$$\text{Perimeter} = 2 \times 3.75 \text{ m}$$

$$\text{Perimeter} = 7.50 \text{ m}$$

Therefore, the perimeter of the table top is 7 meters and 50 centimeters.

$$6. 4s = 128$$

Dividing both sides by 4, we get:

$$s = 32$$

Therefore the side of the square is 32 cm.

$$7. 4s = 20$$

Dividing both sides by 4, we get:

$$s = 5$$

Therefore, the side of the square is 5 meters.

8. Distance covered in one round = $2(\text{length} + \text{breadth})$

$$\text{Distance covered in one round} = 2(80 + 50)$$

$$\text{Distance covered in one round} = 260 \text{ m}$$

Therefore, the distance covered by Sangeeta in four rounds is:

$$\text{Distance covered in four rounds} = 4 \times 260 \text{ m}$$

$$\text{Distance covered in four rounds} = 1040 \text{ m}$$

9. The perimeter of the rectangular park is given by:

$$P = 2(l + b) = 2(300 + 200) = 1000 \text{ m}$$

So, the cost of fencing the park at the rate of ₹ 28 per metre is:

$$C = 28 \times P = 28 \times 1000 = ₹ 28000$$

Therefore, the cost of fencing the rectangular park is ₹ 28,000.

$$10. \text{Perimeter} = 4s$$

$$\text{Perimeter} = 4 \times 250$$

$$\text{Perimeter} = 1000 \text{ m}$$

The cost of fencing per meter is given as 20. So the cost of fencing the entire perimeter is:

$$\text{Cost of fencing} = 1000 \times 20$$

$$\text{Cost of fencing} = 20,000$$

Therefore, the cost of fencing the square park is 20,000 rupees.

$$11. 2(\text{length} + \text{breadth}) = 8.1$$

$$2(5x + 4x) = 8.1$$

$$18x = 8.1$$

$$x = 0.45$$

Therefore, the length of the field is:

$$\text{Length} = 5x = 5 \times 0.45 = 2.25 \text{ m}$$

And the breadth of the field is:

$$\text{Breadth} = 4x = 4 \times 0.45 = 1.8 \text{ m}$$

$$12. \text{Perimeter} = 2(\text{length} + \text{breadth})$$

$$\text{Perimeter} = 2(90 + 70)$$

$$\text{Perimeter} = 320 \text{ m}$$

Therefore, the length of the wire required to fence around the rectangular park is 320 meters

13. (1) For an equilateral triangle, all sides are equal. So, the length of each side of the string will be:

$$30 / 3 = 10 \text{ cm}$$

Therefore, each side of the string used to form an equilateral triangle will be 10 cm.

(2) For a regular hexagon, all sides are also equal. A regular hexagon has six sides, so the length of each side of the string will be:

$$30 / 6 = 5 \text{ cm}$$

Therefore, each side of the string used to form a regular hexagon will be 5 cm.

14. Suman runs around a square park of side 80 m. The perimeter of the square park is 4 times the length of its side, which is $4 \times 80 \text{ m} = 320 \text{ m}$.

Reena runs around a rectangular park with length 65 m and breadth 48 m. The perimeter of the rectangular park is $2 \times (\text{length} + \text{breadth}) = 2 \times (65 \text{ m} + 48 \text{ m}) = 2 \times 113 \text{ m} = 226 \text{ m}$.

Therefore, Suman covers more distance as compared to Reena.

15. The perimeter of a regular hexagon is 6 times the length of its side. Therefore, the perimeter of a regular hexagon with each side measuring 7 cm is $6 \times 7 \text{ cm} = 42 \text{ cm}$.

16. Raju runs twice around a square park with side 35 m. Therefore, the distance covered by Raju is $2 \times \text{perimeter of the square park with side } 35 \text{ m} = 2 \times 4 \times 35 \text{ m} = 280 \text{ m}$.

Ajay runs thrice around a rectangular park with length 60 m and breadth 40 m. Therefore, the distance covered by Ajay is $3 \times \text{perimeter of the rectangular park with length } 60 \text{ m and breadth } 40 \text{ m} = 3 \times 2 \times (60 \text{ m} + 40 \text{ m}) = 3 \times 2 \times 100 \text{ m} = 600 \text{ m}$.

Therefore, Ajay covers more distance as compared to Raju.

17. (1) Let x be the length of a side of the square.

The perimeter of a square is given by $P = 4x$.

Given, $P = 30 \text{ cm}$.

Therefore, $4x = 30$

Thus, $x = 7.5 \text{ cm}$

Hence, the length of each side of the square is 7.5 cm.

(2) Let x be the length of a side of the equilateral triangle.

The perimeter of an equilateral triangle is given by $P = 3x$.

Given, $P = 24 \text{ cm}$.

Therefore, $3x = 24$

Thus, $x = 8 \text{ cm}$.

Hence, the length of each side of the equilateral triangle is 8 cm.

(3) Let x be the length of a side of the regular pentagon.

The perimeter of a regular pentagon is given by $P = 5x$.

Given, $P = 75 \text{ cm}$.

Therefore, $5x = 75$

Thus, $x = 15$ cm.

Hence, the length of each side of the regular pentagon is 15 cm.

18. Do it yourself

19. Do it yourself

20. Do it yourself

Exercise 14.2

1.(1) 42 (2) 9 (3) 5

2. (1) 13.6cm, 11.56cm² (2) 24cm, 36cm² (3) 36cm, 81cm² (4) 5cm, 25 cm²

3. (1) Let the breadth of the rectangular plot be 'b'. We know that the area of a rectangle is given by length x breadth. So, we have:

length x breadth = area

$$80 \times b = 2,400$$

$$b = 2,400/80$$

$$b = 30$$

Therefore, the breadth of the rectangular plot is 30 m.

(2) Let the length of the rectangular plot be 'l'. We know that the area of a rectangle is given by length x breadth. So, we have:

length x breadth = area

$$l \times 40 = 2,400$$

$$l = 2,400/40$$

$$l = 60$$

Therefore, the length of the rectangular plot is 60 m.

4. Given, area of rectangle = 195 cm²

and breadth = 12 cm

Area of rectangle = length x breadth

$$195 = l \times 12$$

$$l = 195/12 = 16.25 \text{ cm}$$

Therefore, the length of the rectangle is 16.25 cm.

Now, the perimeter of the rectangle is given by:

$$\text{Perimeter} = 2 \times (\text{Length} + \text{Breadth})$$

$$= 2 \times (16.25 + 12) \text{ cm}$$

$$= 2 \times 28.25 \text{ cm}$$

$$= 56.5 \text{ cm}$$

Hence, the perimeter of the rectangle is 56.5 cm.

5. Area of rectangle = length x breadth

$$176 = 22 \times \text{breadth}$$

$$\text{Breadth} = 176/22 = 8 \text{ m}$$

Now, the perimeter of the rectangle is given by:

$$\text{Perimeter} = 2 \times (\text{Length} + \text{Breadth})$$

$$= 2 \times (22 + 8) \text{ m}$$

$$= 2 \times 30 \text{ m}$$

$$= 60 \text{ m}$$

Hence, the perimeter of the rectangular field is 60 m.

6. The area of the room is $15 \text{ m} \times 10 \text{ m} = 150 \text{ m}^2$.

The area of the square carpet is $7 \text{ m} \times 7 \text{ m} = 49 \text{ m}^2$.

The remaining area of the floor not covered by the carpet is:

$$150 \text{ m}^2 - 49 \text{ m}^2 = 101 \text{ m}^2.$$

Therefore, 101 m² of the floor area is not carpeted.

7. Do it yourself

8. Let's assume the width of the cardboard to be w cm. Then we have:

Area of the cardboard = Length \times Width

$$36 = 9 \times w$$

$$w = 4 \text{ cm}$$

Therefore, the width of the cardboard is 4 cm.

9. Length of the inner square garden = $160 \text{ m} - 2 \times 3 \text{ m} = 154 \text{ m}$

Breadth of the inner square garden = $160 \text{ m} - 2 \times 3 \text{ m} = 154 \text{ m}$

Area of the inner square garden = Length \times Breadth = $154 \text{ m} \times 154 \text{ m} = 23,716 \text{ sq m}$

Area of the remaining part of the garden = Area of the outer square garden - Area of the inner square garden

$$= 160 \text{ m} \times 160 \text{ m} - 154 \text{ m} \times 154 \text{ m}$$

$$= 25,600 \text{ sq m} - 23,716 \text{ sq m}$$

$$= 1,884 \text{ sq m}$$

Therefore, the area of the remaining part of the garden is 1,884 sq m.

10. Area of the room = Length \times Breadth = $18 \text{ m} \times 12 \text{ m} = 216 \text{ sq m}$

Cost of carpeting 1 sq m = ₹ 9.50

Cost of carpeting 216 sq m = $216 \times ₹ 9.50$

$$= ₹ 2,052$$

Therefore, the cost of carpeting the room at the rate of ₹ 9.50 per square metre is ₹ 2,052.

11. Area of one tile = $25 \text{ cm} \times 15 \text{ cm} = 375 \text{ sq cm}$

Area of the base of the swimming pool = Length \times Breadth = $25 \text{ m} \times 15 \text{ m} = 375 \text{ sq m}$

Number of tiles required = (Area of the base of the swimming pool) / (Area of one tile)

$$= 375 \text{ sq m} \times (10,000 \text{ cm}^2 / 1 \text{ sq m}) / 375 \text{ sq cm}$$

$$= 10,000 \text{ tiles}$$

Therefore, the number of tiles required is 10,000.

12. (a) 84 sq unit (b) 50 sq unit (c) 40 sq unit (d) 64 sq unit (e) 50 sq unit (f) 43 sq unit

13. The total area of the five square flower beds is $5 \times 3^2 = 45 \text{ sq m}$.

The area of the piece of land is $25 \times 15 = 375 \text{ sq m}$.

So, the area of the remaining part of the land is:

$$375 - 45 = 330 \text{ sq m}.$$

Therefore, the area of the remaining part of the land is 330 sq m.

14. (1) 93 cm^2 (2) 50 m^2 (3) 80 cm^2 (4) 50 cm^2

15. First, we need to calculate the area of the rectangular piece of land:

Area = length \times width

$$\text{Area} = 300 \text{ m} \times 175 \text{ m}$$

$$\text{Area} = 52500 \text{ sq m}$$

Now we need to find the cost of tiling the land at the rate of ₹ 12 per hundred square metre.

1 hundred square metre = 100 sq m

So, the cost of tiling 1 sq m = ₹ 12/100

Therefore, the cost of tiling 52500 sq m = $(₹ 12/100) \times 52500 = ₹ 6300$

Hence, the cost of tiling a rectangular piece of land 300 m long and 175 m wide at the rate of ₹ 12 per hundred square metre is ₹ 6300.

16. (1) Area of the first rectangle = length \times breadth = $8 \text{ m} \times 4 \text{ m} = 32 \text{ m}^2$

(2) Area of the second rectangle = length \times breadth = $12 \text{ m} \times 3 \text{ m} = 36 \text{ m}^2$

(3) Area of the third rectangle = length \times breadth = $15 \text{ m} \times 4 \text{ m} = 60 \text{ m}^2$

Therefore, the rectangle with the greatest area is the third rectangle, which has dimensions 15m \times 4m, and the rectangle with the least area is the first rectangle, which has dimensions 8m \times 4m.

17. The length of the street in centimeters is:

$$30 \text{ m} \times 100 \text{ cm/m} = 3000 \text{ cm}$$

The width of the street in centimeters is:

$$12 \text{ m} \times 100 \text{ cm/m} = 1200 \text{ cm}$$

Next, we need to find the area of the street in square centimeters:

$$\text{Area of street} = \text{length} \times \text{width}$$

$$\text{Area of street} = 3000 \text{ cm} \times 1200 \text{ cm}$$

$$\text{Area of street} = 3,600,000 \text{ cm}^2$$

Now we need to find the number of bricks required to cover this area.

First, we need to convert the dimensions of the bricks to square centimeters:

$$\text{Length of brick in cm} = 15 \text{ cm}$$

$$\text{Breadth of brick in cm} = 10 \text{ cm}$$

$$\text{Area of one brick} = \text{Length} \times \text{Breadth}$$

$$\text{Area of one brick} = 15 \text{ cm} \times 10 \text{ cm}$$

$$\text{Area of one brick} = 150 \text{ cm}^2$$

To find the number of bricks required, we divide the area of the street by the area of one brick:

$$\text{Number of bricks} = \text{Area of street} / \text{Area of one brick}$$

$$\text{Number of bricks} = 3,600,000 \text{ cm}^2 / 150 \text{ cm}^2$$

$$\text{Number of bricks} = 24,000$$

Therefore, 24,000 bricks are required to pave the street road.

18. Rectangle 1 = 6 cm^2

$$\text{Rectangle 2} = 60 \text{ cm}^2$$

$$\text{Rectangle 3} = 16 \text{ cm}^2$$

$$\text{Rectangle 4} = 4 \text{ cm}^2$$

CHAPTER 15

Exercise 15.1

1.(1) Raw data: the data that has been collected directly from a primary source of data that is not processed or cleaned by anyone

(2) Primary data: When data is directly collected from the source is called Primary data.

(3) Secondary data: The data collected from sources, not directly from the survey is called Secondary data.

(4) Collection of data: The starting point of any survey is the collection of data.

(5) Frequency of an Observation: Frequency of an observation is defined as the number of times the observation occurs in the data.

2. Do it yourself

3. Do it yourself

4. Do it yourself

5. Do it yourself

BOOK 7

Let's revise!

Question 1

$$1.4 \times 3 = 12.$$

$$36 / 3 = 12.$$

$$12 + 12 - 4.$$

$$12 + 12 = 24, \text{ and } 24 - 4 = 20.$$

$$36/3 + 4 \times 3 - 4 \text{ equals } 20.$$

2. $7 * 3 = 21$.

$36 / 6 = 6$.

$21 - 4 + 6$.

$21 - 4 = 17$, and $17 + 6 = 23$.

$7*3-4+36/6$ equals 23.

3. $16 - 8 = 8$, and $4 - 2 = 2$.

$8 / 2 = 4$.

$(16-8)/(4-2)$ equals 4.

$4.6/2 = 3$.

$3 * 9 = 27$.

$14 + 27 - 3 + 2$.

$14 + 27 = 41$, $41 - 3 = 38$, and $38 + 2 = 40$.

$14+6/2*9-3+2$ equals 40.

Rest of the parts are do yourself because they are from the previous book

Question 2

(1)The prime factorization of 36 is $2^2 * 3^2$, which means its factors are 1, 2, 3, 4, 6, 9, 12, 18, 36.

The prime factorization of 75 is $3 * 5^2$, which means its factors are 1, 3, 5, 15, 25, 75.

Therefore, the common factors of 36 and 75 are 1 and 3.

(2)The prime factorization of 24 is $2^3 * 3$, which means its factors are 1, 2, 3, 4, 6, 8, 12, 24.

The prime factorization of 72 is $2^3 * 3^2$, which means its factors are 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72.

Therefore, the common factors of 24 and 72 are 1, 2, 3, 4, 6, 8, 12, and 24.

(3)The prime factorization of 60 is $2^2 * 3 * 5$, which means its factors are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60.

The prime factorization of 90 is $2 * 3^2 * 5$, which means its factors are 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90.

Therefore, the common factors of 60 and 90 are 1, 2, 3, 5, 6, 10, 15, 30.

(4)The prime factorization of 44 is $2^2 * 11$, which means its factors are 1, 2, 4, 11, 22, 44.

The prime factorization of 88 is $2^3 * 11$, which means its factors are 1, 2, 4, 8, 11, 22, 44, 88.

Therefore, the common factors of 44 and 88 are 1, 2, 4, 11, 22, and 44

Question 3

(1)The prime factorization of 10 is $2 * 5$, which means its factors are 1, 2, 5, and 10.

The prime factorization of 30 is $2 * 3 * 5$, which means its factors are 1, 2, 3, 5, 6, 10, 15, and 30.

The prime factorization of 40 is $2^3 * 5$, which means its factors are 1, 2, 4, 5, 8, 10, 20, and 40.

Therefore, the common factors of 10, 30, and 40 are 1 and 5.

(2)The prime factorization of 25 is 5^2 , which means its factors are 1, 5 and 25

The prime factorization of 16 is 2^4 , which means its factors are 1, 2, 4, 8 and 16..

The prime factorization of 45 is $3^2 * 5$, which means its factors are 1, 3, 5, 9, ,15 and 45.

Therefore, the common factors of 25, 16, and 45 is 1.

(3)The prime factorization of 12 is $2^2 * 3$, which means its factors are 1, 2, 3, 4, 6, and 12.

The prime factorization of 8 is 2^3 , which means its factors are 1, 2, 4, and 8.

The prime factorization of 24 is $2^3 * 3$, which means its factors are 1, 2, 3, 4, 6, 8, 12, and 24.

Therefore, the common factors of 12, 8, and 24 are 1, 2, 4, and 8.

(4)The prime factorization of 6 is $2 * 3$, which means its factors are 1, 2, 3, and 6.

The prime factorization of 16 is 2^4 , which means its factors are 1, 2, 4, 8, and 16.

The prime factorization of 26 is $2 * 13$, which means its factors are 1, 2, 13, and 26.

Therefore, the only common factor of 6, 16, and 26 is 1.

Question 4

(1) Prime factorization of 18: 18 can be factorized as $2 * 3^2$. Therefore, the prime factors of 18 are 2 and 3.

Prime factorization of 117: 117 can be factorized as $3^2 * 13$. Therefore, the prime factors of 117 are 3 and 13.

Hence, the HCF of 18 and 117 is 3.

(2) Prime factorization of 27: 27 can be factorized as 3^3 . Therefore, the prime factor of 27 is 3.

Prime factorization of 81: 81 can be factorized as 3^4 . Therefore, the prime factor of 81 is 3.

Hence, the HCF of 27 and 81 is 3.

(3) Prime factorization of 144: 144 can be factorized as $2^4 * 3^2$. Therefore, the prime factors of 144 are 2 and 3.

Prime factorization of 180: 180 can be factorized as $2^2 * 3^2 * 5$. Therefore, the prime factors of 180 are 2, 3, and 5.

Hence, the HCF of 144 and 180 is 36.

(4) Prime factorization of 65: 65 can be factorized as $5 * 13$. Therefore, the prime factors of 65 are 5 and 13.

Prime factorization of 105: 105 can be factorized as $3 * 5 * 7$. Therefore, the prime factors of 105 are 3, 5, and 7.

Hence, the HCF of 65 and 105 is 5.

(5) Prime factorization of 180: 180 can be factorized as $2^2 * 3^2 * 5$. Therefore, the prime factors of 180 are 2, 3, and 5.

Prime factorization of 270: 270 can be factorized as $2 * 3^3 * 5$. Therefore, the prime factors of 270 are 2, 3, and 5.

Prime factorization of 630: 630 can be factorized as $2 * 3^2 * 5 * 7$. Therefore, the prime factors of 630 are 2, 3, 5, and 7.

Hence, the HCF of 180, 270, and 630 is 90.

Rest of the parts are do yourself

Question 5

(1) HCF of 288 and 576:

Dividing 576 by 288 gives us a quotient of 2 and a remainder of 0. Therefore, the HCF of 288 and 576 is 288.

(2) HCF of 345 and 506:

Dividing 506 by 345 gives us a quotient of 1 and a remainder of 161.

Now, dividing 345 by 161 gives us a quotient of 2 and a remainder of 23.

Lastly, dividing 161 by 23 gives us a quotient of 7 and a remainder of 0.

Therefore, the HCF of 345 and 506 is 23.

(3) HCF of 230 and 280:

Dividing 280 by 230 gives us a quotient of 1 and a remainder of 50.

Now, dividing 230 by 50 gives us a quotient of 4 and a remainder of 10.

Lastly, dividing 50 by 10 gives us a quotient of 5 and a remainder of 0.

Therefore, the HCF of 230 and 280 is 10.

(4) HCF of 160 and 240:

Dividing 240 by 160 gives us a quotient of 1 and a remainder of 80.
Now, dividing 160 by 80 gives us a quotient of 2 and a remainder of 0.
Therefore, the HCF of 160 and 240 is 80.

(5) HCF of 207 and 230:

Dividing 230 by 207 gives us a quotient of 1 and a remainder of 23.
Now, dividing 207 by 23 gives us a quotient of 9 and a remainder of 0.
Therefore, the HCF of 207 and 230 is 23.

(6) HCF of 762 and 1270:

Dividing 1270 by 762 gives us a quotient of 1 and a remainder of 508.
Now, dividing 762 by 508 gives us a quotient of 1 and a remainder of 254.
Next, dividing 508 by 254 gives us a quotient of 2 and a remainder of 0.
Therefore, the HCF of 762 and 1270 is 254

Question 6

(1) Pair: 61 and 75

To find the GCD of 61 and 75, we can use the Euclidean algorithm.
Dividing 75 by 61 gives a quotient of 1 and a remainder of 14.
Now, dividing 61 by 14 gives a quotient of 4 and a remainder of 5.
Lastly, dividing 14 by 5 gives a quotient of 2 and a remainder of 4.
The remainder is not 1, but we continue.
Dividing 5 by 4 gives a quotient of 1 and a remainder of 1.
Since the remainder is 1, the GCD of 61 and 75 is 1. Therefore, they are coprime.

(2) Pair: 875 and 1859

Dividing 1859 by 875 gives a quotient of 2 and a remainder of 109.
Now, dividing 875 by 109 gives a quotient of 8 and a remainder of 3.
Lastly, dividing 109 by 3 gives a quotient of 36 and a remainder of 1.
The remainder is 1, indicating that the GCD of 875 and 1859 is 1. Therefore, they are coprime.

(3) Pair: 924 and 1093

Dividing 1093 by 924 gives a quotient of 1 and a remainder of 169.
Now, dividing 924 by 169 gives a quotient of 5 and a remainder of 59.
Lastly, dividing 169 by 59 gives a quotient of 2 and a remainder of 51.
The remainder is not 1, but we continue.
Dividing 59 by 51 gives a quotient of 1 and a remainder of 8.
Lastly, dividing 51 by 8 gives a quotient of 6 and a remainder of 3.
Since the remainder is 3, the GCD of 924 and 1093 is not 1. Therefore, they are not coprime.

Question 7

The capacity of the first tanker is 660 liters.
The capacity of the second tanker is 1020 liters.
Dividing 1020 by 660 gives a quotient of 1 and a remainder of 360.
Now, dividing 660 by 360 gives a quotient of 1 and a remainder of 300.
Next, dividing 360 by 300 gives a quotient of 1 and a remainder of 60.
Then, dividing 300 by 60 gives a quotient of 5 and a remainder of 0.

Since the remainder is 0, the GCD of 660 and 1020 is 60.

Therefore, the maximum capacity of a container that can measure the petrol in either tanker in an exact number of times is 60 liters.

Question 8

$$63 = 3 * 3 * 7$$

$$91 = 7 * 13$$

$$140 = 2 * 2 * 5 * 7$$

Common prime factors: 7

Number of students in each row = 7

Therefore, the physical education teacher arranged 7 students in each row for the march past, ensuring that each row has an equal number of students

Question 9

$$40 = 2 * 2 * 2 * 5$$

$$75 = 3 * 5 * 5$$

Common prime factors: 5

Therefore, the maximum capacity of the bucket that can measure the milk from both containers in an exact number of times is 5 liters.

Question 10

$$(1) -20 - 35 = -55$$

$$(2) 5 - (-20) = 25$$

$$(3) -80 - 28 = -108$$

$$(4) 96 - 420 = -324$$

$$(5) 0 - (-47) = 47$$

$$(6) -227 - 15 = -242$$

$$(7) -4000 - (-3807) = -192$$

$$(8) 500 - (-4329) = 4829$$

$$(9) -590 - (-170) = -420$$

Question 11

$$(1) 70 + (-85) - (-95) + (-12) = 70 - 85 + 95 - 12 = 68$$

$$(2) -24 - 9 - (-29) = -24 - 9 + 29 = -4$$

$$(3) (-13) + 32 - 8 - 1 = -13 + 32 - 8 - 1 = 10$$

$$(4) (-7) - 8 - (-25) = -7 - 8 + 25 = 10$$

$$(5) 675 + (-202) + (-67) + 7 + 43 = 675 - 202 - 67 + 7 + 43 = 456$$

$$(6) 600 + (-345) + 465 - 987 = 600 - 345 + 465 - 987 = -267$$

Question 12

Subtract the sum of -16 and 27 from -40:

$$-40 - (-16 + 27) = -40 - (-11) = -29$$

Question 13

From the sum of 405 and -103, subtract -198:

$$(405 + (-103)) - (-198) = 302 - (-198) = 500$$

Question 14

(1) $0.5 = 1/2$

(2) $0.07 = 7/100$

(3) $0.39 = 39/100$

(4) $0.008 = 8/1000 = 1/125$

(5) $7.053 = 7053/1000 = 3513/500$

(6) $3.108 = 3108/1000 = 777/250$

(7) $0.304 = 304/1000 = 76/250$

(8) $0.719 = 719/1000$

Question 15

(1) 0.5 -> zero point five

(2) 0.07 -> zero point zero seven

(3) 3.018 -> three point zero one eight

(4) 11.602 -> eleven point six zero two

(5) 304.56 -> three hundred four point five six

(6) 18.92 -> eighteen point nine two

(7) 503.9 -> five hundred three point nine

(8) 817.503 -> eight hundred seventeen point five zero three

Question 16

(1) $8.98 + 97.8 =$

8.98

+97.80

106.78

(2) $5.03 + 2.35 =$

5.03

+2.35

7.38

(3) $0.282 + 639 =$

0.282

+639.000

639.282

(4) $6.728 + 3.238 =$

6.728

+3.238

9.966

Question 17

Weight of melons = 8 kg 250 g = 8,000 g + 250 g = 8,250 g

Weight of mangoes = 2 kg 150 g = 2,000 g + 150 g = 2,150 g

Weight of plums = 500 g

Weight of guavas = 1 kg 250 g = 1,000 g + 250 g = 1,250 g

Total weight of fruits carried = 8,250 g + 2,150 g + 500 g + 1,250 g = 12,150 g

Therefore, Roni carried a total weight of 12,150 grams of fruits.

Question 18.

Total sugar sold = 135.400 kg + 190.500 kg + 156.325 kg = 482.225 kg

Therefore, the shopkeeper sold a total of 482.225 kilograms of sugar.

Question 19.

Amount spent on books = ₹96.75

Amount spent on pen = ₹9.50

Amount spent on pencils = ₹10.75

Total amount spent = ₹96.75 + ₹9.50 + ₹10.75 = ₹117

Therefore, Sunita spent a total of ₹117.

Question 20

(1) $a + b + c$ if $a = 5$, $b = 7$, $c = 9$:

Substitute the values:

$$5 + 7 + 9 = 21$$

(2) $m^2 - n^2$ if $m = 5$, $n = 4$:

Substitute the values:

$$5^2 - 4^2 = 25 - 16 = 9$$

(3) $4a^2 - 12ab + 9b^2$ if $a = 1$, $b = 2$:

Substitute the values:

$$4(1^2) - 12(1)(2) + 9(2^2) = 4 - 24 + 36 = 16$$

Question 21:

(1) $2l + 4$:

The expression represents a linear equation of a line, where " l " represents the variable. The coefficient 2 represents the slope of the line, and the constant term 4 represents the y-intercept.

(2) $3x^2 + 4x + 1$:

The expression represents a quadratic equation, specifically a parabola, where " x " represents the variable. The terms involving x^2 and x represent the quadratic nature of the equation, while the constant term 1 represents the y-intercept.

(3) $2x + 1$:

The expression represents a linear equation of a line, where "x" represents the variable. The coefficient 2 represents the slope of the line, and the constant term 1 represents the y-intercept.

(4) $s^2 + s + 3$:

The expression represents a quadratic equation, specifically a parabola, where "s" represents the variable. The terms involving s^2 and s represent the quadratic nature of the equation, while the constant term 3 represents the y-intercept.

Question 22.

The total length of the edges of a cube can be found by multiplying the length of one edge by 12, since a cube has 12 edges.

Therefore, the total length of the edges of the cube is 12 times the length of one edge, which can be expressed as $12l$.

Question 23.

Assuming Isha's current age is x:

(1) Her age 10 years from now would be $x + 10$.

(2) Her age 5 years ago would be $x - 5$.

(3) If Isha's father is 5 years more than twice her age, then her father's age would be $2x + 5$.

Question 24.

Comparing ratios:

(1) $12:36 = 1:3$ and $30:40 = 3:4$. The ratio 3:4 is larger.

(2) $7:35 = 1:5$ and $15:35 = 3:7$. The ratio 3:7 is larger.

(3) $64:56 = 8:7$ and $18:12 = 3:2$. The ratio 8:7 is larger.

Question 25.

Let the numbers be $4x$ and $5x$, since they are in the ratio 4:5.

The sum of the numbers is given as 378, so we have the equation:

$$4x + 5x = 378$$

$$9x = 378$$

$$x = 42$$

Hence, the numbers are $4x = 4 * 42 = 168$ and $5x = 5 * 42 = 210$.

Question 26.

In the first school, the ratio of girls to boys is 5:8, which simplifies to $\frac{5}{8}$.

In the second school, the ratio of girls to boys is 7:10, which simplifies to $\frac{7}{10}$.

To compare the ratios, we need to find the larger fraction.

Since $\frac{5}{8}$ is smaller than $\frac{7}{10}$, the second school has a higher ratio of girls.

Question 27.

The ratio of zinc to copper in the alloy is 9:7.

Given that the weight of copper is 9.8 kg, we can set up the following proportion:

$$\frac{9}{7} = \frac{x}{9.8}$$

Cross-multiplying, we get:

$$7x = 9 * 9.8$$

$$7x = 88.2$$

$$x = 88.2/7$$

$$x \approx 12.6$$

Therefore, the weight of zinc in the alloy is approximately 12.6 kg.

Question 28.

$$27 * 3 = x * x$$

$$81 = x^2$$

Taking the square root of both sides, we get:

$$x = \sqrt{81}$$

$$x = 9$$

Question 29.

$$51 * 57 = 85 * x$$

$$2907 = 85x$$

Dividing both sides by 85, we get:

$$x = 2907/85$$

$$x \approx 34.2$$

Therefore, the fourth term is approximately 34.2.

Question 30.

$$x/15 = 15/25$$

Cross-multiplying, we get:

$$25x = 15 * 15$$

$$25x = 225$$

Dividing both sides by 25, we get:

$$x = 225/25$$

$$x = 9$$

Therefore, the value of x is 9.

Question 31.

$$36 * x = 90 * 90$$

$$36x = 8100$$

Dividing both sides by 36, we get:

$$x = 8100/36$$

$$x = 225$$

Question 32.

the mean proportional between 2 and 50 is $\sqrt{2 * 50} = \sqrt{100} = 10$.

Question 33.

Given that the cost of 5 kg of wheat flour is ₹80.50:

(1) To find the cost of 8 kg of wheat flour, we can set up a proportion:

$$5 \text{ kg} / ₹80.50 = 8 \text{ kg} / x$$

Cross-multiplying, we get:

$$5x = 8 * ₹80.50$$

$$5x = ₹644$$

Dividing both sides by 5, we get:

$$x = ₹644/5$$

$$x = ₹128.80$$

Therefore, the cost of 8 kg of wheat flour is ₹128.80.

(2) To find the quantity of wheat flour that can be purchased for ₹144.90, we can set up a proportion:

$$5 \text{ kg} / ₹80.50 = y \text{ kg} / ₹144.90$$

Cross-multiplying, we get:

$$5 * ₹144.90 = ₹80.50 * y$$

$$₹724.50 = ₹80.50y$$

Dividing both sides by ₹80.50, we get:

$$y = ₹724.50/₹80.50$$

$$y = 9 \text{ kg}$$

Therefore, ₹144.90 can purchase 9 kg of wheat flour.

Question 34.

If a cow eats 35 kg of grass in a week, then it eats $35/7 = 5$ kg of grass in a day.

For 10 days, the cow would need $10 * 5 = 50$ kg of grass.

Question 35.

If the cost of a dozen of pens is ₹158.60, then the cost of 1 pen is $₹158.60/12 = ₹13.22$.

The cost of 10 such pens would be $10 * ₹13.22 = ₹132.20$.

Question 36.

For 8 kg of apples priced at ₹192, the price per kg is $₹192/8 = ₹24/\text{kg}$.

For 5 kg of apples priced at ₹125, the price per kg is $₹125/5 = ₹25/\text{kg}$.

Therefore, the better buy would be 8 kg of apples for ₹192 as it has a lower price per kilogram.

Question 37.

If the weight of 90 books is 54 kg, then the weight of 1 book is $54 \text{ kg}/90 = 0.6 \text{ kg}$.

For 105 such books, the weight would be $105 * 0.6 \text{ kg} = 63 \text{ kg}$.

Question 38.

(1) open (2) closed (3) closed (4) open (5) closed (6) open (7) open (8) closed

Question 39.

(1)not a ploygon (2) polygon (3)not a polygon (4)not a ploygon (5)polygon (6)not a polygon (7)not a polygon (8)not a polygon

Question 41.

- (1) Point S
- (2) Points X,Y & K
- (3) Points R & C

Question 42.

True

Question 43.

- (1) G,D,E & P
- (2) L,G,I,Z & K
- (3) J & I
- (4) I,D & E

Question 44.

- (1) Straight angle (2) Right angle (3) Obtuse angle (4) Reflex angle (5) Acute angle (6) Full angle (7) Reflex angle (8) Acute angle

Question 45.

- (1) 60° : Acute angle
- (2) 45° : Acute angle
- (3) 230° : Reflex angle
- (4) 180° : Straight angle
- (5) 170° : Obtuse angle
- (6) 75° : Acute angle
- (7) 90° : Right angle
- (8) 105° : Obtuse angle
- (9) 80° : Acute angle
- (10) 290° : Reflex angle
- (xi) 125° : Obtuse angle
- (xii) 78° : Acute angle

Question 46.

Do it yourself

Question 47.

Do it yourself

Question 48.

- (1) 90 degrees, 48 degrees, 42 degrees:

This triangle has one right angle (90 degrees) and two acute angles (48 degrees and 42 degrees). Therefore, it is a right-angled triangle.

- (2) 40 degrees, 80 degrees, 60 degrees:

All three angles in this triangle are acute angles (less than 90 degrees). Therefore, it is an acute-angled triangle.

(3) 55 degrees, 85 degrees, 40 degrees:

All three angles in this triangle are acute angles (less than 90 degrees). Therefore, it is an acute-angled triangle.

(4) 32 degrees, 120 degrees, 28 degrees:

This triangle has one obtuse angle (greater than 90 degrees) and two acute angles. Therefore, it is an obtuse-angled triangle.

(5) 60 degrees, 60 degrees, 60 degrees:

All three angles in this triangle are equal and measure 60 degrees. Therefore, it is an equilateral triangle.

(6) 30 degrees, 120 degrees, 30 degrees:

This triangle has one obtuse angle (greater than 90 degrees) and two acute angles. Therefore, it is an obtuse-angled triangle.

Question 49.

(1) 40°, 50°, 90°: Right-angled triangle (90° angle is present)

(2) 20°, 30°, 130°: Obtuse-angled triangle (130° angle is greater than 90°)

(3) 60°, 60°, 60°: Equilateral triangle (all angles are equal and measure 60°, which is acute)

(4) 56°, 72°, 52°: Acute-angled triangle (all angles are less than 90°)

(5) 70°, 70°, 40°: Obtuse-angled triangle (one angle measures 40°, which is less than 90°, and the other two angles are equal and measure 70°, which is greater than 90°)

(6) 40°, 30°, 110°: Obtuse-angled triangle (110° angle is greater than 90°)

Question 50. – Question 52 (do it yourself)

Question 53.

- Scalene triangle: 0 lines of symmetry.

- Circle: Infinite lines of symmetry.

- Parallelogram: 0, 1, or 2 lines of symmetry, depending on its specific shape.

- Equilateral triangle: 3 lines of symmetry.

Question 54 – Question 62 (do it yourself)

Question 63.

Let's denote the side of the square as "s". Therefore, we have the equation:

$$4s = 20$$

To find the value of "s", we divide both sides of the equation by 4:

$$s = 20 / 4$$

$$s = 5$$

Therefore, the side of the square is 5 m.

Question 64.

$$\text{Perimeter} = 2 \times (\text{Length} + \text{Breadth})$$

$$\text{Perimeter} = 2 \times (80 + 50)$$

$$\text{Perimeter} = 2 \times 130$$

$$\text{Perimeter} = 260 \text{ m}$$

Since Sangeeta takes four rounds, the total distance she covers is:

$$\text{Total Distance} = 4 \times \text{Perimeter}$$

$$\text{Total Distance} = 4 \times 260$$

$$\text{Total Distance} = 1040 \text{ m}$$

Therefore, Sangeeta covers a distance of 1040 m.

Question 65.

$$\text{Perimeter} = 2 \times (\text{Length} + \text{Breadth})$$

$$\text{Perimeter} = 2 \times (300 + 200)$$

$$\text{Perimeter} = 2 \times 500$$

$$\text{Perimeter} = 1000 \text{ m}$$

Now, we can calculate the cost of fencing:

$$\text{Cost} = \text{Perimeter} \times \text{Rate}$$

$$\text{Cost} = 1000 \text{ m} \times ₹ 28/\text{m}$$

$$\text{Cost} = ₹ 28000$$

Therefore, the cost of fencing the rectangular park is ₹ 28000.

Question 66.

$$\text{Perimeter} = 4 \times \text{Side}$$

$$\text{Perimeter} = 4 \times 250$$

$$\text{Perimeter} = 1000 \text{ m}$$

Now, we can calculate the cost of fencing:

$$\text{Cost} = \text{Perimeter} \times \text{Rate}$$

$$\text{Cost} = 1000 \text{ m} \times ₹ 20/\text{m}$$

$$\text{Cost} = ₹ 20000$$

Therefore, the cost of fencing the square park is ₹ 20000.

67. Let's assume the length of the rectangular field is $5x$ and the breadth is $4x$

$$\text{Perimeter} = 2 \times (\text{Length} + \text{Breadth})$$

In this case, the perimeter is given as 810 cm. We need to convert it to meters:

$$\text{Perimeter} = 810 \text{ cm} = 810/100 \text{ m} = 8.1 \text{ m}$$

Now, we can write the equation for the perimeter:

$$8.1 = 2 \times (5x + 4x)$$

$$8.1 = 2 \times 9x$$

$$8.1 = 18x$$

To find the value of "x," we divide both sides of the equation by 18:

$$x = 8.1 / 18$$

$$x = 0.45$$

Now, we can find the length and breadth of the field:

$$\text{Length} = 5x = 5 \times 0.45 = 2.25 \text{ m}$$

$$\text{Breadth} = 4x = 4 \times 0.45 = 1.8 \text{ m}$$

Therefore, the length of the rectangular field is 2.25 m, and the breadth is 1.8 m.

Question 68.

$$\text{Perimeter} = 2 \times (\text{Length} + \text{Width})$$

$$\text{Perimeter} = 2 \times (90 + 70)$$

$$\text{Perimeter} = 2 \times 160$$

$$\text{Perimeter} = 320 \text{ m}$$

Therefore, the length of the wire required to fence around the park is 320 m.

Question 69.

(1) Let's denote the length of each side as "s". Since an equilateral triangle has three equal sides, we have the equation:

$$3s = 30 \text{ cm}$$

$$s = 30 \text{ cm} / 3$$

$$s = 10 \text{ cm}$$

Therefore, the length of each side of the equilateral triangle is 10 cm.

(2) Let's denote the length of each side as "s":

$$s = \text{Total length} / \text{Number of sides}$$

$$s = 30 \text{ cm} / 6$$

$$s = 5 \text{ cm}$$

Therefore, the length of each side of the regular hexagon is 5 cm.

Question 70.

Do it yourself

Question 71.

The area of a square is calculated by multiplying the length of its side by itself (side^2). If the side of a square is halved, let's denote the original side as "s" and the halved side as "s/2". The new area, denoted as "A'", can be calculated as follows:

$$A' = (s/2)^2 = (s^2)/4$$

Question 72.

$$\text{Area} = \text{Length} \times \text{Breadth}$$

$$\text{Area} = 15 \text{ m} \times 14 \text{ m}$$

$$\text{Area} = 210 \text{ square meters}$$

Now, we can calculate the total expenditure:

$$\text{Total Expenditure} = \text{Area} \times \text{Rate}$$

$$\text{Total Expenditure} = 210 \text{ m}^2 \times ₹ 20/\text{m}^2$$

$$\text{Total Expenditure} = ₹ 4200$$

Therefore, the total expenditure for flooring the room at the rate of ₹ 20 per square meter is ₹ 4200.

Question 73.

data in ascending order:

134, 134, 135, 135, 135, 136, 136, 136, 138, 138,

139, 139, 139, 140, 140, 140, 140, 141, 141, 134,

135, 136, 140, 155, 155, 162, 162, 140, 155

To create a frequency distribution table, we need to list each unique value and count the number of times it appears in the data.

Height (cm) | Frequency

134	2
135	4
136	3
138	2
139	3
140	5
141	2
155	3
162	2

Question 74.

Family Members | Frequency

1	2
2	2
3	1
4	1
5	3
6	2
7	2
8	2
9	2
10	3
11	5
12	2
13	1

(2) family 11 has the highest frequency of 5 members.

(3) families with the least frequency of 1 member: families 1, 3, 4, 13.

(4) there are 2 families with 2 members (families 1 and 2).

CHAPTER 2

Exercise 2.1

1. P to W: -8, -7, -6, -5, -4, -3, -2, -1A to G: 7, 6, 5, 4, 3, 2, 1

2. -97, -85, -40, 55, 63

3. (1) Depth of 500 m (2) 110 m below sea level (3) 125 m east (4) increase in temperature

4. $87 \rightarrow -87$, $-87 \rightarrow 87$; $-198 \rightarrow 198$; $198 \rightarrow -198$; $200 \rightarrow -200$

5. -105 , -108 , -204 , -301

6. (1) -5 , -10 , -15 (2) -10 , -12 , -14 (3) -36 , -42 , -48

Exercise 2.2

1. (1) integer itself (2) 14 (3) zero (4) additive inverse (5) negative

2. (1) $-37 - 15 = -52$ (2) $-13 + 24 = 11$
(3) $17 - 31 = -14$ (4) $-10 - 38 = -48$
(5) $26 - 54 = -28$ (6) $0 - 11 = -11$

3. (1) $-4058 - 2232 = -6290$
(2) $207 - 270 = -63$
(3) $-235 + 484 + 46 = 295$
(4) $-275 + 3142 - 4812 = -1945$

4. (1) -8 (2) 36 (3) -203 (4) 415

5. -8 , -7 , -6 , -5 , -4 , -3 , -2 , -1 , 0 , 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8

6. (1) $13 - 28 = -15$ (2) $8 + 33 = 41$
(3) $-30 - 30 = -60$ (4) $40 + 17 = 57$
(5) $0 - 22 = -22$ (6) $28 - 114 = -86$

7. (1) $-13 - 19 + 24 = -8$
(2) $-58 + 25 + 20 = -13$
(3) $-22 + 6 - 101 + 128 = 12$
(4) $77 - 58 + 85 - 21 = 83$
(5) $634 - 154 + 465 - 687 = 258$
(6) $285 - 132 - 69 + 84 + 48 = 216$

8. Let's denote the unknown integer by 'a'. According to the problem, we know that:

$$a + (-34) = -47$$

To find 'a', we can isolate it on one side of the equation by adding 34 to both sides:

$$a = -47 - (-34)$$

$$a = -47 + 34$$

$$a = -13$$

Therefore, the other integer is -13 .

9. If x is the predecessor of y , then $x = y - 1$. We can substitute this expression into the given expression:

$$x - y + 5 = (y - 1) - y + 5$$

Simplifying this expression, we get:

$$x - y + 5 = -1 + 5$$

$$x - y + 5 = 4$$

Therefore, $(x - y + 5)$ is equal to 4.

10. Pairing the numbers, we have required sum = $(1 - 2) + (3 - 4) + (5 - 6) \dots (19 - 20) = (-1) + (-1) + (-1) \dots + (-1)$.
There being 10 terms in all = -10.

11. (1) If the number of terms is 10, there are five pairs of 3 and -3. So, the sum is:

$$3 + (-3) + 3 + (-3) + 3 + (-3) + 3 + (-3) + 3 + (-3) = 0$$

(2) If the number of terms is 15, there are seven pairs of 3 and -3, and an additional 3 at the end. So, the sum is:

$$3 + (-3) + 3 + (-3) + 3 + (-3) + 3 + (-3) + 3 + (-3) + 3 + (-3) + 3 + (-3) + 3 = 3$$

12. Do it yourself

$$13. (1) 3 + (-12) = -9 \quad (2) 7 + (-4) = 3 \quad (3) -8 + (-5) = -13$$

$$14. (1) -42 - 28 = -70$$

$$(2) -53 - 37 = -90$$

$$(3) -16 - 25 = -41$$

15. Do it yourself

16. Let x be the other integer. Then we have:

$$x + 53 = -16$$

Subtracting 53 from both sides, we get:

$$x = -16 - 53 = -69$$

Therefore, the other integer is -69.

17. The distance between the plane and the submarine is the sum of their distances from sea level:

$$\text{Distance} = 14,000 \text{ m} + 2,500 \text{ m} = 16,500 \text{ m}$$

Therefore, the distance between them is 16,500 meters.

18. The total distance travelled by Ram is the sum of the distances travelled towards Gujarat and West Bengal:

$$\text{Total distance} = 540 \text{ km} + 1,245 \text{ km} = 1,785 \text{ km}$$

Therefore, Ram is 1,785 km away from Delhi finally.

19. Let x be the other integer. Then we have:

$$x + (-135) = -248$$

Adding 135 to both sides, we get:

$$x = -248 + 135 = -113$$

Therefore, the other integer is -113.

20. (1) True (2) False (3) False (4) False
(5) True (6) True

21. In the first round, John's score was 28, which means he answered 28 questions correctly and 22 questions incorrectly (since there are 50 questions in total in each round). Therefore, his net score after the first round is:
 $28 - 22 = 6$

In the second round, John's score was -30, which means he answered 20 questions correctly and 30 questions incorrectly. Therefore, his net score after the second round is:
 $6 - 30 = -24$

In the third round, John's score was 48, which means he answered 48 questions correctly and 2 questions incorrectly. Therefore, his net score after the third round is:
 $-24 + 48 = 24$

In the fourth round, John's score was 41, which means he answered 41 questions correctly and 9 questions incorrectly. Therefore, his net score after the fourth round is:
 $24 - 9 = 15$

In the fifth round, John's score was -37, which means he answered 13 questions correctly and 37 questions incorrectly. Therefore, his net score after the fifth round is:
 $15 - 37 = -22$

Therefore, John's total score at the end is -22.

22. Ali deposited ₹12,000, so his initial balance was ₹12,000.

He then withdrew ₹3,750, so his new balance is:

$$₹12,000 - ₹3,750 = ₹8,250.$$

Therefore, Ali's balance after the withdrawal is ₹8,250.

23. (1) A pair of negative integers whose sum gives 12 would be -6 and -6.
(2) A pair of negative integers whose difference gives -8 would be -12 and -4.
(3) A negative integer and a positive integer whose sum is -10 could be -12 and 2.
(4) A negative integer and a positive integer whose difference is 12 could be -6 and 6.

24. (1) -7, -4 (2) 18 (3) 0 (4) -15, 0
(5) -4, 12

25. (1) $x=5, y=7, z=-4$:

$$\text{Left-hand side: } [-x-(-y)]-z = [-5-(-7)]-(-4) = -5$$

$$\text{Right-hand side: } -x-[-y-(-z)] = -5-[-7-4] = -12$$

Therefore, the inequality is true.

(2) $x=20, y=13, z=-24$:

$$\text{Left-hand side: } [-x-(-y)]-z = [-20-(-13)]-(-24) = -7$$

$$\text{Right-hand side: } -x-[-y-(-z)] = -20-[-13-24] = -5$$

Therefore, the inequality is true.

(3) $x=28, y=-12, z=27$:

Left-hand side: $[-x-(-y)]-z = [-28-12]-27 = -47$

Right-hand side: $-x-[-y-(-z)] = -28-[-12-(-27)] = -43$

Therefore, the inequality is true.

(4) $x=-21, y=30, z=-41$:

Left-hand side: $[-x-(-y)]-z = [21-(-30)]-(-41) = -10$

Right-hand side: $-x-[-y-(-z)] = -21-[-30-41] = 70$

Therefore, the inequality is false.

26. (1) $x=8, y=10$:

Left-hand side: $x-(-y) = 8-(-10) = 18$

Right-hand side: $x+y = 8+10 = 18$

Therefore, the equation is true.

(2) $x=24, y=33$:

Left-hand side: $x-(-y) = 24-(-33) = 57$

Right-hand side: $x+y = 24+33 = 57$

Therefore, the equation is true.

(3) $x=24, y=44$:

Left-hand side: $x-(-y) = 24-(-44) = 68$

Right-hand side: $x+y = 24+44 = 68$

Therefore, the equation is true.

(4) $x=-65, y=15$:

Left-hand side: $x-(-y) = -65-(-15) = -50$

Right-hand side: $x+y = -65+15 = -50$

Therefore, the equation is true.

(5) $x=59, y=-82$:

Left-hand side: $x-(-y) = 59-82 = -23$

Right-hand side: $x+y = 59+(-82) = -23$

Therefore, the equation is true.

(6) $x=43, y=52$:

Left-hand side: $x-(-y) = 43-(-52) = 95$

Right-hand side: $x+y = 43+52 = 95$

Therefore, the equation is true.

Hence, the equation $x-(-y) = x+y$ is verified to be true for all the given values of x and y .

27. (1) c (2) b (3) a (4) d

Exercise 2.3

1. (1) $0 \text{ by } 5 = 0$

(2) $-2 \text{ by } 6 = -12$

(3) $3 \text{ by } (-3) = -9$

(4) $-23 \text{ by } 7 = -161$

(5) $-125 \text{ by } 7 = -875$

(6) $12 \text{ by } -12 = -144$

(7) $-15 \text{ by } -10 = 150$

(8) $35 \text{ by } -11 = -385$

2. (1) $(9 + 7) \times 10 = 16 \times 10 = 160$

$9 + 7 \times 10 = 9 + 70 = 79$

Therefore, $(9 + 7) \times 10$ is greater than $9 + 7 \times 10$.

(2) $(3 - 8) \times 16 = (-5) \times 16 = -80$

$3 - 8 \times 16 = 3 - 128 = -125$

Therefore, $(3 - 8) \times 16$ is greater than $3 - 8 \times 16$.

(3) $[(-1) - 7] \times (-6) = (-8) \times (-6) = 48$

$(-1) - 7 \times (-6) = (-1) - (-42) = 41$

Therefore, $[(-1) - 7] \times (-6)$ is greater than $(-1) - 7 \times (-6)$.

3. (1) $-22 \times [(-3) + 23] = (-22) \times (-3) + (-22) \times 23$

Left-hand side:

$-22 \times [(-3) + 23] = -22 \times [20] = -440$

Right-hand side:

$(-22) \times (-3) + (-22) \times 23 = 66 + (-506) = -440$

Since both sides are equal, the equation is verified.

(2) $13 \times [7 + (-8)] = 13 \times 7 + 13 \times (-8)$

Left-hand side:

$13 \times [7 + (-8)] = 13 \times [-1] = -13$

Right-hand side:

$13 \times 7 + 13 \times (-8) = 91 + (-104) = -13$

Since both sides are equal, the equation is verified.

(3) $(-11) \times [(-5) + (9)] = (-11) \times (-5) + (-11) \times (-9)$

Left-hand side:

$(-11) \times [(-5) + (9)] = (-11) \times [4] = -44$

Right-hand side:

$(-11) \times (-5) + (-11) \times (-9) = 55 + 99 = 154$

The left-hand side is -44, while the right-hand side is 154. Therefore, the equation is not verified.

4. Do it yourself

5. (1) $(-3) \times 2 \times (-5) = 30$

(2) $5 \times (-7) \times 8 = -280$

(3) $3 \times (-8) \times (-4) = 96$

(4) $(-20) \times 12 \times (-10) = 2400$

(5) $(-9) \times (-35) \times 0 = 0$

(6) $(-3) \times (-5) \times (-7) = -105$

(7) $(-3) \times (-6) \times (-9) \times (-12) = -1944$

$$(8) (-2) \times (-4) \times (-6) \times (-8) = -384$$

$$6. (1) 13 \times (40 - 2) = 13 \times 38$$

$$= 494$$

$$(2) 10 \times (-15) \times (-12) = 10 \times 180$$

$$= 1800$$

$$(3) 15 \times (-21) + 22 = -315 + 22$$

$$= -293$$

$$(4) (-23) \times (-6) \times 5 \times (-15) = (-23) \times 6 \times 5 \times 15$$

$$= 10350$$

$$(5) 17 \times [(-18) + 8] = 17 \times (-10)$$

$$= -170$$

$$(6) (-16) \times 32 + 8 \times (-16) = -512 - 128$$

$$= -640$$

7. If x multiplied by (-1) is 17 , we can write this as:

$$x(-1) = 17$$

Multiplying both sides by (-1) , we get:

$$x = -17$$

Therefore, the integer x is negative.

8. Let the required integer be x . We are given that:

$$x(-1) = -51$$

Multiplying both sides by (-1) , we get:

$$x = 51$$

Therefore, the integer whose product with -1 is -51 is 51 .

9. (1) For Ravi, number of correct answers = $15 - 8 = 7$

$$\text{Total marks obtained by Ravi} = 4 \times 7 + (-1) \times 8 = 28 - 8 = 20$$

(2) For Leena, number of correct answers = 12 and number of incorrect answers = $20 - 12 = 8$

$$\text{Total marks obtained by Leena} = 4 \times 12 + (-1) \times 8 = 48 - 8 = 40$$

Therefore, Ravi obtained 20 marks and Leena obtained 40 marks.

10. (1) When we multiply 5 negative integers and 2 positive integers, the product will be negative. This is because when an odd number of negative numbers are multiplied, the product will be negative.

(2) When we multiply 4 negative integers and 7 positive integers, the product will be positive. This is because when an even number of negative numbers are multiplied, the product will be positive. However, since we have 4 negative numbers which is an even number, the product will be positive.

11. Let x and y be the two integers.

Given that their sum is -11 , we have:

$$x + y = -11$$

Given that their product is -60 , we have:

$$xy = -60$$

We can now use algebraic manipulation to solve for x and y. First, we can rewrite the equation for the sum as:

$$y = -11 - x$$

We can then substitute this expression for y into the equation for the product:

$$x(-11 - x) = -60$$

Expanding the left side, we get:

$$-11x - x^2 = -60$$

Rearranging and simplifying, we get a quadratic equation:

$$x^2 + 11x - 60 = 0$$

We can solve for x by factoring or using the quadratic formula. Factoring, we find:

$$(x + 15)(x - 4) = 0$$

So either $x + 15 = 0$ or $x - 4 = 0$. Solving for x in each case, we get:

$$x = -15 \text{ or } x = 4$$

If $x = -15$, then $y = -11 - x = -11 - (-15) = 4$, which gives us a product of $xy = (-15)(4) = -60$.

If $x = 4$, then $y = -11 - x = -11 - 4 = -15$, which again gives us a product of $xy = (4)(-15) = -60$.

Therefore, the two integers are -15 and 4.

12. (1) positive (2) negative (3) positive
(4) negative (5) negative

13. (1) Profit earned by selling 5 kg of potatoes = $5 \times ₹ 7 = ₹ 35$

Loss incurred by selling 8 kg of tomatoes = $8 \times ₹ 8 = ₹ 64$

Total profit or loss = Profit earned - Loss incurred = $₹ 35 - ₹ 64 = - ₹ 29$

Therefore, the vender incurred a loss of ₹ 29 on the sale of 5 kg of potatoes and 8 kg of tomatoes.

(2) Let the quantity of potatoes to be sold be x kg.

Profit earned by selling x kg of potatoes = $7x$

Loss incurred by selling 14 kg of tomatoes = $14 \times ₹ 8 = ₹ 112$

For a no-profit no-loss situation, we need to have:

Profit earned = Loss incurred

$$7x = ₹ 112$$

$$x = ₹ 112/7$$

$$x = 16$$

Therefore, the vender should sell 16 kg of potatoes.

14. (1) f (2) c (3) b (4) e (5) d (6) a

15. Cost of 1 TV set = Rs. 12,000

Cost of 4 TV sets = $4 \times 12,000 = ₹ 48,000$

Let, Selling Price of 1 TV set = Rs x Then, Selling price of 4 TV sets = $4x$

Given that the target is less by Rs 1600 for the 4 TV's

$$\text{So, } 48,000 = 4x + 1600 \quad 4x = 46,400 \quad x = 11,600$$

So, the four TVs was sold for Rs 11,600 each. Total sales target = $10 \times 12,000 = ₹ 1,20,000$

Remaining Sales target = $6 \times 12,000 = ₹ 72,000$

Selling price of 6 Tvs = $6 \times 11,600 = 69,600$
Short from target = Rs. $(72,000 - 69,600) = \text{Rs } 2400$.

16. (1) b (2) a (3) b (4) c (5) a

Exercise 2.4

1. (1) $(-15) + 6 = -9$

$-9 \div (-3) = 3$

(2) $-45 \div (-45) = 1$

(3) $16 \div (-16) = -1$

(4) $(-36) \div (-4) = 9$

$(-216) \div 9 = -24$

(5) $[(-5) + 4] = -1$

$19 \div (-1) = -19$

(6) $(-7) + 13 = 6$

$(-9) + 3 = -6$

$6 \div (-6) = -1$

2. (1) F (2) F (3) F (4) T

3. $(-11,5)$, $(-12,6)$, $(-13,7)$, $(-20,14)$, $(-25,19)$

4. (1) 0 (2) -32 (3) -81 (4) -1 (5) -1 (6) -125

5. (1) Total Marks = 24

Number of Correct Answers = 12

Marks for Correct Answer = +4

Marks for Incorrect Answer = -1

setting up the equation:

$$24 = (12 * 4) + (x * -1)$$

Simplifying the equation:

$$24 = 48 - x$$

$$x = 48 - 24$$

$$x = 24$$

(2) Total Marks = -5

Number of Correct Answers = 7

Marks for Correct Answer = +4

Marks for Incorrect Answer = -1

Setting up the equation:

$$-5 = (7 * 4) + (y * -1)$$

Simplifying the equation:

$$-5 = 28 - y$$

$$y = 28 + 5$$

$$y = 33$$

6. One number = 125

Product of the two numbers = -625

$$-625 = 125 * x$$

$$x = -625 / 125$$

$$x = -5$$

7. The height of each floor is 8 m, so the distance between the 32nd and 96th floor is $(96 - 32) * 8 = 64 * 8 = 512$ m.

The balloon rises 4 m every second, so to cover a distance of 512 m, it will take $512 / 4 = 128$ seconds.

Therefore, it will take 2 minutes 8 seconds for the balloon

8. The lift moves at a rate of 3 m per 15 seconds. Therefore, in 1 minute, the lift covers a distance of $(3/15) * 60 = 12$ meters

After 12 minutes, the lift will cover a distance of $12 \text{ meters} * 12 = 144$ meters

Since the lift starts coming down from a height of 70 meters, its final position after 12 minutes will be $70 \text{ meters} - 144 \text{ meters} = -74$ meters.

Therefore, the lift will be at a position of -74 meters after 12 minutes.

9. The elevator descends at a rate of 8 m per minute. To reach a depth of -270 m, it needs to cover a total distance of $30 \text{ m} - (-270 \text{ m}) = 300$ m.

Since the elevator descends at a rate of 8 m per minute, the time taken to cover a distance of 300 m is $300 \text{ m} / 8 \text{ m per minute} = 37.5$ minutes

10. The room temperature needs to be lowered from 32°C to -12°C , which is a difference of $32^\circ\text{C} - (-12^\circ\text{C}) = 44^\circ\text{C}$.

The temperature can be lowered by 4°C every hour, so the total time required to lower the temperature by 44°C is $44^\circ\text{C} / 4^\circ\text{C per hour} = 11$ hours

11. Day 1: 6 metres

Day 2: $6 + 6 = 12$ meters

Day 3: $12 + 6 = 18$ meters

Day 4: $18 + 6 = 24$ meters

Day 5: $24 + 6 = 30$ meters

Day 6: $30 + 6 = 36$ meters

Day 7: $36 + 6 = 42$ meters

Therefore, Bhawesh dove to a depth of 42 meters on the seventh day.

12. The number of hours required to reach 5°C below zero as follows:

$$10^\circ\text{C above zero} - 5^\circ\text{C below zero} = 10^\circ\text{C} - (-5^\circ\text{C}) = 10^\circ\text{C} + 5^\circ\text{C} = 15^\circ\text{C}$$

$$15^\circ\text{C decrease} / 3^\circ\text{C per hour} = 5 \text{ hours}$$

Temperature decrease = $3\text{ }^{\circ}\text{C}/\text{hour} \times 12\text{ hours} = 36\text{ }^{\circ}\text{C}$

Initial temperature at 8 p.m. = $10\text{ }^{\circ}\text{C}$ above zero

Temperature at 8 a.m. = $10\text{ }^{\circ}\text{C} - 36\text{ }^{\circ}\text{C} = -26\text{ }^{\circ}\text{C}$

Therefore, the temperature at 8 a.m. would be $-26\text{ }^{\circ}\text{C}$.

CHAPTER 3

Exercise 3.1

1. (1) unlike fractions (2) like fractions
(3) like fractions (3) unlike fractions

2. (1) improper fraction (2) improper fraction (3) mixed fraction (4) proper fraction (5) mixed fraction (6) mixed fraction (7) mixed fraction (8) improper fraction

3. (1) $4/10$ $6/15$ $8/20$
(2) $2/12$ $3/18$ $4/24$
(3) $3/4$ $9/12$ $45/60$
(4) $18/22$ $27/33$ $36/44$

4. (1) $3/8$ with numerator 36:

Since $36 = 3 \times 12$, we can multiply both the numerator and denominator of $3/8$ by 12:

$$3/8 = 3 \times 12 / 8 \times 12 = 36/96$$

- (2) $5/7$ with denominator 35:

Since $35 = 7 \times 5$, we can multiply both the numerator and denominator of $5/7$ by 5:

$$5/7 = 5/7 \times 5/5 = 25/35$$

- (3) $9/11$ with numerator 63:

Since $63 = 9 \times 7$, we can multiply both the numerator and denominator of $9/11$ by 7:

$$9/11 = 9 \times 7 / 11 \times 7 = 63/77$$

- (4) $12/15$ with numerator 4:

Since $4 = 12 / 3$, we can divide both the numerator and denominator of $12/15$ by 3:

$$12/15 = 12/15 / 3/3 = 4/5$$

- (5) $20/30$ with denominator 15:

Since $15 = 30 / 2$, we can divide both the numerator and denominator of $20/30$ by 2:

$$20/30 = 20/30 / 2/2 = 10/15$$

- (6) $10/38$ with numerator 5:

Since $5 = 10 / 2$, we can divide both the numerator and denominator of $10/38$ by 2:

$$10/38 = 10/38 / 2/2 = 5/19$$

5. (1) $11\frac{1}{7}$:

$$11 \times 6 + 1 = 77 + 1 = 78$$

The improper fraction is $78/6$.

- (2) $5\frac{1}{5}$:

$$5 * 5 + 1 = 25 + 1 = 26$$

The improper fraction is $26/5$.

(3) $7 \frac{5}{7}$:

$$7 * 7 + 5 = 49 + 5 = 54$$

The improper fraction is $54/7$.

(4) $16 \frac{7}{9}$:

$$16 * 9 + 7 = 144 + 7 = 151$$

The improper fraction is $151/9$.

6. (1) $54/19 = 2 \frac{16}{19}$

(2) $122/5 = 24 \frac{2}{5}$

(3) $27/5 = 5 \frac{2}{5}$

(4) $134/13 = 10 \frac{4}{13}$

7. (1) $6/11, 6/7, 6/5, 6/8$

The LCM of 11, 7, 5, and 8 is 770.

Comparing the numerators:

$$6/11 = 462/770$$

$$6/7 = 660/770$$

$$6/5 = 924/770$$

$$6/8 = 577.5/770$$

Arranging them in ascending order:

$$6/11 < 6/8 < 6/7 < 6/5$$

(2) $2/5, 3/10, 9/14, 16/35$

The LCM of 5, 10, 14, and 35 is 70.

Comparing the numerators:

$$2/5 = 28/70$$

$$3/10 = 21/70$$

$$9/14 = 45/70$$

$$16/35 = 32/70$$

Arranging them in ascending order:

$$3/10 < 2/5 < 16/35 < 9/14$$

(3) $3/4, 2/5, 1/10, 5/8$

The LCM of 4, 5, 10, and 8 is 40.

Comparing the numerators:

$$3/4 = 30/40$$

$$2/5 = 16/40$$

$$1/10 = 4/40$$

$$5/8 = 25/40$$

Arranging them in ascending order:

$$1/10 < 2/5 < 5/8 < 3/4$$

(4) $3/10, 4/5, 7/15, 9/25$

The LCM of 10, 5, 15, and 25 is 150.

Comparing the numerators:

$$3/10 = 45/150$$

$$4/5 = 120/150$$

$$7/15 = 70/150$$

$$9/25 = 54/150$$

Arranging them in ascending order:

$$3/10 < 9/25 < 7/15 < 4/5$$

8. (1) $2/7, 2/9, 2/10, 2/5$:

The LCM of 7, 9, 10, and 5 is 630.

$$2/7 = 180 / 630$$

$$2/9 = 140 / 630$$

$$2/10 = 126 / 630$$

$$2/5 = 252 / 630$$

So, the fractions in descending order are:

$$2/5 > 2/7 > 2/9 > 2/10.$$

(2) $1/2, 3/4, 1/8, 5/6$:

The LCM of 2, 4, 8, and 6 is 24.

$$1/2 = 12/24$$

$$3/4 = 18/24$$

$$1/8 = 3/24$$

$$5/6 = 20/24$$

So, the fractions in descending order are:

$$5/6 > 3/4 > 1/2 > 1/8.$$

(3) $1/3, 1/4, 1/6, 1/10$:

The LCM of 3, 4, 6, and 10 is 60.

$$1/3 = 20/60$$

$$1/4 = 15/60$$

$$1/6 = 10/60$$

$$1/10 = 6/60$$

So, the fractions in descending order are:

$$1/3 > 1/4 > 1/6 > 1/10.$$

(4) $2/9, 17/9, 15/9, 8/9$:

Since all the fractions have the same denominator, we can directly compare their numerators:

So, the fractions in descending order are:

$$17/9 > 15/9 > 8/9 > 2/9.$$

9. (1) $3/4$ (2) $7/5$ (3) $7/6$ (4) 1 (5) $3/5$ (6) $39/17$ (7) $36/20$

10. (1) $6/7 + 5/6$:

The LCM of 7 and 6 is 42.

$$6/7 * 6/6 = 36/42$$

$$5/6 * 7/7 = 35/42$$

Now, we can add the fractions:

$$36/42 + 35/42 = 71/42$$

(2) $3 + 2\frac{5}{7}$:

$$2\frac{5}{7} \text{ can be written as } (2 * 7 + 5)/7 = 19/7.$$

Now, we can add the fractions:

$$3 + 19/7 = 21/7 + 19/7 = 40/7$$

(3) $3\frac{5}{9} + 1\frac{3}{8}$:

To add mixed numbers, we need to convert them to improper fractions.

$$3\frac{5}{9} \text{ can be written as } (3 * 9 + 5)/9 = 32/9.$$

$$1\frac{3}{8} \text{ can be written as } (1 * 8 + 3)/8 = 11/8.$$

The LCM of 9 and 8 is 72.

$$32/9 * 8/8 = 256/72$$

$$11/8 * 9/9 = 99/72$$

Now, we can add the fractions:

$$256/72 + 99/72 = 355/72$$

(4) $4/9 + 5/12 + 19/18$:

The LCM of 9, 12, and 18 is 36.

$$4/9 * 4/4 = 16/36$$

$$5/12 * 3/3 = 15/36$$

$$19/18 * 2/2 = 38/36$$

Now, we can add the fractions:

$$16/36 + 15/36 + 38/36 = 69/36$$

5) $7/12 + 11/16 + 9/24$:

The LCM of 12, 16, and 24 is 48.

$$7/12 * 4/4 = 28/48$$

$$11/16 * 3/3 = 33/48$$

$$9/24 * 2/2 = 18/48$$

Now, we can add the fractions:

$$28/48 + 33/48 + 18/48 = 79/48$$

(6) $6\frac{2}{4} + 1\frac{1}{6} + 2\frac{1}{8}$:

$$6\frac{2}{4} \text{ can be written as } (6 * 4 + 2)/4 = 26/4.$$

$$1\frac{1}{6} \text{ can be written as } (1 * 6 + 1)/6 = 7/6.$$

$$2\frac{1}{8} \text{ can be written as } (2 * 8 + 1)/8 = 17/8.$$

Now, we can find the LCM of 4, 6, and 8, which is 24.

$$26/4 * 6/6 = 156/24$$

$$7/6 * 4/4 = 28/24$$

$$17/8 * 3/3 = 51/24$$

Now, we can add the fractions:

$$156/24 + 28/24 + 51/24 = 235/24$$

(7) $2\frac{3}{8} + 4\frac{5}{6} + 7\frac{3}{4}$:

$$2\frac{3}{8} \text{ can be written as } (2 * 8 + 3)/8 = 19/8.$$

$$4\frac{5}{6} \text{ can be written as } (4 * 6 + 5)/6 = 29/6.$$

$$7\frac{3}{4} \text{ can be written as } (7 * 4 + 3)/4 = 31/4.$$

The LCM of 8, 6, and 4 is 24.

$$19/8 * 3/3 = 57/24$$

$$29/6 * 4/4 = 116/24$$

$$31/4 * 6/6 = 186/24$$

Now, we can add the fractions:

$$57/24 + 116/24 + 186/24 = 359/24$$

$$(8)3 \frac{3}{7} + 4 \frac{1}{3} + 3 \frac{1}{8}$$

$$3 \frac{3}{7} \text{ can be written as } (7 * 3 + 3) / 7 = 24/7$$

$$4 \frac{1}{3} \text{ can be written as } (3 * 4 + 1) / 3 = 13/3$$

$$3 \frac{1}{8} \text{ can be written as } (8 * 3 + 1) / 8 = 25/8$$

The LCM of 7, 3, and 8 is 168.

$$24/7 * 24/24 = 576/168$$

$$13/3 * 56/56 = 728/168$$

$$25/8 * 21/21 = 525/168$$

Now, we can add the fractions.

$$576/168 + 728/168 + 525/168 = 1829/168$$

11. (1) $5/6 - 3/4$:

$$\text{LCM}(6, 4) = 12$$

Convert fractions to have a common denominator of 12:

$$5/6 = 10/12$$

$$3/4 = 9/12$$

$$\text{Subtract: } 10/12 - 9/12 = 1/12$$

(2) $5/7 - 2/7$:

$$\text{LCM}(7, 7) = 7$$

The denominators are already the same, so subtract the numerators directly:

$$5/7 - 2/7 = 3/7$$

(3) $4/7 - 5/21$:

$$\text{LCM}(7, 21) = 21$$

Convert fractions to have a common denominator of 21:

$$4/7 = 12/21$$

$5/21$ remains the same

$$\text{Subtract: } 12/21 - 5/21 = 7/21 = 1/3$$

(4) $5 \frac{1}{40} - 1 \frac{3}{25}$:

$$\text{LCM}(40, 25) = 200$$

Convert mixed numbers to improper fractions:

$$5 \frac{1}{40} = 201/40$$

$$1 \frac{3}{25} = 28/25$$

$$\text{Subtract: } 201/40 - 28/25 = 1005/200 - 224/200 = 781/200$$

(5) $3/8 - 1/4$:

$$\text{LCM}(8, 4) = 8$$

Convert fractions to have a common denominator of 8:

$3/8$ remains the same

$$1/4 = 2/8$$

$$\text{Subtract: } 3/8 - 2/8 = 1/8$$

$$(6) 13 \frac{8}{9} - 5 \frac{3}{7}:$$

$$\text{LCM}(9, 7) = 63$$

Convert mixed numbers to improper fractions:

$$13 \frac{8}{9} = 125/9$$

$$5 \frac{3}{7} = 38/7$$

$$\text{Subtract: } 125/9 - 38/7 = 875/63 - 342/63 = 533/63$$

$$(7) 2 \frac{4}{5} - 2 \frac{3}{10}:$$

$$\text{LCM}(5, 10) = 10$$

Convert mixed numbers to improper fractions:

$$2 \frac{4}{5} = 14/5$$

$$2 \frac{3}{10} = 23/10$$

$$\text{Subtract: } 14/5 - 23/10 = 28/10 - 23/10 = 5/10 = 1/2$$

$$(8) 4 \frac{3}{20} - 3 \frac{4}{15}:$$

$$\text{LCM}(20, 15) = 60$$

Convert mixed numbers to improper fractions:

$$4 \frac{3}{20} = 83/20$$

$$3 \frac{4}{15} = 49/15$$

$$\text{Subtract: } 83/20 - 49/15 = 249/60 - 196/60 = 53/60$$

12. Do it yourself

$$13. \text{Length} = 24 \frac{1}{3} \text{ m}$$

$$\text{Width} = 15 \frac{1}{4} \text{ m}$$

$$24 \frac{1}{3} = (3 * 24 + 1) / 3 = 73/3$$

$$15 \frac{1}{4} = (4 * 15 + 1) / 4 = 61/4$$

$$\text{Perimeter} = 2(\text{length} + \text{width})$$

$$\text{Perimeter} = 2((73/3) + (61/4))$$

$$\text{Perimeter} = 2((73/3) + (61/4))$$

$$\text{Perimeter} = 2((734 + 613) / (3*4))$$

$$\text{Perimeter} = 2((292 + 183) / 12)$$

$$\text{Perimeter} = 2(475 / 12)$$

$$\text{Perimeter} = 950/12$$

Simplify the fraction further, The numerator and denominator of 950/12 can be divided by 2:

$$\text{Perimeter} = (950/2) / (12/2)$$

$$\text{Perimeter} = 475/6 = 79 \frac{1}{6}$$

So, the perimeter of the rectangular piece of land is $79 \frac{1}{6}$ meters.

$$14. \text{Total study time} = 8 \frac{1}{2} \text{ hours}$$

$$\text{Time spent on science subjects} = 2 \frac{1}{4} \text{ hours}$$

First, let's convert the mixed numbers to improper fractions:

$$8 \frac{1}{2} = 17/2$$

$$2 \frac{1}{4} = \frac{9}{4}$$

Total study time - Time spent on science subjects = $\frac{17}{2} - \frac{9}{4}$

The least common multiple (LCM) of 2 and 4 is 4.

$$\frac{17}{2} = \frac{34}{4}$$

$\frac{9}{4}$ remains the same

$$\text{Subtracting: } \frac{34}{4} - \frac{9}{4} = \frac{(34 - 9)}{4} = \frac{25}{4}$$

Therefore, the boy spends $\frac{25}{4}$ hours, or $6 \frac{1}{4}$ hours, on other subjects.

15. If Soma gave $\frac{3}{7}$ of the pizza to her brother, the fraction of pizza left with her can be found by subtracting $\frac{3}{7}$ from 1 (which represents the whole pizza).

$$1 - \frac{3}{7} = \frac{7}{7} - \frac{3}{7} = \frac{4}{7}$$

Therefore, Soma has $\frac{4}{7}$ of the pizza left with her.

16. (1) Length = $2 \frac{1}{3}$ m and Breadth = $\frac{3}{4}$ m

Converting the mixed number to an improper fraction:

$$\text{Length} = 2 \frac{1}{3} = \frac{7}{3} \text{ m}$$

$$\text{Breadth} = \frac{3}{4} \text{ m}$$

$$\text{Perimeter} = 2\left(\frac{7}{3} + \frac{3}{4}\right)$$

$$= 2\left(\frac{28}{12} + \frac{9}{12}\right)$$

$$= 2\left(\frac{37}{12}\right)$$

$$= \frac{74}{12}$$

$$= 6 \frac{2}{12} \text{ m}$$

$$= 6 \frac{1}{6} \text{ m}$$

Therefore, the perimeter of the rectangle is $6 \frac{1}{6}$ m.

(2) Length = $7 \frac{1}{4}$ m and Breadth = $2 \frac{2}{3}$ m

Converting the mixed number to an improper fraction:

$$\text{Length} = 7 \frac{1}{4} = \frac{29}{4} \text{ m}$$

$$\text{Breadth} = 2 \frac{2}{3} = \frac{8}{3} \text{ m}$$

$$\text{Perimeter} = 2\left(\frac{29}{4} + \frac{8}{3}\right)$$

$$= 2\left(\frac{87}{12} + \frac{32}{12}\right)$$

$$= 2\left(\frac{119}{12}\right)$$

$$= \frac{238}{12}$$

$$= 19 \frac{10}{12} \text{ m}$$

$$= 19 \frac{5}{6} \text{ m}$$

Therefore, the perimeter of the rectangle is $19 \frac{5}{6}$ m.

17. (1) c (2) d (3) d (4) b

Exercise 3.2

1.(1) $\frac{5}{8} \times 4$:

Multiply the numerator of the fraction by 4:

$$\frac{5}{8} \times 4 = \frac{(5 \times 4)}{8} = \frac{20}{8} = 2 \frac{1}{2}$$

(2) $2\frac{4}{15} \times 12$:

Convert the mixed number to an improper fraction:

$$2\frac{4}{15} = (2 \times 15 + 4) / 15 = 34/15$$

Multiply the fraction by 12:

$$34/15 \times 12 = (34 \times 12) / 15 = 408/15 = 27\frac{3}{15} = 27\frac{1}{5}$$

(3) $3\frac{1}{8} \times 16$:

Convert the mixed number to an improper fraction:

$$3\frac{1}{8} = (3 \times 8 + 1) / 8 = 25/8$$

Multiply the fraction by 16:

$$25/8 \times 16 = (25 \times 16) / 8 = 400/8 = 50$$

(4) $5\frac{5}{6} \times 15/7$:

Convert the mixed number to an improper fraction:

$$5\frac{5}{6} = (5 \times 6 + 5) / 6 = 35/6$$

Multiply the fractions:

$$35/6 \times 15/7 = (35 \times 15) / (6 \times 7) = 525/42 = 25/2 = 12\frac{1}{2}$$

(5) $3\frac{6}{7} \times 49/81$:

Convert the mixed number to an improper fraction:

$$3\frac{6}{7} = (3 \times 7 + 6) / 7 = 27/7$$

Multiply the fractions:

$$27/7 \times 49/81 = (27 \times 49) / (7 \times 81) = 1323/567 = 63/27 = 2\frac{1}{3}$$

(6) $9/8 \times 3\frac{5}{9}$:

Convert the mixed number to an improper fraction:

$$3\frac{5}{9} = (3 \times 9 + 5) / 9 = 32/9$$

Multiply the fractions:

$$9/8 \times 32/9 = (9 \times 32) / (8 \times 9) = 288/72 = 4$$

2.(1) $3/4$ of 32:

Multiply 32 by $3/4$:

$$(3/4) * 32 = (3 * 32) / 4 = 96 / 4 = 24$$

(2) $1/3$ of $6/7$:

Multiply $6/7$ by $1/3$:

$$(1/3) * (6/7) = (1 * 6) / (3 * 7) = 6 / 21 = 2/7$$

(3) $5/9$ of 45:

Multiply 45 by $5/9$:

$$(5/9) * 45 = (5 * 45) / 9 = 225 / 9 = 25$$

(4) $5/8$ of $32/45$:

Multiply $32/45$ by $5/8$:

$$(5/8) * (32/45) = (5 * 32) / (8 * 45) = 160 / 360 = 4/9$$

(5) $3/2$ of $4\frac{2}{3}$:

Convert the mixed number to an improper fraction:

$$4\frac{2}{3} = (4 * 3 + 2) / 3 = 14/3$$

Multiply $14/3$ by $3/2$:

$$(3/2) * (14/3) = (3 * 14) / (2 * 3) = 42 / 6 = 7$$

(6) $1/13$ of $5 \frac{1}{5}$:

Convert the mixed number to an improper fraction:

$$5 \frac{1}{5} = (5 * 5 + 1) / 5 = 26/5$$

Multiply $26/5$ by $1/13$:

$$(1/13) * (26/5) = (1 * 26) / (13 * 5) = 26 / 65$$

3. (1) $12/27 = 4/9$

$$81/36 = 9/4$$

$$6/4 = 3/2$$

$$(4/9) * (9/4) * (3/2) = (4 * 9 * 3) / (9 * 4 * 2) = 108/72$$

To further simplify the fraction, we can divide both the numerator and the denominator by their greatest common divisor, which is 36:

$$108/72 = (108 \div 36) / (72 \div 36) = 3/2$$

Therefore, the simplified expression is $3/2$.

$$(2) 6/5 = 6/5$$

$$8/15 = 8/15$$

$$5/32 = 5/32$$

$$(6/5) * (8/15) * (5/32) = (6 * 8 * 5) / (5 * 15 * 32) = 240/2400$$

To further simplify the fraction, we can divide both the numerator and the denominator by their greatest common divisor, which is 120:

$$240/2400 = (240 \div 120) / (2400 \div 120) = 2/20 = 1/10$$

Therefore, the simplified expression is $1/10$.

$$(3) 7 \frac{2}{5} = (7 * 5 + 2)/5 = 37/5$$

Now, we can multiply the fractions together:

$$(37/5) * (25/74) * (16/40) * (1/1) = (37 * 25 * 16) / (5 * 74 * 40 * 1) = 14800/14800 = 1$$

Therefore, the simplified expression is 1.

$$(4) 4 \frac{1}{6} = (4 * 6 + 1)/6 = 25/6$$

$$6 \frac{6}{7} = (6 * 7 + 6)/7 = 48/7$$

Now, we can multiply the fractions together:

$$(25/6) * (48/7) * (5/24) * (11/25) = (25 * 48 * 5 * 11) / (6 * 7 * 24 * 25) = 66000/25200$$

To further simplify the fraction, we can divide both the numerator and the denominator by their greatest common divisor, which is 1200:

$$66000/25200 = (66000 \div 1200) / (25200 \div 1200) = 55/21$$

Therefore, the simplified expression is $55/21$.

$$(5) 2 \frac{1}{14} = (2 * 14 + 1)/14 = 29/14$$

Now, we can multiply the fractions together:

$$(7/10) * (29/14) * (20/58) = (7 * 29 * 20) / (10 * 14 * 58) = 4060/8120$$

To further simplify the fraction, we can divide both the numerator and the denominator by their greatest common divisor, which is 20:

$$4060/8120 = (4060 \div 20) / (8120 \div 20) = 203/406$$

Therefore, the simplified expression is $203/406$, which can be further reduced to $1/2$.

$$(6) 3 \frac{4}{7} = (3 * 7 + 4)/7 = 25/7$$

$$3 \frac{3}{5} = (3 * 5 + 3)/5 = 18/5$$

$$1\frac{2}{3} = (1 * 3 + 2)/3 = 5/3$$

Now, we can multiply the fractions together:

$$(25/7) * (18/5) * (5/9) * (5/3) = (25 * 18 * 5 * 5) / (7 * 5 * 9 * 3) = 11250/4725$$

To further simplify the fraction, we can divide both the numerator and the denominator by their greatest common divisor, which is 75:

$$11250/4725 = (11250 \div 75) / (4725 \div 75) = 150/63$$

To simplify it even further, we can divide both the numerator and the denominator by their greatest common divisor, which is 3:

$$150/63 = (150 \div 3) / (63 \div 3) = 50/21$$

Therefore, the simplified expression is 50/21.

4. Calculate the share of his son:

$$1/3 \text{ of } ₹ 90,00,000 = (1/3) * ₹ 90,00,000 = ₹ 30,00,000$$

Calculate the share of his daughter:

$$1/5 \text{ of } ₹ 90,00,000 = (1/5) * ₹ 90,00,000 = ₹ 18,00,000$$

Calculate the remaining share for the granddaughter:

$$\text{Remaining share} = \text{Total amount} - (\text{Son's share} + \text{Daughter's share})$$

$$\text{Remaining share} = ₹ 90,00,000 - (₹ 30,00,000 + ₹ 18,00,000) = ₹ 42,00,000$$

5. Distance covered in 1 hour: $3\frac{1}{4}$ km = $13/4$ km

Number of hours: 8

$$\text{Distance covered in 8 hours: } (13/4 \text{ km}) * 8 = 13/4 * 8 = 104/4 \text{ km} = 26 \text{ km}$$

Therefore, Rama would go 26 km in 8 hours.

6. Area = side length * side length

First, let's convert the mixed number $3\frac{1}{4}$ to an improper fraction:

$$3\frac{1}{4} = (3 * 4 + 1)/4 = 13/4$$

Now, we can calculate the area:

$$\text{Area} = (13/4 \text{ m}) * (13/4 \text{ m}) = 169/16 \text{ square meters}$$

Therefore, the area of the square park is 169/16 square meters.

7. First, let's convert the mixed numbers to improper fractions:

$$\text{Length} = 5\frac{3}{4} \text{ m} = (5 * 4 + 3)/4 = 23/4 \text{ m}$$

$$\text{Breadth} = 5 \text{ m}$$

Now, we can calculate the area:

$$\text{Area} = (23/4 \text{ m}) * (5 \text{ m}) = (23 * 5)/(4 * 1) = 115/4 \text{ square meters}$$

Therefore, the area of the school playground is 115/4 square meters.

8. Cost of 1 m of cloth: ₹ $7\frac{3}{5}$

$$\text{Length of cloth: } 2\frac{1}{2} \text{ m} = 5/2 \text{ m}$$

Now, we can calculate the cost:

$$\text{Cost of } 2\frac{1}{2} \text{ m of cloth} = (₹ 7\frac{3}{5}) * (5/2) = ₹ (7\frac{3}{5}) * (5/2)$$

To simplify this calculation, we first convert the mixed number ₹ $7\frac{3}{5}$ to an improper fraction:

$$\text{₹ } 7 \frac{3}{5} = (\text{₹ } 7 * 5 + 3)/5 = \text{₹ } 38/5$$

Substituting this value into the calculation:

$$\text{Cost of } 2 \frac{1}{2} \text{ m of cloth} = (\text{₹ } 38/5) * (5/2) = \text{₹ } (38 * 5)/(5 * 2) = \text{₹ } 190/10 = \text{₹ } 19$$

Therefore, the cost of $2 \frac{1}{2}$ m of the same cloth is ₹ 19.

9. Distance covered in one day: $6 \frac{3}{8} \text{ km} = (6 * 8 + 3)/8 = 51/8 \text{ km}$

Number of days: $7 \frac{1}{2} \text{ days} = 7 + 1/2 = 15/2 \text{ days}$

Total distance covered: $(51/8 \text{ km}) * (15/2 \text{ days}) = (51 * 15)/(8 * 2) = 765/16 \text{ km}$

10. Distance covered in one hour: $58 \frac{2}{3} \text{ km} = (58 * 3 + 2)/3 = 176/3 \text{ km}$

Number of hours: 15

Total distance covered: $(176/3 \text{ km}) * 15 = (176 * 15)/3 = 880 \text{ km}$

Therefore, the truck will cover a distance of 880 km in 15 hours.

11. Cost per kg: ₹ $23 \frac{4}{5}$

Weight: 5 kg

Now, let's calculate the cost:

Cost of 5 kg of mangoes = $(\text{₹ } 23 \frac{4}{5}) * 5$

To simplify this calculation, we first convert the mixed number ₹ $23 \frac{4}{5}$ to an improper fraction:

$$\text{₹ } 23 \frac{4}{5} = (\text{₹ } 23 * 5 + 4)/5 = \text{₹ } 119/5$$

Substituting this value into the calculation:

$$\text{Cost of 5 kg of mangoes} = (\text{₹ } 119/5) * 5 = \text{₹ } 119$$

12. Total number of pages in the book: 175 pages

Part of the book read by Shyama: $3/7$

Number of pages Shyama has read: $(3/7) * 175 = 75 \text{ pages}$

To find the number of pages she has left to read:

$$\text{Total number of pages} - \text{Pages read} = 175 - 75 = 100 \text{ pages}$$

13. Each ticket costs ₹ $42 \frac{3}{4}$.

Therefore, the cost of 208 tickets = $208 * \text{₹ } 42 \frac{3}{4}$

$$= \text{₹ } (208 * 42) + (208 * 3/4)$$

$$= \text{₹ } 8736 + \text{₹ } 156$$

$$= \text{₹ } 8892$$

Hence, the amount collected for selling 208 tickets is ₹ 8892.

14. Area = (Side length)²

First, let's convert the mixed number $4 \frac{2}{3}$ to an improper fraction:

$$4 \frac{2}{3} = (3 * 4 + 2) / 3 = 14/3$$

Now we can calculate the area:

$$\text{Area} = (14/3)^2 = (14/3) * (14/3) = 196/9 \approx 21.78 \text{ m}^2$$

Therefore, the area of the square field is approximately 21.78 square meters.

15. Amount deposited in the bank = Monthly income - Amount spent

Amount spent = $(\frac{4}{7}) * \text{Monthly income}$

Let's calculate the amount spent:

Amount spent = $(\frac{4}{7}) * ₹ 19,600$

= $(\frac{4}{7}) * 19600$

= ₹ 11200

Now we can calculate the amount deposited in the bank:

Amount deposited in the bank = Monthly income - Amount spent

= ₹ 19600 - ₹ 11200

= ₹ 8400

16. Number of male employees = $(\frac{3}{7}) * 560$

Let's calculate this:

Number of male employees = $(\frac{3}{7}) * 560$

= $(\frac{3}{7}) * 560$

= 240

17. Height of the stack = Thickness of each board * Number of boards

First, let's convert the mixed number $3 \frac{2}{3}$ to an improper fraction:

$3 \frac{2}{3} = \frac{(3 * 3 + 2)}{3} = \frac{11}{3}$

Now we can calculate the height of the stack:

Height of the stack = $(\frac{11}{3}) * 9$

= $(\frac{11}{3}) * (\frac{9}{1})$

= $\frac{99}{3}$

= 33 cm

18. Number of passengers in one compartment = $(\frac{4}{7}) * 182$

= $(\frac{4}{7}) * 182$

= 104

Number of passengers in the other compartment = $182 - 104$

= 78

19. Weight of potatoes = $(\frac{5}{8}) * 352$

= $(\frac{5}{8}) * 352$

= 220 kg

Now, let's calculate the weight of the rotten potatoes:

Weight of rotten potatoes = $(\frac{1}{4}) * \text{Weight of potatoes}$

= $(\frac{1}{4}) * 220$

= 55 kg

Finally, let's calculate the weight of the good potatoes:

Weight of good potatoes = Weight of potatoes - Weight of rotten potatoes

= $220 - 55$

= 165 kg

The vendor sold all the good potatoes at ₹ 10 $\frac{1}{3}$ per kg.

First, let's convert the mixed number 10 $\frac{1}{3}$ to an improper fraction:

$$10 \frac{1}{3} = (3 * 10 + 1) / 3 = 31/3$$

Now, let's calculate the money received:

$$\text{Money received} = (165) * (31/3)$$

$$= (165 * 31) / 3$$

$$= 5115 / 3$$

$$= ₹ 1705$$

20. (1) b (2) b

Exercise 3.3

1.(1) $\frac{19}{8}$ (2) $\frac{5}{4}$ (3) $\frac{4}{13}$

2.(1) $\frac{1}{4}$ (2) $\frac{11}{14}$ (3) $\frac{24}{16}$

3.(1) $\frac{7}{10} \div \frac{3}{5}$

$$\text{Quotient} = (\frac{7}{10}) / (\frac{3}{5})$$

$$= (\frac{7}{10}) * (\frac{5}{3})$$

$$= (7 * 5) / (10 * 3)$$

$$= \frac{35}{30}$$

$$= \frac{7}{6}$$

(2) $\frac{4}{7} \div 1$

$$\text{Quotient} = (\frac{4}{7}) / 1$$

$$= (\frac{4}{7}) * (\frac{1}{1})$$

$$= \frac{4}{7}$$

(3) $\frac{8}{9} \div 16$

$$\text{Quotient} = (\frac{8}{9}) / 16$$

$$= (\frac{8}{9}) * (\frac{1}{16})$$

$$= \frac{8}{144}$$

$$= \frac{1}{18}$$

(4) $3 \frac{1}{6} \div \frac{38}{12}$

First, let's convert the mixed number $3 \frac{1}{6}$ to an improper fraction:

$$3 \frac{1}{6} = (6 * 3 + 1) / 6 = \frac{19}{6}$$

$$\text{Quotient} = (\frac{19}{6}) / (\frac{38}{12})$$

$$= (\frac{19}{6}) * (\frac{12}{38})$$

$$= (19 * 12) / (6 * 38)$$

$$= \frac{228}{228}$$

$$= 1$$

(5) $4 \frac{2}{7} \div 5 \frac{1}{7}$

First, let's convert the mixed numbers to improper fractions:

$$4 \frac{2}{7} = (7 * 4 + 2) / 7 = \frac{30}{7}$$

$$5 \frac{1}{7} = (7 * 5 + 1) / 7 = 36/7$$

$$\text{Quotient} = (30/7) / (36/7)$$

$$= (30/7) * (7/36)$$

$$= (30 * 7) / (7 * 36)$$

$$= 210/252$$

$$= 5/6$$

$$(6) 5 \frac{1}{2} \div 2$$

First, let's convert the mixed number $5 \frac{1}{2}$ to an improper fraction:

$$5 \frac{1}{2} = (2 * 5 + 1) / 2 = 11/2$$

$$\text{Quotient} = (11/2) / 2$$

$$= (11/2) * (1/2)$$

$$= 11/4$$

$$4.(1) 66 \div (22/17)$$

To divide by a fraction, we multiply by its reciprocal:

$$\text{Division} = 66 * (17/22)$$

$$= (66 * 17) / 22$$

$$= 1122 / 22$$

$$= 51$$

$$(2) (5/7) \div (6/17)$$

$$\text{Division} = (5/7) * (17/6)$$

$$= (5 * 17) / (7 * 6)$$

$$= 85/42$$

$$= 2 \frac{1}{42}$$

$$(3) (5 \frac{5}{7}) \div (1 \frac{2}{7})$$

Convert the mixed numbers to improper fractions:

$$(5 \frac{5}{7}) = (7 * 5 + 5) / 7 = 40/7$$

$$(1 \frac{2}{7}) = (7 * 1 + 2) / 7 = 9/7$$

$$\text{Division} = (40/7) \div (9/7)$$

$$= (40/7) * (7/9)$$

$$= (40 * 7) / (7 * 9)$$

$$= 280/63$$

$$= 4 \frac{4}{9}$$

$$(4) (4 \frac{2}{9}) \div (2 \frac{11}{27})$$

Converting the mixed numbers into improper fractions:

$$4 \frac{2}{9} = (4 * 9 + 2) / 9 = 38/9$$

$$2 \frac{11}{27} = (2 * 27 + 11) / 27 = 65/27$$

$$\text{Reciprocal of } 65/27 = 27/65$$

$$=(38/9) \div (65/27) = (38/9) \times (27/65)$$

$$=(38/9) \times (27/65) = (38/1) \times (3/65) = 38/1 \times 3/65 = (38 \times 3) / (1 \times 65) = 114/65$$

5. Let's call the other fraction "x". We know that the product of the two fractions is $6 \frac{3}{7}$, which we can write as an improper fraction:

$$6\frac{3}{7} = \frac{45}{7}$$

So we have:

$$9x = \frac{45}{7}$$

To solve for x, we can divide both sides by 9:

$$x = \frac{45}{7} \div 9$$

To divide by a fraction, we can multiply by its reciprocal:

$$x = \frac{45}{7} * \frac{1}{9}$$

$$x = \frac{5}{7}$$

6. Average speed = Distance / Time

$$\text{Average speed} = 12 \text{ km} / (3\frac{3}{4} \text{ hours})$$

$$\text{Average speed} = 12 \text{ km} / (\frac{15}{4} \text{ hours})$$

To divide by a fraction, we can multiply by its reciprocal:

$$\text{Average speed} = 12 \text{ km} * (\frac{4}{15} \text{ hours})$$

$$\text{Average speed} = \frac{48}{15} \text{ km/h}$$

$$\text{Distance} = \text{Speed} * \text{Time}$$

$$\text{Distance} = (\frac{48}{15} \text{ km/h}) * 4 \text{ hours}$$

$$\text{Distance} = (\frac{48}{15}) * 4 \text{ km}$$

$$\text{Distance} = \frac{64}{5} \text{ km}$$

$$7. 6\frac{3}{4} = (4 * 6 + 3) / 4 = \frac{27}{4} \text{ litres}$$

The capacity of the small mug is $\frac{1}{4}$ litre.

$$\text{Number of mugs} = (\frac{27}{4} \text{ litres}) / (\frac{1}{4} \text{ litre})$$

To divide by a fraction, we multiply by its reciprocal:

$$\text{Number of mugs} = (\frac{27}{4} \text{ litres}) * (\frac{4}{1} \text{ litre})$$

$$\text{Number of mugs} = \frac{27}{1}$$

$$\text{Number of mugs} = 27$$

$$8. \text{Length of each piece} = (\frac{24}{7} \text{ m}) / 8$$

To divide by a fraction, we can multiply by its reciprocal:

$$\text{Length of each piece} = (\frac{24}{7} \text{ m}) * (\frac{1}{8})$$

$$\text{Length of each piece} = (24 * 1) / (7 * 8) \text{ m}$$

$$\text{Length of each piece} = \frac{24}{56} \text{ m}$$

$$\text{Length of each piece} = \frac{3}{7} \text{ m}$$

$$9. ₹ 4\frac{2}{5} = ₹(4 * 5 + 2) / 5 = ₹(\frac{22}{5})$$

Now, we divide the total amount of money by the cost of each chocolate:

$$₹44 / ₹(\frac{22}{5})$$

we can multiply by its reciprocal:

$$₹44 * (\frac{5}{22})$$

Simplifying the multiplication:

$$(44 * 5) / 22 = ₹\frac{220}{22}$$

$$₹\frac{220}{22} = ₹10$$

Therefore, Ram can buy 10 chocolates with ₹44

10. Cost of 25 liters = ₹ $37 \frac{1}{2}$

To find the cost of 1 liter, we divide both sides of the equation by 25:

$$\text{Cost of 1 liter} = (\text{₹ } 37 \frac{1}{2}) / 25$$

To simplify the calculation, let's convert the mixed fraction into an improper fraction:

$$\text{Cost of 1 liter} = (\text{₹ } (37 * 2 + 1) / 2) / 25$$

$$\text{Cost of 1 liter} = (\text{₹ } 75/2) / 25$$

multiplying the fraction by the reciprocal of the whole number:

$$\text{Cost of 1 liter} = (\text{₹ } 75/2) * (1/25)$$

Simplifying the multiplication:

$$\text{Cost of 1 liter} = \text{₹ } 75/50$$

$$\text{Cost of 1 liter} = \text{₹ } 3/2$$

11. $65 \frac{1}{4} = (65 * 4 + 1) / 4 = 261/4$

$$5 \frac{7}{16} = (5 * 16 + 7) / 16 = 87/16$$

Length = Area / Breadth

$$\text{Length} = (261/4) / (87/16)$$

we multiply by its reciprocal:

$$\text{Length} = (261/4) * (16/87)$$

Simplifying the multiplication:

$$\text{Length} = (261 * 16) / (4 * 87)$$

$$\text{Length} = 4176/348$$

$$\text{Length} = 12$$

Therefore, the length of the rectangular garden is 12 meters.

12. Let's assume that the total number of students in the school is "x"

$$\text{Number of girls} = (5/7) * x$$

$$275 = (5/7) * x$$

we can multiply both sides by the reciprocal of 5/7, which is 7/5:

$$275 * (7/5) = x$$

Simplifying the left side of the equation:

$$275 * (7/5) = 1925/5 = 385$$

Number of boys = Total number of students - Number of girls

$$\text{Number of boys} = 385 - 275$$

$$\text{Number of boys} = 110$$

13. Area = $(144/4)$ sq m

Taking the square root of both sides, we get:

$$\sqrt{\text{Area}} = \sqrt{(144/4)} \text{ sq m}$$

$$\sqrt{\text{Area}} = \sqrt{(36)} \text{ sq m}$$

$$\sqrt{\text{Area}} = 6 \text{ sq m}$$

Therefore, the side of the square field is 6 meters

14. Total amount collected = ₹ 5272 1/2

Cost of each ticket = ₹ 55 1/2

Total amount collected = ₹ 5272.50

Cost of each ticket = ₹ 55.50

Number of tickets sold = Total amount collected / Cost of each ticket

Number of tickets sold = ₹ 5272.50 / ₹ 55.50

Number of tickets sold = 95

15. (1) a (2) c (3) d

CHAPTER 4

Exercise 4.1

1. (1) T (2) T (3) F (4) F (5) F (6) T

2. (1) Whole number part: 212, Decimal part: 314

(2) Whole number part: 500, Decimal part : 025

(3) Whole number part: 139, Decimal part: 057

(4) Whole number part: 1, Decimal part: 0

(5) Whole number part: 8, Decimal part: 217

(6) Whole number part: 0, Decimal part : 07

3. (1) Three hundred forty-eight point eight seven one

(2) Eight point two five

(3) Zero point four zero nine

(4) Four point zero zero eight

(5) Four hundred forty point zero zero five

(6) Fifteen point three three three

4. (1) 3356.7 (2) 89.14 (3) 30.344 (4) 79.006 (5) 0.890

5. (1) 63.51, 73.81, 83.91, 635.1

(2) 7.0001, 70.001, 700.1, 7001.0

(3) 38.63, 42.62, 43.61, 43.67

(4) 83.25, 823.5, 832.5, 852.5

6. (1) 72.37, 72.35, 72.30, 70.32

(2) 763.01, 750.01, 725.1, 7.5001

(3) 63.01, 60.05, 6.325, 0.63

(4) 5600.1, 560.01, 56.001, 5.6001

7. (1) 4.7 (2) 0.75 (3) 2.08 (4) 4.32 (5) 3.29 (6) 6.44 (7) 6.5 (8) 13.2

8. (1) 0.6

$$0.6 = \frac{6}{10} = \frac{3}{5}$$

Therefore, 0.6 is equivalent to $\frac{3}{5}$ in its lowest terms.

(2) 2.05

$$2.05 = \frac{205}{100} = \frac{41}{20}$$

Therefore, 2.05 is equivalent to $\frac{41}{20}$ in its lowest terms.

(3) 0.195

$$0.195 = \frac{195}{1000} = \frac{39}{200}$$

Therefore, 0.195 is equivalent to $\frac{39}{200}$ in its lowest terms.

(4) 7.36

$$7.36 = \frac{736}{100} = \frac{46}{5}$$

Therefore, 7.36 is equivalent to $\frac{46}{5}$ in its lowest terms.

(5) 18.201

Therefore, 18.201 is equivalent to $\frac{18201}{1000}$ in its lowest terms.

(6) 32.050

Therefore, 32.050 is equivalent to $\frac{32050}{1000}$ in its lowest terms.

(7) 0.225

$$0.225 = \frac{225}{1000} = \frac{9}{40}$$

Therefore, 0.225 is equivalent to $\frac{9}{40}$ in its lowest terms.

(8) 79.002

$$79.002 = \frac{79002}{1000} = \frac{39501}{500}$$

Therefore, 79.002 is equivalent to $\frac{39501}{500}$ in its lowest terms.

9. (1) $32.8 + 10.23 + 46.20$:

$$32.80$$

$$+ 10.23$$

$$+ 46.20$$

$$89.23$$

Therefore, the sum is 89.23.

(2) $7.03 + 16.78$:

$$7.03$$

$$+ 16.78$$

$$23.81$$

Therefore, the sum is 23.81.

(3) $29.63 + 7.067 + 5.253$:

$$29.630$$

$$+ 7.067$$

$$+ 5.253$$

41.950

Therefore, the sum is 41.950.

(4) $18.8 + 176.06 + 65.480$:

18.800
+ 176.060
+ 65.480

260.340

Therefore, the sum is 260.340.

(5) $15.551 + 2.83 + 12.120$:

15.551
+ 2.830
+ 12.120

30.501

Therefore, the sum is 30.501.

(6) $8.24 + 36.02 + 8.89$:

8.240
+ 36.020
+ 8.890

53.150

Therefore, the sum is 53.150.

10. (1) $36.006 - 36.002$:

36.006
- 36.002

0.004

Therefore, the difference is 0.004.

(2) $600.1 - 263.363$:

600.100
- 263.363

336.737

Therefore, the difference is 336.737.

(3) $15.57 - 3.73$:

15.570
- 3.730

11.840

Therefore, the difference is 11.840.

(4) $708.36 - 76.306$:

$$\begin{array}{r} 708.360 \\ - 76.306 \\ \hline \end{array}$$

$$632.054$$

Therefore, the difference is 632.054.

(5) $18.6 - 15.005$:

$$\begin{array}{r} 18.600 \\ - 15.005 \\ \hline \end{array}$$

$$3.595$$

Therefore, the difference is 3.595.

(6) $63.02 - 11.05$:

$$\begin{array}{r} 63.020 \\ - 11.050 \\ \hline \end{array}$$

$$51.970$$

Therefore, the difference is 51.970.

(7) $70 - 3.008$:

$$\begin{array}{r} 70.000 \\ - 3.008 \\ \hline \end{array}$$

$$66.992$$

Therefore, the difference is 66.992.

(8) $67.6 - 21.39$:

$$\begin{array}{r} 67.600 \\ - 21.390 \\ \hline \end{array}$$

$$46.210$$

Therefore, the difference is 46.210.

Exercise 4.2

1. (1) 0.6 (2) 107.1 (3) 34.06 (4) 16.5 (5) 40.64 (6) 24.748 (7) 8.6344 (8) 0.129

2. (1) 87 (2) 16.74 (3) 11.999 (4) 25.5021 (5) 409.448 (6) 21.828 (7) 3173.8135 (8) 8.30471

3. (1) $2.8 * 4.5 = 12.6$

(2) $6.2 * 2.7 = 16.74$

(3) $9.23 * 1.3 = 11.999$

(4) $5.07 * 5.03 = 25.5021$

(5) $50.8 * 8.06 = 409.448$

(6) $27.285 * 0.8 = 21.828$

(7) $443.89 * 7.15 = 3173.8135$

(8) $2.071 * 4.01 = 8.30471$

4. The cost of one pen is ₹ 28.50. To find the cost of 48 pens, we multiply the cost of one pen by 48:

Cost of 48 pens = ₹ $28.50 * 48 = ₹ 1,368$

5. 1 m is equal to 3.2555 feet. To find the number of feet in 18 m, we multiply 18 by the conversion factor:

Number of feet in 18 m = $18 * 3.2555 = 58.599$ feet

6. 1 kg of milk has 0.264 kg of fat. To find the amount of fat in 12.5 kg of milk, we multiply 12.5 by the proportion of fat:

Amount of fat in 12.5 kg of milk = $12.5 \text{ kg} * 0.264 = 3.3 \text{ kg}$

7. The cost of one bag of basmati rice is ₹ 425.75. To find the cost of 390 bags, we multiply the cost of one bag by 390:

Cost of 390 bags = ₹ $425.75 * 390 = ₹ 166,297.50$

8. One dollar is equal to ₹ 49.75. To find the value of 75 dollars, we multiply the exchange rate by the number of dollars:

Value of 75 dollars = ₹ $49.75 * 75 = ₹ 3,731.25$

9. (1) 1.035 (2) 225.14 (3) 20,200.5 (4) 0 (5) 1 (6) 1 (7) 100

10. The cost of one book is ₹ 24.65. To find the cost of 12 books, we multiply the cost of one book by 12: Cost of 12 books = ₹ $24.65 * 12 = ₹ 295.80$

11. Take away 8.613 from 12: $12 - 8.613 = 3.387$. Then, multiply the result by 12:

$(12 - 8.613) * 12 = 3.387 * 12 = 40.644$

12. A bottle holds 0.250 L of a soft drink. To find the amount of soft drink in 32 bottles, we multiply the volume of one bottle by 32:

Amount of soft drink in 32 bottles = $0.250 \text{ L} * 32 = 8 \text{ L}$

13. A pipe of rope is divided into 18 equal parts, and one part is 2.15 m long. To find the total length of the rope, we multiply the length of one part by the number of parts:

Total length of the rope = $2.15 \text{ m} * 18 = 38.7 \text{ m}$

14. The length of a side of a regular pentagon is 8.4 cm. To find the perimeter of the pentagon, we multiply the length of one side by the number of sides:

Perimeter of the pentagon = $8.4 \text{ cm} * 5 = 42 \text{ cm}$

Exercise 4.3

1. (1) $24.5 \div 7 = 3.5$ (2) $32.5 \div 13 = 2.5$
(3) $48.3 \div 2.1 = 23$ (4) $31 \div 0.5 = 62$
(5) $0.4 \div 16 = 0.025$

2. (1) $16 \div 0.4 = 40$ (2) $41 \div 0.25 = 164$
(3) $17 \div 0.34 = 50$ (4) $1032 \div 2.064 = 500$
(5) $2 \div 2.5 = 0.8$ (6) $72 \div 0.36 = 200$

3. (1) $6.8 \div 10 = 0.68$ (2) $8.05 \div 50 = 0.161$
(3) $45.85 \div 10 = 4.585$ (4) $32.763 \div 100 = 0.32763$
(5) $826.96 \div 400 = 2.0674$. (6) $0.010 \div 100 = 0.0001$
(7) $6.003 \div 1000 = 0.00600$. (8) $0.003 \div 3000 = 0.000001$

4. (1) $12 \div 5 = 2.4$
(2) $17 \div 34 = 0.5$
(3) $28 \div 25 = 1.12$
(4) $12 \div 25 = 0.48$
(5) $41 \div 20 = 2.05$
(6) $41 \div 250 = 0.164$
(7) $36 \div 1500 = 0.024$

5. (1) $8.2 \div 0.06 = 136.67$
(2) $84.24 \div 1.9 = 44.34$
(3) $0.31 \div 1.2 = 0.258$
(4) $21.492 \div 2.5 = 8.5968$
(5) $3.024 \div 0.024 = 126$

6. A set of 15 books in history cost ₹ 1,025. To find the cost of each book, we divide the total cost by the number of books:

$$\text{Cost of each book} = ₹ 1,025 / 15 = ₹ 68.33$$

7. 21.875 litres of oil is contained in 3 full cans and one half can of tin of equal capacity. To find the capacity of oil in each can, we divide the total amount of oil by the number of cans:

$$\text{Capacity of oil in each can} = 21.875 \text{ litres} / (3 + 1/2) \text{ cans} = 21.875 \text{ litres} / 3.5 \text{ cans} = 6.25 \text{ litres per can}$$

8. ₹ 5,653.60 is to be distributed equally among 100 people. To find the amount each person will get, we divide the total amount by the number of people:

$$\text{Amount each person will get} = ₹ 5,653.60 / 100 = ₹ 56.53$$

9. Ram can run 36.9 km in 1.5 hours. To find the average distance run by him in 1 hour, we divide the total distance by the total time:

$$\text{Average distance run by Ram in 1 hour} = 36.9 \text{ km} / 1.5 \text{ hours} = 24.6 \text{ km/h}$$

10. To find the average of 4.2, 7.4, and 8.8, we add the numbers and divide the sum by the total count:

$$\text{Average} = (4.2 + 7.4 + 8.8) / 3 = 20.4 / 3 = 6.8$$

11. (1) c (2) c (3) a (4) b

CHAPTER 5

Exercise 5.1

1. (1) -2 (2) -4 (3) 0 (4) -60

2. (1) rational number (2) rational number (3) rational number (4) not a rational number

3. (1) 1 (2) 13 (3) -75 (4) -15

4. (1) $5/1$ (2) $-6/1$ (3) $32/1$ (4) $-306/1$

5. (1) -1 (2) 5 (3) -2 (4) 7

6. Positive rational numbers: $4/1, -27/-36$

Negative rational numbers: $-3/7, 5/-13, 57/-34, 76/-101, -12/160$

7. No, because division by zero is not defined.

8. $1000/99999$

9. Positive rational number: $13/18, -12/-15, -29/-231$

Negative rational number:

$-6/7, -26/53, 85/-117$

Exercise 5.2

1. (1) To convert the denominator 24 to 48, we can multiply it by 2:

$$(-18 * 2) / (24 * 2) = -36/48$$

(2) To convert the denominator 24 to 72, we can multiply it by 3:

$$(-18 * 3) / (24 * 3) = -54/72$$

(3) To convert the denominator 24 to 120, we can multiply it by 5:

$$(-18 * 5) / (24 * 5) = -90/120$$

(4) To convert the denominator 24 to -192, we can multiply it by -8:

$$(-18 * -8) / (24 * -8) = 144/192$$

2. (1) To convert the numerator 5 to 25, we can multiply it by 5:

$$(5 * 5) / (14 * 5) = 25/70$$

(2) To convert the numerator 5 to -35, we can multiply it by -7:

$$(5 * -7) / (14 * -7) = -35/-98$$

(3) To convert the numerator 5 to -30, we can multiply it by -6:

$$(5 * -6) / (14 * -6) = -30/-84$$

(4) To convert the numerator 5 to 45, we can multiply it by 9:

$$(5 * 9) / (14 * 9) = 45/126$$

3. (1) $11/-19$ (2) $6/-1$ (3) $-23/-11$ (4) $11/-22$

4. (1) $-22,-35,-88$ (2) $6,12,20$

5. (1) $2/7$ (2) $-5/11$ (3) $-15/1$ (4) $-13/25$

6. (1) $7/11 = 21/a$

By cross-multiplying, we have:

$$7 * a = 11 * 21$$

Simplifying the equation, we get:

$$7a = 231$$

Dividing both sides by 7, we find:

$$a = 33$$

(2) $5/6 = a/18$

By cross-multiplying, we have:

$$5 * 18 = 6 * a$$

Simplifying the equation, we get:

$$90 = 6a$$

Dividing both sides by 6, we find:

$$a = 15$$

(3) $a/-11 = 9/33$

By cross-multiplying, we have:

$$a * 33 = -11 * 9$$

Simplifying the equation, we get:

$$33a = -99$$

Dividing both sides by 33, we find:

$$a = -3$$

(4) $8/13 = a/39$

By cross-multiplying, we have:

$$8 * 39 = 13 * a$$

Simplifying the equation, we get:

$$312 = 13a$$

Dividing both sides by 13, we find:

$$a = 24$$

7. (1) Let's denote the denominator as "x." We can set up the proportion as follows:

$$(-54) / x = 3 / 8$$

To solve for x, we can cross-multiply:

$$(-54) * 8 = 3 * x$$

$$-432 = 3x$$

Dividing both sides by 3:

$$-432 / 3 = x$$

$$x = -144$$

Therefore, the rational number equivalent to $3/8$ with a numerator equal to -54 is $-54 / -144$.

(2) Let's denote the denominator as "x." We can set up the proportion as follows:

$$327 / x = 3 / 8$$

To solve for x, we can cross-multiply:

$$327 * 8 = 3 * x$$

$$2616 = 3x$$

Dividing both sides by 3:

$$2616 / 3 = x$$

$$x = 872$$

Therefore, the rational number equivalent to $3/8$ with a numerator equal to 327 is $327/872$.

(3) Let's denote the denominator as "x." We can set up the proportion as follows:

$$(-360) / x = 3 / 8$$

To solve for x, we'll cross-multiply:

$$(-360) * 8 = 3 * x$$

$$-2880 = 3x$$

Dividing both sides by 3:

$$-2880 / 3 = x$$

$$x = -960$$

Therefore, the rational number equivalent to $3/8$ with a numerator equal to -360 is $-360 / -960$.

(4) Let's denote the denominator as "x." We can set up the proportion as follows:

$$450 / x = 3 / 8$$

To solve for x, we'll cross-multiply:

$$450 * 8 = 3 * x$$

$$3600 = 3x$$

Dividing both sides by 3:

$$3600 / 3 = x$$

$$x = 1200$$

Therefore, the rational number equivalent to $3/8$ with a numerator equal to 450 is $450/1200$.

8. (1) To express $5/7$ as a rational number with a denominator of -21 , we can multiply both the numerator and the denominator by -3 :

$$5/7 = (5 * -3) / (7 * -3) = -15 / -21$$

Therefore, the answer is $-15/-21$.

(2) To express $5/7$ as a rational number with a denominator of 56 , we can multiply both the numerator and the denominator by 8 :

$$5/7 = (5 \cdot 8) / (7 \cdot 8) = 40/56$$

Therefore, the answer is 40/56.

(3) To express 5/7 as a rational number with a denominator of 168, we can multiply both the numerator and the denominator by 24:

$$5/7 = (5 \cdot 24) / (7 \cdot 24) = 120/168$$

Therefore, the answer is 120/168.

(4) To express 5/7 as a rational number with a denominator of 1456, we can multiply both the numerator and the denominator by 208:

$$5/7 = (5 \cdot 208) / (7 \cdot 208) = 1040/1456$$

Therefore, the answer is 1040/1456.

9. (1) For 5/6 and 7/18:

The LCM of 6 and 18 is 18. To convert the fractions, we multiply the numerator and denominator of each fraction by the appropriate factor to make the denominator 18.

$$5/6 = (5 \cdot 3) / (6 \cdot 3) = 15/18$$

7/18 remains as it is.

Therefore, the equivalent rational numbers with a common denominator of 18 are 15/18 and 7/18.

(2) For 2/5, 19/20, 42/40, and 14/16:

The LCM of 5, 20, 40, and 16 is 80. To convert the fractions, we multiply the numerator and denominator of each fraction by the appropriate factor to make the denominator 80.

$$2/5 = (2 \cdot 16) / (5 \cdot 16) = 32/80$$

$$19/20 = (19 \cdot 4) / (20 \cdot 4) = 76/80$$

$$42/40 = (42 \cdot 2) / (40 \cdot 2) = 84/80$$

$$14/16 = (14 \cdot 5) / (16 \cdot 5) = 70/80$$

Therefore, the equivalent rational numbers with a common denominator of 80 are 32/80, 76/80, 84/80, and 70/80.

(3) For 3/8, 1/12, 10/16, and 21/24:

The LCM of 8, 12, 16, and 24 is 48. To convert the fractions, we multiply the numerator and denominator of each fraction by the appropriate factor to make the denominator 48.

$$3/8 = (3 \cdot 6) / (8 \cdot 6) = 18/48$$

$$1/12 = (1 \cdot 4) / (12 \cdot 4) = 4/48$$

$$10/16 = (10 \cdot 3) / (16 \cdot 3) = 30/48$$

$$21/24 = (21 \cdot 2) / (24 \cdot 2) = 42/48$$

Therefore, the equivalent rational numbers with a common denominator of 48 are 18/48, 4/48, 30/48, and 42/48.

10. (1) -5/15, -6/18, -7/21, -8/24

(2) 25/-20, 30/-24, 35/-28, 40/-32

(3) -35/25, -42/30, -49/35, -56/40

Exercise 5.3

1.(1) Simplifying 3/-4:

$$3/-4 = -3/4$$

Simplifying $-51/68$:

$$-51/68 = (-3 * 17) / (4 * 17) = -3/4$$

Since both fractions simplify to $-3/4$, the pair $3/-4$ and $-51/68$ are equal.

(2) Simplifying $-24/30$:

$$-24/30 = (-4 * 6) / (5 * 6) = -4/5$$

Simplifying $21/-36$:

$$21/-36 = (3 * 7) / (6 * -6) = 7/-12$$

The fractions $-4/5$ and $7/-12$ are not equal, so the pair $-24/30$ and $21/-36$ are not equal.

(3) Simplifying $-8/9$:

$-8/9$ remains as it is.

Simplifying $136/-153$:

$$136/-153 = (8 * 17) / (9 * -17) = 8/-9$$

The fractions $-8/9$ and $136/-153$ are equal, as they both simplify to $8/-9$.

2. (1) $-4/13$ and $2/3$:

To compare these fractions, we can find a common denominator:

$$-4/13 = (-4 * 3) / (13 * 3) = -12/39$$

$$2/3 = (2 * 13) / (3 * 13) = 26/39$$

Since $-12/39$ is less than $26/39$, the rational number $2/3$ is greater than $-4/13$.

(2) $-18/28$ and $-7/17$:

To compare these fractions, we can cross-multiply:

$$-18/28 = (-18 * 17) / (28 * 17) = -306/476$$

$-7/17$ remains as it is.

Since $-306/476$ is less than $-7/17$, the rational number $-7/17$ is greater than $-18/28$.

(3) $-7/9$ and $-3/11$:

To compare these fractions, we can find a common denominator:

$$-7/9 = (-7 * 11) / (9 * 11) = -77/99$$

$-3/11$ remains as it is.

Since $-77/99$ is less than $-3/11$, the rational number $-3/11$ is greater than $-7/9$.

(4) $77/-175$ and $136/-153$:

To compare these fractions, we can cross-multiply:

$$77/-175 = (77 * -153) / (-175 * -153) = -11781/26775$$

$$136/-153 = (136 * -175) / (-153 * -175) = -23800/26775$$

Since $-11781/26775$ is less than $-23800/26775$, the rational number $136/-153$ is greater than $77/-175$.

3. (1) $2/9$ (2) $-2/5$ (3) $2/3$ (4) $-7/8$ (5) $-11/14$ (6) $4/15$ (7) $-12/41$

4. (1) $4/7$ (2) $3/7$ (3) 1 (4) $2/11$

5. (1) $>$ (2) $>$ (3) $=$ (4) $<$

6. Do it yourself

7. (1) Arranging $-1/2, 2/3, 4/-5, -7/15$ in ascending order:

We can convert all fractions to have a common denominator of 30:

$$-1/2 = -15/30$$

$$2/3 = 20/30$$

$$4/-5 = -24/30$$

$$-7/15 = -14/30$$

So, the order from smallest to largest is: $-24/30, -15/30, -14/30, 20/30$.

Therefore, the arranged set is: $\{-4/5, -1/2, -7/15, 2/3\}$.

(2) Arranging $4/3, -7/-7, 11/-24, -5/3$ in ascending order:

Simplifying $-7/-7$ to 1 and $11/-24$ to $-11/24$, we have:

$$-5/3, -11/24, 1, 4/3$$

Therefore, the arranged set is: $\{-5/3, -11/24, 1, 4/3\}$.

(3) Arranging $-7/2, -8/5, 9/-10, -2/10$ in ascending order:

We can convert all fractions to have a common denominator of 10:

$$-7/2 = -35/10$$

$$-8/5 = -16/10$$

$$9/-10 = -9/10$$

$$-2/10 = -1/5$$

So, the order from smallest to largest is: $-35/10, -16/10, -9/10, -1/5$.

Therefore, the arranged set is: $\{-7/2, -8/5, 9/-10, -2/10\}$.

8. (1) positive side (2) negative side

(3) positive side (4) negative side

9. (1) Arranging $3/-4, -7/10, 2/-5, -1/6$ in descending order:

We can convert all fractions to have a common denominator of 60:

$$3/-4 = -45/60$$

$$-7/10 = -42/60$$

$$2/-5 = -24/60$$

$$-1/6 = -10/60$$

So, the order from largest to smallest is: $-10/60, -24/60, -42/60, -45/60$.

Therefore, the arranged set is: $\{-1/6, 2/-5, -7/10, 3/-4\}$.

(2) Arranging $-4/9, -21/-18, 1/7, 7/-12$ in descending order:

Therefore, the arranged set is: $\{-21/-18, 1/7, -4/9, 7/-12\}$.

(3) Arranging $-5/12, -1/4, 11/-6, -5/16$ in descending order:

We can convert all fractions to have a common denominator of 48:

$$-5/12 = -20/48$$

$$-1/4 = -12/48$$

$$11/-6 = -22/48$$

$$-5/16 = -15/48$$

So, the order from largest to smallest is: $-12/48, -15/48, -20/48, -22/48$.

Therefore, the arranged set is: $\{-1/4, -5/16, -5/12, 11/-6\}$.

10. (1) $-1/4 = 4/x$

To solve for x, we can cross-multiply:

$$-1 * x = 4 * 4$$

$$-x = 16$$

$$x = -16$$

Therefore, $x = -16$.

(2) $13/x = -7$

To solve for x, we can cross-multiply:

$$13 = -7 * x$$

$$x = 13 / -7$$

$$x = -13/7$$

Therefore, $x = -13/7$.

(3) $-24/x = 3/7$

To solve for x, we can cross-multiply:

$$-24 * 7 = 3 * x$$

$$-168 = 3x$$

$$x = -168 / 3$$

$$x = -56$$

Therefore, $x = -56$.

(4) $15/9 = -75/x$

To solve for x, we can cross-multiply:

$$15 * x = -75 * 9$$

$$15x = -675$$

$$x = -675 / 15$$

$$x = -45$$

Therefore, $x = -45$.

(5) $8/25 = x/-125$

To solve for x, we can cross-multiply:

$$8 * -125 = 25 * x$$

$$-1000 = 25x$$

$$x = -1000 / 25$$

$$x = -40$$

Therefore, $x = -40$.

(6) $-44/33 = x/21$

To solve for x, we can cross-multiply:

$$-44 * 21 = 33 * x$$

$$-924 = 33x$$

$$x = -924 / 33$$

$$x = -28$$

Therefore, $x = -28$.

11. (1) less (2) right (3) left

12. (1) a (2) d (3) a,b (4) d

Exercise 5.4

1.(1) $1/7 + 4/7$

$$1/7 + 4/7 = (1 + 4)/7 = 5/7$$

Therefore, the simplified form is $5/7$.

(2) $9/19 + 3/19$

$$9/19 + 3/19 = (9 + 3)/19 = 12/19$$

Therefore, the simplified form is $12/19$.

(3) $2/5 + 5/6$

To find a common denominator, we need to multiply the denominators together:

$$\text{Common denominator} = 5 * 6 = 30$$

Now, we can convert the fractions to have a common denominator:

$$2/5 = 12/30 \text{ (by multiplying numerator and denominator by 6)}$$

$$5/6 = 25/30 \text{ (by multiplying numerator and denominator by 5)}$$

Adding the numerators:

$$12/30 + 25/30 = (12 + 25)/30 = 37/30$$

Therefore, the simplified form is $37/30$.

(4) $15/36 + 65/18$

To find a common denominator, we need to determine the least common multiple (LCM) of 36 and 18, which is 36.

Now, we can convert the fractions to have a common denominator:

$$15/36 = 15/36 \text{ (no need to convert)}$$

$$65/18 = (65/18) * (2/2) = 130/36 \text{ (by multiplying numerator and denominator by 2)}$$

Adding the numerators:

$$15/36 + 130/36 = (15 + 130)/36 = 145/36$$

Therefore, the simplified form is $145/36$.

2. (1) $7/10 + 3/10 = 10/10 = 1$

$$(2) -6 + 3/20 = -120/20 + 3/20 = -117/20$$

(3) To add mixed numbers, we first need to convert them to improper fractions:

$$2 \frac{1}{2} = (2 * 2 + 1)/2 = 5/2$$

$$7 \frac{1}{5} = (7 * 5 + 1)/5 = 36/5$$

Now, we can add the fractions:

$$5/2 + 36/5 = (5 * 5 + 2 * 36)/(2 * 5) = (25 + 72)/10 = 97/10$$

To convert this back to a mixed number:

$$97/10 = 9 \frac{7}{10}$$

$$(4) -11/41 + 9/20 = (-11 * 20 + 9 * 41)/(41 * 20) = (-220 + 369)/820 = 149/820$$

(5) To add mixed numbers, we convert them to improper fractions:

$$6 \frac{1}{4} = (6 * 4 + 1)/4 = 25/4$$

$$3 \frac{1}{7} = (3 * 7 + 1)/7 = 22/7$$

Now, we can add the fractions:

$$25/4 + 22/7 = (25 * 7 + 4 * 22)/(4 * 7) = (175 + 88)/28 = 263/28$$

To convert this back to a mixed number:

$$263/28 = 9 \frac{11}{28}$$

$$(6) -7/20 + [-15/60] = -7/20 - 15/60 = -21/60 - 15/60 = -36/60 = -3/5$$

$$3. (1) 3/9 + 8/9 = 11/9$$

$$(2) 4/11 + 7/11 = 11/11 = 1$$

$$(3) 13/39 + 18/39 = 31/39$$

(4) The LCM of 20 and 30 is 60.

$$-17/20 + 37/30 = (-17 * 3)/(20 * 3) + (37 * 2)/(30 * 2) = -51/60 + 74/60 = 23/60$$

(5) The LCM of 30 and 60 is 60.

$$-21/30 + 31/60 = (-21 * 2)/(30 * 2) + (31 * 1)/(60 * 1) = -42/60 + 31/60 = -11/60$$

$$(6) 1 + (-5/14) = (1 * 14)/(1 * 14) + (-5/14) = 14/14 - 5/14 = 9/14$$

$$4. (1) 3/7 \quad (2) 0 \quad (3) 2/11 \quad (4) 31/51$$

$$5. (1) -3/14 + (-2) = (-2) + (-3/14)$$

$$-3/14 + (-2) = -3/14 + (-28/14) = (-3 - 28)/14 = -31/14$$

$$(-2) + (-3/14) = (-28/14) + (-3/14) = (-28 - 3)/14 = -31/14$$

Both sides of the equation simplify to $-31/14$, so the equation is verified.

$$(2) -8/11 + (-9/13) = (-9/13) + (-8/11)$$

The LCM of 11 and 13 is 143.

$$-8/11 + (-9/13) = (-8 * 13)/(11 * 13) + (-9 * 11)/(13 * 11) = -104/143 + (-99/143) = (-104 - 99)/143 = -203/143$$

$$(-9/13) + (-8/11) = (-9 * 11)/(13 * 11) + (-8 * 13)/(11 * 13) = (-99/143) + (-104/143) = (-99 - 104)/143 = -203/143$$

Both sides of the equation simplify to $-203/143$, so the equation is verified.

$$6. (1) -7/6 + (-3/8) + 14/16 + 10/12$$

The LCM of 6, 8, 16, and 12 is 48.

$$-7/6 + (-3/8) + 14/16 + 10/12 = (-7 * 8)/(6 * 8) + (-3 * 6)/(8 * 6) + (14 * 3)/(16 * 3) + (10 * 4)/(12 * 4) = -56/48 +$$

$$(-18/48) + 42/48 + 40/48 = (-56 - 18 + 42 + 40)/48 = 8/48 = 1/6$$

Therefore, $-7/6 + (-3/8) + 14/16 + 10/12 = 1/6$.

$$(2) 4/7 + (-5/9) + (-8/18) + 7/15$$

The LCM of 7, 9, 18, and 15 is 630.

$$4/7 + (-5/9) + (-8/18) + 7/15 = (4 * 90)/(7 * 90) + (-5 * 70)/(9 * 70) + (-8 * 35)/(18 * 35) + (7 * 42)/(15 * 42) =$$

$$360/630 + (-350/630) + (-280/630) + 294/630 = (360 - 350 - 280 + 294)/630 = 24/630 = 4/105$$

Therefore, $4/7 + (-5/9) + (-8/18) + 7/15 = 4/105$.

$$(3) 6/7 + (-5/9) + (-13/7) + 19/21$$

The LCM of 7, 9, and 21 is 63.

$$6/7 + (-5/9) + (-13/7) + 19/21 = (6 * 9)/(7 * 9) + (-5 * 7)/(9 * 7) + (-13 * 9)/(7 * 9) + (19 * 3)/(21 * 3) = 54/63 + (-35/63) + (-117/63) + 57/63 = (54 - 35 - 117 + 57)/63 = -41/63$$

Therefore, $6/7 + (-5/9) + (-13/7) + 19/21 = -41/63$.

$$(4) \frac{3}{5} + \frac{7}{3} + \frac{1}{5} + (-\frac{2}{5})$$

The LCM of 5 and 3 is 15.

$$\frac{3}{5} + \frac{7}{3} + \frac{1}{5} + (-\frac{2}{5}) = \frac{(3 * 3)}{(5 * 3)} + \frac{(7 * 5)}{(3 * 5)} + \frac{(1 * 3)}{(5 * 3)} + \frac{(-2 * 3)}{(5 * 3)} = \frac{9}{15} + \frac{35}{15} + \frac{3}{15} - \frac{6}{15} = \frac{(9 + 35 + 3 - 6)}{15} = \frac{41}{15}$$

Therefore, $\frac{3}{5} + \frac{7}{3} + \frac{1}{5} + (-\frac{2}{5}) = \frac{41}{15}$.

Exercise 5.5

$$1.(1) -\frac{1}{27} - \frac{1}{9}:$$

First, we need to find a common denominator, which in this case is 27. Then we can subtract the fractions:

$$-\frac{1}{27} - \frac{1}{9} = -\frac{1}{27} - \frac{3}{27} = \frac{(-1 - 3)}{27} = -\frac{4}{27}$$

$$(2) \frac{5}{18} - \frac{7}{18}:$$

$$\frac{5}{18} - \frac{7}{18} = \frac{(5 - 7)}{18} = -\frac{2}{18} = -\frac{1}{9}$$

$$(3) 3\frac{3}{12} - \frac{7}{18}:$$

We need to convert the mixed number into an improper fraction:

$$3\frac{3}{12} = \frac{(3 * 12 + 3)}{12} = \frac{39}{12}$$

Now we find a common denominator, which in this case is 36:

$$\frac{39}{12} - \frac{7}{18} = \frac{(39 * 3)}{(12 * 3)} - \frac{(7 * 2)}{(18 * 2)} = \frac{117}{36} - \frac{14}{36} = \frac{(117 - 14)}{36} = \frac{103}{36}$$

$$(4) -\frac{21}{43} - (-\frac{11}{129}):$$

$$-\frac{21}{43} + \frac{11}{129}$$

We need to find a common denominator, which in this case is 129:

$$-\frac{21}{43} + \frac{11}{129} = \frac{(-21 * 3)}{(43 * 3)} + \frac{11}{129} = -\frac{63}{129} + \frac{11}{129} = \frac{(-63 + 11)}{129} = -\frac{52}{129}$$

$$(5) \frac{17}{25} - (-\frac{13}{20}):$$

$$\frac{17}{25} + \frac{13}{20}$$

To find a common denominator, we multiply the denominators:

$$\frac{17}{25} + \frac{13}{20} = \frac{(17 * 20)}{(25 * 20)} + \frac{(13 * 25)}{(20 * 25)} = \frac{340}{500} + \frac{325}{500} = \frac{(340 + 325)}{500} = \frac{665}{500}$$

We can simplify this fraction by dividing the numerator and denominator by their greatest common divisor, which is 5:

$$\frac{665}{500} = \frac{(665/5)}{(500/5)} = \frac{133}{100}$$

$$(6) 2\frac{6}{22} - 4\frac{11}{55}:$$

$$2\frac{6}{22} = \frac{(2 * 22 + 6)}{22} = \frac{50}{22}$$

$$4\frac{11}{55} = \frac{(4 * 55 + 11)}{55} = \frac{231}{55}$$

We need to find a common denominator, which in this case is 110:

$$\frac{50}{22} - \frac{231}{55} = \frac{(50 * 5)}{(22 * 5)} - \frac{(231 * 2)}{(55 * 2)} = \frac{250}{110} - \frac{462}{110} = \frac{(250 - 462)}{110} = -\frac{212}{110}$$

We can simplify this fraction by dividing the numerator and denominator by their greatest common divisor, which is 2:

$$-\frac{212}{110} = \frac{(-212/2)}{(110/2)} = -\frac{106}{55}$$

$$2. (1) -\frac{6}{25} - 1\frac{19}{20}:$$

$$1\frac{19}{20} = \frac{(1 * 20 + 19)}{20} = \frac{39}{20}$$

Now we can find a common denominator, which in this case is 100:

$$-\frac{6}{25} = -\frac{96}{100}$$

$$\frac{39}{20} = \frac{195}{100}$$

Now we can subtract the numerators

$$-96/100 - 195/100 = (-96 - 195)/100 = -291/100$$

So, the result is $-291/100$.

(2) $2\frac{5}{16} - (-1\frac{9}{32})$:

$$2\frac{5}{16} = (2 * 16 + 5)/16 = 37/16$$

$$-1\frac{9}{32} = (-1 * 32 + 9)/32 = -23/32$$

Finding a common denominator, which is 32:

$$37/16 = (37 * 2)/32 = 74/32$$

$-23/32$ remains the same

Now we subtract the numerators:

$$74/32 - (-23/32) = (74 + 23)/32 = 97/32$$

So, the result is $97/32$.

(3) $2/9 - 1/6$:

To subtract these fractions, we need to find a common denominator, which is 18:

$$2/9 = (2 * 2)/18 = 4/18$$

$$1/6 = (1 * 3)/18 = 3/18$$

Now we can subtract the numerators:

$$4/18 - 3/18 = 1/18$$

So, the result is $1/18$.

(4) $-15/27 - (-29/81)$:

$$-15/27 = -15/27$$

$$-29/81$$

Finding a common denominator, which is 81:

$$-15/27 = (15 * 3)/81 = -45/81$$

$$-29/81$$

Now we subtract the numerators:

$$-45/81 - (-29/81) = (-45 + 29)/81 = -16/81$$

So, the result is $-16/81$.

3. (1) $-6/-13 - (-9/13)$:

$$(-6/-13) - (-9/13) = (-6 + 9)/(-13) = 3/(-13) \text{ or } -3/13$$

Therefore, $-6/-13 - (-9/13) = -3/13$.

(2) $-3/11 - (4/-11)$:

$$(-3/11) - (4/-11) = (-3 - 4)/11 = -7/11$$

Therefore, $-3/11 - (4/-11) = -7/11$.

(3) $8/5 - 3/5$

$$(8/5) - (3/5) = (8 - 3)/5 = 5/5 = 1$$

Therefore, $8/5 - 3/5 = 1$

4. $5 + (-35/48)$

$$5 + (-35/48) = (5 * 48/48) + (-35/48) = 240/48 - 35/48$$

$$240/48 - 35/48 = (240 - 35)/48 = 205/48$$

$$5. 1 \frac{3}{25} = (1 * 25 + 3)/25 = 28/25$$

$$-10 - 28/25$$

$$-10 - 28/25 = (-10 * 25/25) - 28/25 = -250/25 - 28/25$$

$$-250/25 - 28/25 = (-250 - 28)/25 = -278/25$$

6. Let's denote the other rational number as x.

$$-7/12 + x = -11/36$$

LCM of 12 and 36, which is 36:

$$36 * (-7/12) + 36 * x = 36 * (-11/36)$$

Simplifying this equation:

$$-7 * 3 + 36x = -11$$

$$-21 + 36x = -11$$

$$36x = -11 + 21$$

$$36x = 10$$

$$x = 10/36$$

$$x = 5/18$$

$$7. 2 \frac{1}{5} = (2 * 5 + 1)/5 = 11/5$$

$$11/15 - x = 11/5$$

LCM of 15 and 5, which is 15:

$$15 * (11/15) - 15 * x = 15 * (11/5)$$

$$11 - 15x = 33$$

$$-15x = 33 - 11$$

$$-15x = 22$$

$$x = 22/(-15)$$

$$x = -22/15$$

$$8. (3/10) + (5/7) = (3 * 7/70) + (5 * 10/70) = 21/70 + 50/70$$

$$21/70 + 50/70 = (21 + 50)/70 = 71/70$$

$$9. 14/36 - (-2/3) = 14/36 + 2/3$$

$$14/36 + 24/36 = (14 + 24)/36 = 38/36$$

$$38/36 = (19/18) * (2/2) = 19/18$$

$$10. (1) 2/3 + 4/15 - 1/3:$$

LCM of 3 and 15 is 15.

$$2/3 + 4/15 - 1/3 = (2 * 5/15) + 4/15 - (1 * 5/15) = 10/15 + 4/15 - 5/15$$

$$10/15 + 4/15 - 5/15 = (10 + 4 - 5)/15 = 9/15$$

$$9/15 = (3/3) * (3/5) = 1/1 * 3/5 = 3/5$$

$$(2) -9/10 + 3/16 - 2/18:$$

LCM of 10, 16, and 18 is 144.

$$-9/10 + 3/16 - 2/18 = (-9 * 14/144) + (3 * 9/144) - (2 * 8/144)$$

$$-9/10 + 3/16 - 2/18 = -126/144 + 27/144 - 16/144$$

$$-126/144 + 27/144 - 16/144 = (-126 + 27 - 16)/144 = -115/144$$

$$(3) 4 - 1/8 - 3/4:$$

LCM of 8 and 4 is 8.

$$4 - 1/8 - 3/4 = (4 * 8/8) - 1/8 - (3 * 2/8) = 32/8 - 1/8 - 6/8$$

$$32/8 - 1/8 - 6/8 = (32 - 1 - 6)/8 = 25/8$$

Exercise 5.6

$$1. (1) 2/9 * 5/13 = (2 * 5) / (9 * 13) = 10/117$$

$$(2) 7/19 * -38/21 = (7 * -38) / (19 * 21) = -266/399$$

$$(3) -2/77 * 35/-50 = (-2 * 35) / (77 * -50) = 70/3850 = 14/770 = 2/110 = 1/55$$

$$(4) 22/36 * 16/-33 = (22 * 16) / (36 * -33) = 352/-1188 = -88/297$$

$$(5) -18/25 * -45/64 = (-18 * -45) / (25 * 64) = 810/1600 = 81/160$$

$$2. (1) (2/7) * (7/2) = (2 * 7) / (7 * 2) = 14/14 = 1$$

$$(2) (-4/15) * (30/48) = (-4 * 30) / (15 * 48) = -120/720 = -1/6$$

$$(3) (8/25) * 10 = (8 * 10) / 25 = 80/25 = 16/5$$

$$(4) (-56/31) * (6/-7) = (-56 * 6) / (31 * -7) = 336/-217 = -336/217$$

$$(5) (3/17) * (-51/48) = (3 * -51) / (17 * 48) = -153/816 = -9/48 = -3/16$$

$$(6) (11/18) * 36 = (11 * 36) / 18 = 396/18 = 22$$

$$(7) -35 * (9/10) = (-35 * 9) / 10 = -315/10 = -63/2$$

$$3. -4/15 + 4/15 = 0/15 = 0$$

$$0 * (10/13) = 0$$

$$4. (1) [1/10 + 7/15] * [3/16 + 3/8]$$

$$1/10 + 7/15 = (3/30) + (14/30) = 17/30$$

$$3/16 + 3/8 = (3/16) + (6/16) = 9/16$$

$$(17/30) * (9/16) = (17 * 9) / (30 * 16) = 153 / 480$$

$$153 / 480 = (153 \div 3) / (480 \div 3) = 51 / 160$$

$$(2) [-2/3 + 4/9] * [11/15 - 2/5]$$

$$-2/3 + 4/9 = -6/9 + 4/9 = -2/9$$

$$11/15 - 2/5 = 11/15 - 6/15 = 5/15 = 1/3$$

$$(-2/9) * (1/3) = (-2 * 1) / (9 * 3) = -2/27$$

$$(3) [1/6 - 5/18] * [5/9 - 7/12]$$

$$1/6 - 5/18 = 3/18 - 5/18 = -2/18 = -1/9$$

$$5/9 - 7/12 = 20/36 - 21/36 = -1/36$$

$$(-1/9) * (-1/36) = (1 * 1) / (9 * 36) = 1/324$$

$$(4) [2/9 + -5/6] * [-3/-8 - 3/4]$$

$$2/9 - 5/6 = 4/18 - 15/18 = -11/18$$

$$-3/-8 - 3/4 = 3/8 - 6/8 = -3/8$$

$$(-11/18) * (-3/8) = (11 * 3) / (18 * 8) = 33/144 = 11/48$$

$$(5) [-8/15 + 4/9] * [2/5 - 7/9]$$

$$-8/15 + 4/9 = -24/45 + 20/45 = -4/45$$

$$2/5 - 7/9 = 18/45 - 35/45 = -17/45$$

$$(-4/45) * (-17/45) = (4 * 17) / (45 * 45) = 68/2025$$

5. (LCM) of 9 and 3 is 9.

Multiplying the numerator and denominator of $2/3$ by 3:

$$5/9 + (2/3) * (3/3) = 5/9 + 6/9$$

$$5/9 + 6/9 = (5 + 6)/9 = 11/9$$

$$(11/9) * (7/3 + (-4/15))$$

The LCM of 3 and 15 is 15.

Multiplying the numerator and denominator of $7/3$ by 5:

$$(11/9) * (7/3) * (5/5) = (11/9) * (35/15)$$

Multiplying the numerator and denominator of $11/9$ by 5:

$$(11/9) * (35/15) = (11 * 35) / (9 * 15) = 385/135$$

Exercise 5.7

1. (1) no (2) -1 (3) positive (4) negative

2. (1) $5 \frac{1}{2}$ (2) $-2 \frac{1}{7}$ (3) $1 \frac{16}{21}$ (4) $-2 \frac{2}{5}$

3. (1) $-8/16 \div 4/8$:

$-8/16$ simplifies to $-1/2$, and $4/8$ simplifies to $1/2$.

$$(-1/2) \div (1/2) = -1/2 * 2/1 = -1/1 = -1.$$

(2) $-5/7 \div -11/7$:

$$(-5/7) \div (-11/7) = (-5/7) * (7/-11) = -5/-11.$$

(3) $20/39 \div (-13)$:

$$(20/39) \div (-13) = (20/39) * (-1/13).$$

$$(20/39) * (-1/13) = (-20/39) * (1/13) = -20/(39*13) = -20/507.$$

(4) $12/-13 \div 2/7$:

$$(12/-13) \div (2/7) = (12/-13) * (7/2).$$

$$(12/-13) * (7/2) = (-12/13) * (7/2) = -84/(13*2) = -84/26.$$

$$-84/26 = -42/13.$$

4. (1) $(7/8) \div (1/4)$

$$= (7/8) \times (4/1)$$

$$= 7 \times 4 / 8 \times 1$$

$$= 28/8$$

$$= 7/2$$

(2) $(12/13) \div (6/13)$

$$= (12/13) \times (13/6)$$

$$= 12 \times 13 / 13 \times 6$$

$$= 156/78$$

$$= 2$$

$$(3) (-4/21) \div (-5/14)$$

$$= (-4/21) \times (-14/5)$$

$$= 4 \times 14 / 21 \times 5$$

$$= 56/105$$

$$= 8/15$$

$$(4) (-4/5) \div (8/45)$$

$$= (-4/5) \times (45/8)$$

$$= -4 \times 45 / 5 \times 8$$

$$= -180/40$$

$$= -9/2$$

$$(5) (3/10) \div (-1)$$

$$= (3/10) \times (-1/1)$$

$$= -3/10$$

$$(6) 0 \div (11/19)$$

$$= 0$$

$$(7) (-21/51) \div (-14)$$

$$= (-21/51) \times (-1/14)$$

$$= 21/51 \times 1/14$$

$$= 21/714$$

$$= 1/34$$

$$(8) (4/72) \div (-7/24)$$

$$= (4/72) \times (-24/7)$$

$$= 4 \times (-24) / 72 \times 7$$

$$= -96/504$$

$$= -8/42$$

$$= -4/21$$

8. Let the unknown rational number be x. We have the equation:

$$(-5/8) * x = 1/16$$

$$((-5/8) * x) * (-8/5) = (1/16) * (-8/5)$$

$$(-5/8) * (-8/5) * x = -8/80$$

$$1 * x = -8/80$$

$$x = -8/80$$

$$x = -1/10$$

9. Let the unknown rational number be x. We have the equation:

$$(-5/9) * x = -7/6$$

$$((-5/9) * x) * (-9/5) = (-7/6) * (-9/5)$$

$$(-5/9) * (-9/5) * x = 63/30$$

$$1 * x = 63/30$$

$$x = 63/30$$

To simplify the fraction, we can find the greatest common divisor (GCD) of the numerator and denominator, which is 3:

$$63/30 = (63/3) / (30/3) = 21/10$$

10. $(11/23) * x = -65/69$

$$((11/23) * x) * (23/11) = (-65/69) * (23/11)$$

$$(11/23) * (23/11) * x = (-65/69) * (23/11)$$

$$1 * x = (-65/69) * (23/11)$$

$$x = (-65/69) * (23/11)$$

$$x = (-65 * 23) / (69 * 11)$$

$$x = -1495 / 759$$

11. $(-3/10 * 2/15) - (1 / (5/14))$

$$(-3/10 * 2/15) = -6/150 = -1/25$$

$$1 / (5/14) = 14/5$$

$$-1/25 - 14/5 = (-1/25) - (14/5) = -1/25 - 70/25 = -71/25$$

12. $(1 / (3/2)) + (1 / (-3/7))$

$$1 / (3/2) = 2/3$$

$$1 / (-3/7) = -7/3$$

$$(2/3) + (-7/3) = (2 - 7) / 3 = -5/3$$

13. If the product of two rational numbers is -3, and one of the numbers is 11/27, we can find the other number by dividing -3 by 11/27:

$$(-3) \div (11/27) = (-3) \times (27/11) = -81/11$$

14. $((7/10) + (-3/5)) \div (1 / (-11/20))$

$$(7/10) + (-3/5) = (7/10) - (6/10) = 1/10$$

$$1 / (-11/20) = -20/11$$

$$(1/10) \div (-20/11) = (1/10) \times (-11/20) = -11/200$$

15. $(1) 1/3 + 2/7$:

In this case, the common denominator is $3 * 7 = 21$.

$1/3$ can be converted to $7/21$ by multiplying the numerator and denominator by 7.

$2/7$ can be converted to $6/21$ by multiplying the numerator and denominator by 3.

Now, the expression becomes:

$$7/21 + 6/21$$

Adding the numerators, we get:

$$(7 + 6)/21 = 13/21$$

So, the reciprocal of $13/21$ is $21/13$.

(2) $7/8 - (-9/24)$:

the common denominator is $8 * 3 = 24$.

$7/8$ can be converted to $21/24$ by multiplying the numerator and denominator by 3.

$-9/24$ can be converted to $-72/192$ by multiplying the numerator and denominator by 8.

Now, the expression becomes:

$$168/192 - (-72/192)$$

$$168/192 + 72/192$$

Adding the numerators, we get:

$$(168 + 72)/192 = 240/192$$

$$\text{Reciprocal of } 240/192 = 192/240$$

$$192/240 = 4/5$$

So, the reciprocal of $7/8 - (-9/24)$ is $4/5$.

$$(3) 3/11 \times -33/42:$$

$$\text{Multiplying the numerators: } 3 \times -33 = -99$$

$$\text{Multiplying the denominators: } 11 \times 42 = 462$$

$$-99/462$$

$$\text{Reciprocal of } -99/462 = -462/99$$

$$-462/99 = -14/3$$

$$16. (1) [-3/7 + 2/3] \div 5/21:$$

The common denominator for 7 and 3 is 21.

Converting $-3/7$ to $-9/21$ by multiplying the numerator and denominator by 3.

Converting $2/3$ to $14/21$ by multiplying the numerator and denominator by 7.

$$[-9/21 + 14/21] \div 5/21$$

$$(5/21) \div 5/21$$

$$(5/21) \times (21/5)$$

Therefore, the simplified expression is 1.

$$(2) [-2/3 + 1/9] \div 25/27:$$

The common denominator for 3 and 9 is 9.

Converting $-2/3$ to $-6/9$ by multiplying the numerator and denominator by 3.

Converting $1/9$ to $1/9$ by leaving it as it is.

$$[-6/9 + 1/9] \div 25/27$$

$$(-5/9) \div 25/27$$

$$(-5/9) \times (27/25)$$

$$-135/225$$

$$-3/5$$

$$(3) [4/12 \times -5/36] \div 3/10:$$

The common denominator for 12 and 36 is 36.

Converting $4/12$ to $12/36$ by multiplying the numerator and denominator by 3.

Converting $-5/36$ to $-5/36$ by leaving it as it is.

$$[12/36 \times -5/36] \div 3/10$$

$$(-60/1296) \div 3/10$$

$$(-60/1296) \times (10/3)$$

$$-600/3888$$

$$-25/162$$

17. (1) For $a = 3/5$ and $b = 5/3$:

$$(a + b) \div (a - b) = (3/5 + 5/3) \div (3/5 - 5/3)$$

$$(a + b) \div (a - b) = (9/15 + 25/15) \div (9/15 - 25/15)$$

$$= (34/15) \div (-16/15)$$

$$= (34/15) * (-15/16)$$

$$= -34/16$$

$$= -17/8$$

Therefore, for $a = 3/5$ and $b = 5/3$, $(a + b) \div (a - b) = -17/8$.

(2) For $a = 1/7$ and $b = 4/21$:

$$(a + b) \div (a - b) = (1/7 + 4/21) \div (1/7 - 4/21)$$

$$(a + b) \div (a - b) = (3/21 + 4/21) \div (3/21 - 4/21)$$

$$= (7/21) \div (-1/21)$$

$$= (7/21) * (-21/1)$$

$$= -7/1$$

$$= -7$$

Therefore, for $a = 1/7$ and $b = 4/21$, $(a + b) \div (a - b) = -7$.

(3) For $a = -15/7$ and $b = -17/28$:

$$(a + b) \div (a - b) = (-15/7 + (-17/28)) \div (-15/7 - (-17/28))$$

$$(a + b) \div (a - b) = (-60/28 + (-17/28)) \div (-60/28 - (-17/28))$$

$$= (-77/28) \div (-43/28)$$

$$= (-77/28) * (-28/43)$$

$$= 77/43$$

Therefore, for $a = -15/7$ and $b = -17/28$, $(a + b) \div (a - b) = 77/43$.

Exercise 5.8

1.(1) Between $4/9$ and $5/18$:

$$\text{Average: } (4/9 + 5/18) / 2 = (8/18 + 5/18) / 2 = 13/36$$

So, two rational numbers between $4/9$ and $5/18$ are $13/36$.

(2) Between $2/5$ and $3/10$:

$$\text{Average: } (2/5 + 3/10) / 2 = (4/10 + 3/10) / 2 = 7/20$$

So, two rational numbers between $2/5$ and $3/10$ are $7/20$.

(3) Between $-9/10$ and $-9/8$:

$$\text{Average: } (-9/10 + -9/8) / 2 = (-36/40 + -45/40) / 2 = -81/80$$

So, two rational numbers between $-9/10$ and $-9/8$ are $-81/80$.

(4) Between $-6/7$ and $7/14$:

$$\text{Average: } (-6/7 + 7/14) / 2 = (-12/14 + 7/14) / 2 = -5/28$$

So, two rational numbers between $-6/7$ and $7/14$ are $-5/28$.

2. (1) Between $7/6$ and $2/3$:

$$\text{Interval: } (2/3 - 7/6) / 4 = (4/6 - 7/6) / 4 = -1/6 / 4 = -1/24$$

The three rational numbers between $7/6$ and $2/3$ are:

$$7/6 - 1/24 = 28/24 - 1/24 = 27/24 = 9/8$$

$$7/6 - 2/24 = 28/24 - 2/24 = 26/24 = 13/12$$

$$7/6 - 3/24 = 28/24 - 3/24 = 25/24$$

(2) Between $-4/5$ and $-4/7$:

$$\text{Interval: } (-4/7 - (-4/5)) / 4 = (-4/7 + 4/5) / 4 = (-20/35 + 28/35) / 4 = 8/35 / 4 = 2/35$$

The three rational numbers between $-4/5$ and $-4/7$ are:

$$-4/5 + 2/35 = -28/35 + 2/35 = -26/35$$

$$-4/5 + 4/35 = -28/35 + 4/35 = -24/35$$

$$-4/5 + 6/35 = -28/35 + 6/35 = -22/35$$

(3) Between $1/3$ and $2/5$:

$$\text{Interval: } (2/5 - 1/3) / 4 = (6/15 - 5/15) / 4 = 1/15 / 4 = 1/60$$

The three rational numbers between $1/3$ and $2/5$ are:

$$1/3 + 1/60 = 20/60 + 1/60 = 21/60 = 7/20$$

$$1/3 + 2/60 = 20/60 + 2/60 = 22/60 = 11/30$$

$$1/3 + 3/60 = 20/60 + 3/60 = 23/60$$

(4) Between $-5/12$ and $-1/12$:

$$\text{Interval: } (-1/12 - (-5/12)) / 4 = (-1/12 + 5/12) / 4 = (4/12) / 4 = 1/12$$

The three rational numbers between $-5/12$ and $-1/12$ are:

$$-5/12 + 1/12 = -4/12 = -1/3$$

$$-5/12 + 2/12 = -3/12 = -1/4$$

$$-5/12 + 3/12 = -2/12 = -1/6$$

3. (1) Between -2 and 1 :

-2 and 1 can be expressed as $-2/1$ and $1/1$, respectively.

The average of $-2/1$ and $1/1$ is $(-2/1 + 1/1)/2 = -1/2$.

Four rational numbers between -2 and 1 :

$$-3/4, -1/2, -1/4, 0$$

(2) Between $-3/5$ and $-1/5$:

$-3/5$ and $-1/5$ are already rational numbers.

The average of $-3/5$ and $-1/5$ is $(-3/5 + -1/5)/2 = -4/10 = -2/5$.

Four rational numbers between $-3/5$ and $-1/5$:

$$-9/20, -7/20, -1/2, -3/10$$

(3) Between $-1/20$ and $-3/10$:

$-1/20$ and $-3/10$ can be expressed as $-1/20$ and $-6/20$, respectively.

The average of $-1/20$ and $-6/20$ is $(-1/20 + -6/20)/2 = -7/40$.

Four rational numbers between $-1/20$ and $-3/10$:

$$-3/40, -1/10, -5/40, -7/40$$

(4) Between $-8/15$ and $-7/12$:

$-8/15$ and $-7/12$ can be expressed as $-32/60$ and $-35/60$, respectively.

The average of $-32/60$ and $-35/60$ is $(-32/60 + -35/60)/2 = -67/120$.

Four rational numbers between $-8/15$ and $-7/12$:

$$-2/5, -67/120, -11/30, -59/120$$

4. Between $2/7$ and $-1/3$:

$2/7$ and $-1/3$ can be expressed as $6/21$ and $-7/21$, respectively.

The average of $6/21$ and $-7/21$ is $(6/21 + -7/21)/2 = -1/21$.

Six rational numbers between $2/7$ and $-1/3$:

$5/21, 4/21, 3/21, -1/21, -2/21, -3/21$

5. Between $10/13$ and $-1/13$:

$10/13$ and $-1/13$ are already rational numbers.

The average of $10/13$ and $-1/13$ is $(10/13 + -1/13)/2 = 9/26$.

Ten rational numbers between $10/13$ and $-1/13$:

$7/26, 5/26, 3/26, 1/26, -1/26, -3/26, -5/26, -7/26, -9/26, -11/26$

6. Between -1 and -5 :

-1 and -5 can be expressed as $-1/1$ and $-5/1$, respectively.

The average of $-1/1$ and $-5/1$ is $(-1/1 + -5/1)/2 = -3/1 = -3$.

Two rational numbers between -1 and -5 :

$-7/2, -4$

7. Between -2 and $5/7$:

-2 and $5/7$ can be expressed as $-14/7$ and $5/7$, respectively.

The average of $-14/7$ and $5/7$ is $(-14/7 + 5/7)/2 = -9/14$.

Three rational numbers between -2 and $5/7$:

$-8/14, -10/14, -9/14$

CHAPTER 6

Exercise 6.1

1. (1) 3^6 (2) 6^3 (3) 4^4 (4) 7^3 (5) 5^6

2. (1) $3^3 \times 2^3$ (2) $5^3 \times 3^3$ (3) $b^4 c^2$ (4) $7^3 \times 2^3$ (5) $x^2 y^2 z^2$ (6) $7^3 \times 10^3$

3. (1) 64 (2) 729 (3) 121 (4) 625

4. (1) 625 (2) 9 (3) 49 (4) 441

5. (1) 64 (2) -125 (3) -729 (4) 1,000

6. (1) $3^2 \times 10^6 = (-3)^2 \times (-10)^6$
(2) $2^3 \times 7^3 \times 10^6 > 2^3 \times (-7)^2 \times 10^6$

7. (1) 196 (2) 1,404 (3) 0 (4) 3,025 (5) 144 (6) 1,56,25,00,000

8. (1) 216 (2) 100 (3) 729

9. (1) $72 = 2^3 \times 3^2$

(2) $256 = 2^8$

(3) $1,000 = 2^3 \times 5^3$

(4) $2,800 = 2^4 \times 5^2 \times 7$

(5) $6,300 = 2^2 \times 3^2 \times 5^2 \times 7$

(6) $5,600 = 2^5 \times 5^2 \times 7$

(7) $1,024 = 2^{10}$

10. (1) 64 (2) 16 (3) 49 (4) 59,049

11. $(-2)^3 = -2 * -2 * -2 = -8$

$(-7)^2 = -7 * -7 = -49$

The difference between -8 and -49 is $49 - 8 = 41$.

To find four equal parts, we divide 41 by 5:

$$41 / 5 = 8.2$$

So, we can find the four rational numbers between -8 and -49 by subtracting multiples of 8.2 from -8:

$$-8 - 8.2 = -16.2$$

$$-8 - 2(8.2) = -24.4$$

$$-8 - 3(8.2) = -32.6$$

$$-8 - 4(8.2) = -40.8$$

Therefore, the four rational numbers between $(-2)^3$ and $(-7)^2$ are:

$$-16.2, -24.4, -32.6, -40.8$$

12. (1) $(7^2 - 4^2) \times (2)^3$

$$7^2 - 4^2 = 49 - 16 = 33$$

$$(7^2 - 4^2) \times (2)^3 = 33 \times (2^3) = 33 \times 8 = 264$$

Therefore, $(7^2 - 4^2) \times (2)^3$ simplifies to 264.

(2) $(3^2 + 5^2) \times (9)^2$

$$3^2 + 5^2 = 9 + 25 = 34$$

$$(3^2 + 5^2) \times (9)^2 = 34 \times (9)^2 = 34 \times 81 = 2754$$

Therefore, $(3^2 + 5^2) \times (9)^2$ simplifies to 2754.

(3) $(8^2 - 4^2) \div (1/24)$

$$8^2 - 4^2 = 64 - 16 = 48$$

$$(8^2 - 4^2) \div (1/24) = 48 \div (1/24)$$

$$48 \div (1/24) = 48 \times (24/1) = 48 \times 24 = 1152$$

Therefore, $(8^2 - 4^2) \div (1/24)$ simplifies to 1152.

13. (1) 1 (2) 1 (3) -1 (4) -1

Exercise 6.2

1. (1) 4^8 (2) 6^9

2. (1) $(-1)^{19}$ (2) 3^{13} (3) 5^{12} (4) $(-9)^{11}$
 (5) $(-8)^{12}$

3. (1) $2^9 \div 2^3$

Using the property of division, we subtract the exponents:

$$2^{(9-3)} = 2^6$$

(2) $(51)^{190} \div (51)^{180}$

using the property of division:

$$(51)^{(190-180)} = (51)^{10}$$

(3) $(-16)^7 \div (-16)^3$

Applying the division property:

$$(-16)^{(7-3)} = (-16)^4$$

(4) $(-18)^{13} \div (-18)^9$

Using the exponentiation rule for division:

$$(-18)^{(13-9)} = (-18)^4$$

(5) $a^{125} \div a^{120}$

Applying the division property:

$$a^{(125-120)} = a^5$$

(6) $(-a)^8 \div (-a)^3$

Using the exponentiation rule for division:

$$(-a)^{(8-3)} = (-a)^5$$

(7) $(-a)^{15} \div (-a)^{-8}$

Applying the division property:

$$(-a)^{(15-(-8))} = (-a)^{23}$$

(8) $(4^3)^4$

Using the property of exponentiation:

$$4^{(3 \cdot 4)} = 4^{12}$$

(9) $(12^5)^3$

Applying the property of exponentiation:

$$12^{(5 \cdot 3)} = 12^{15}$$

(10) $(3^2)^6$

Using the property of exponentiation:

$$3^{(2 \cdot 6)} = 3^{12}$$

4. (1) $(5^3) \times 4$ or $(5^3)^4$

$$(5^3) \times 4 = 125 \times 4 = 500$$

$$(5^3)^4 = (125)^4 = 125,000,000$$

125,000,000 is greater than 500.

(2) $3^7 \times 7$ or $(3^1)^7$

$$3^7 \times 7 = 2187 \times 7 = 15,309$$

$$(3^1)^7 = 3^7 = 2187$$

2187 is greater than 15,309.

(3) $(2 \times 5)^4$ or 10×5^4

$$(2 \times 5)^4 = 10^4 = 10,000$$

$$10 \times 5^4 = 10 \times 625 = 6,250$$

10,000 is greater than 6,250.

(4) $(10^4)^2$ or $10^4 \times 3$

$$(10^4)^2 = 10^8 = 100,000,000$$

$$10^4 \times 3 = 10,000 \times 3 = 30,000$$

100,000,000 is greater than 30,000.

(5) $(-4)^3$ or $(4^2)^3$

$$(-4)^3 = -64$$

$$(4^2)^3 = 16^3 = 4,096$$

4,096 is greater than -64.

5. (1) 35^8 (2) 14^{11} (3) $(6a)^{13}$

(4) $(2/5)^8$ (5) $(1 \frac{3}{5})^{13}$ (6) 21^{27}

(7) $(x/5)^3$

6. (1) 1 (2) 1 (3) 1

7. (1) false (2) false (3) true

8. (1) $3^7 / 3^4 \times 3^3$:

$$3^7 / 3^4 \times 3^3 = 3^{(7-4+3)} = 3^6.$$

(2) $2^9 \times 15 \times 3^3 / 64 \times 3^2$:

$$2^9 \times 15 \times 3^3 / 64 \times 3^2 = (2^9 \times 15 \times 3^3) / (64 \times 3^2) = (2^9 \times 15 \times 3^{(3-2)}) / 64 = (2^9 \times 15 \times 3) / 64.$$

(3) $25^4 \div 5^3$:

$$25^4 \div 5^3 = 5^{(4 \times 2 - 3)} = 5^5.$$

(4) $3^0 \times x^0 \times y^0 / 2 \times x^0 \times y^0$:

$$3^0 \times x^0 \times y^0 / 2 \times x^0 \times y^0 = 1 \times 1 \times 1 / 2 \times 1 \times 1 = 1/2.$$

(5) $4^5 \times a^8 b^3 / 4^5 \times a^5 b^2$:

$$4^5 \times a^8 b^3 / 4^5 \times a^5 b^2 = (4^5 / 4^5) \times (a^8 / a^5) \times (b^3 / b^2) = 1 \times a^{(8-5)} \times b^{(3-2)} = a^3 \times b.$$

(6) $(2/7)^5 \times (7/4)^6 / (2/7)^3 \times (7/4)^3$:

$$(2/7)^5 \times (7/4)^6 / (2/7)^3 \times (7/4)^3 = (2/7)^{(5-3)} \times (7/4)^{(6-3)} = (2/7)^2 \times (7/4)^3.$$

9. (1) 30×243 :

To factorize 30, we can write it as $2 \times 3 \times 5$.

To factorize 243, we can write it as 3^5 .

So, 30×243 can be expressed as $(2 \times 3 \times 5) \times (3^5)$.

Combining the common factors, we get $(2 \times 3^6 \times 5)$.

(2) 2,334:

To factorize 2,334, we can start by dividing it by 2 repeatedly until we can no longer divide evenly: $2,334 \div 2 =$

$$1,167 \div 2 = 583 \div 2 = 291 \div 3 = 97.$$

Thus, the prime factors of 2,334 are $2 \times 3 \times 97$.

Expressed in exponential form, 2,334 is equal to $(2^1 \times 3^1 \times 97^1)$.

(3) 5,089:

To factorize 5,089, we can try to divide it by prime numbers. Starting with 2 and moving upward, we find that it is not divisible evenly by 2 or 3. However, dividing it by 7 results in a quotient of 727, which is a prime number.

So, the prime factors of 5,089 are 7×727 .

Expressed in exponential form, 5,089 can be written as $(7^1 \times 727^1)$

10. (1) $3^x = 243$:

Since 243 is equal to 3^5 , we can rewrite the equation as:

$$3^x = 3^5.$$

By comparing the bases on both sides, we can equate the exponents:

$$x = 5.$$

(2) $x^{12} = 1$:

To find x , we can take the 12th root of both sides of the equation:

$$(x^{12})^{(1/12)} = 1^{(1/12)}.$$

This simplifies to:

$$x = 1.$$

(3) $8^x = 4,096$:

Since 4,096 is equal to 8^4 , we can rewrite the equation as:

$$8^x = 8^4.$$

By equating the exponents, we have:

$$x = 4.$$

(4) $(7)^9 \div (7)^3 = (7)^{3x}$:

We can simplify the left side of the equation by dividing the exponents with the same base:

$$7^{(9 - 3)} = 7^{(3x)}.$$

Simplifying further:

$$7^6 = 7^{(3x)}.$$

Since the bases are equal, the exponents must be equal as well:

$$6 = 3x.$$

Solving for x :

$$x = 2.$$

(5) $(\frac{3}{7})^3 \times (\frac{3}{7})^2 = (\frac{3}{7})^{(3x - 1)}$:

Using the property of exponents for multiplication, we can add the exponents with the same base:

$$(\frac{3}{7})^{(3 + 2)} = (\frac{3}{7})^{(3x - 1)}.$$

Simplifying:

$$(\frac{3}{7})^5 = (\frac{3}{7})^{(3x - 1)}.$$

Since the bases are equal, the exponents must be equal as well:

$$5 = 3x - 1.$$

Solving for x :

$$3x = 6,$$

$$x = 2.$$

$$(6) [(-6)^6]^3 = (-6)^{18}$$

We can simplify the left side of the equation by multiplying the exponents:

$$(-6)^{6 \times 3} = (-6)^{18}$$

Simplifying further:

$$(-6)^{18} = (-6)^{18}$$

Since the bases are equal, the exponents must be equal as well:

$$18 = 3x$$

Solving for x:

$$x = 6$$

$$11. (1) (1/5 + 7/10)^2:$$

The common denominator for 5 and 10 is 10. So we have:

$$(1/5 + 7/10)^2 = (2/10 + 7/10)^2 = (9/10)^2 = 81/100$$

$$(2) (1/4 - 1/8)^3 \times 6^2:$$

$$(1/4 - 1/8)^3 \times 6^2 = (2/8 - 1/8)^3 \times 6^2 = (1/8)^3 \times 36 = (1/512) \times 36 = 36/512 = 9/128$$

$$(3) (2^2 + 3^2 - 4^2) \div (-9)^0:$$

$$(2^2 + 3^2 - 4^2) \div (-9)^0 = (4 + 9 - 16) \div 1 = -3$$

$$(4) (5^3 - 3^3) \div (4)^3:$$

$$(5^3 - 3^3) \div (4)^3 = (125 - 27) \div 64 = 98 \div 64 = 49/32$$

$$12. (-5)^{45} = (-1)^{45} \times (5)^{45} = -1 \times (5)^{45} = -(5)^{45}$$

$$(5)^6 \times x = -(5)^{45}$$

To solve for x, we can divide both sides of the equation by $(5)^6$:

$$x = -(5)^{45} / (5)^6$$

Now, we can simplify the equation further:

$$x = -(5)^{(45-6)} = -(5)^{39}$$

$$13. (-12)^6 = (-1)^6 \times (2^2)^6 \times (3)^6 = 1 \times 2^{12} \times 3^6 = 2^{12} \times 3^6$$

$$x / (-12)^6 = 12$$

To solve for x, we can multiply both sides of the equation by $(-12)^6$:

$$x = 12 \times (-12)^6$$

Now, we can simplify the equation further:

$$x = 12 \times (2^2)^6 \times (3)^6 = 12 \times 2^{12} \times 3^6$$

$$14. (1) 9^{2x+1} \div 9^2 = 9^3:$$

$$9^{2x+1-2} = 9^3$$

Simplifying further:

$$9^{2x-1} = 9^3$$

$$2x - 1 = 3$$

Solving for x:

$$2x = 4,$$

$$x = 2$$

$$(2) 18 \times 3^{x+1} = 162:$$

$$3^{x+1} = 162/18,$$

$$3^{x+1} = 9.$$

$$x + 1 = 2.$$

Solving for x:

$$x = 1.$$

$$(3) 343 \times 7^x = 7^7:$$

$$7^x = 7^7 / 343,$$

$$7^x = 7^{(7-3)},$$

$$7^x = 7^4.$$

$$x = 4$$

Exercise 6.3

$$1. (1) (3/5)^{-2} = (5/3)^2 = 25/9$$

$$(2) (-8)^{-12} = 1/(-8)^{12}$$

$$(3) (-9)^{-20} = 1/(-9)^{20}$$

$$(4) (1/7)^{-4} = 7^4$$

$$2. (1) (8)^{-3} = 1/(8)^3 = 1/512$$

$$(2) (-9)^{-7} = 1/(-9)^7 = 1/4782969$$

$$(3) (1/12)^{-4} = 12^4 = 20736$$

$$(4) (4/5)^{-3} = (5/4)^3 = 125/64$$

$$3. (1) \text{ The reciprocal of } (-3)^5 \text{ is } 1/((-3)^5) = 1/(-243) = -1/243.$$

$$(2) \text{ The reciprocal of } (-7)^{-6} \text{ is } 1/((-7)^{-6}) = 1/(1/(-7)^6) = 1/1/117649 = 117649.$$

$$(3) \text{ The reciprocal of } (7/4)^{-3} \text{ is } 1/((7/4)^{-3}) = 1/(1/(7/4)^3) = 1/(1/(343/64)) = 1/(64/343) = 343/64.$$

$$(4) \text{ The reciprocal of } (9/11)^{-2} \text{ is } 1/((9/11)^{-2}) = 1/(1/(9/11)^2) = 1/(1/(81/121)) = 1/(121/81) = 81/121.$$

$$4. (1) (3^{-1} + 5^{-1})^2 \times (-12/21)^{-1}$$

$$(1/3 + 1/5)^2 \times (-12/21)^{-1}$$

$$(8/15)^2 \times (-12/21)^{-1}$$

$$(64/225) \times (-12/21)^{-1}$$

$$(64/225) \times (21/-12)$$

$$(64/225) \times (-7/4)$$

Multiply the numerators and denominators:

$$(64 \times -7) / (225 \times 4) = -448 / 900$$

To simplify the fraction further, divide both the numerator and denominator by their greatest common divisor, which is 4:

$$(-112/225)$$

Therefore, the simplified expression is $-112/225$.

$$(2) (3^{-1} - 4^{-1})^{-1} : (20/9)^1$$

$$(1/3 - 1/4)^{-1} : (20/9)^1$$

$$(4/12 - 3/12)^{-1} : (20/9)^1$$

$$(1/12)^{-1} : (20/9)^1$$

$$12 : (20/9)$$

$$12 \times (9/20) = 108/20$$

To simplify the fraction further, divide both the numerator and denominator by their greatest common divisor, which is 4:

$$27/5$$

Therefore, the simplified expression is 27/5.

$$(3) (3^{-1} \times 20^{-1})^{-3} \times 1/100$$

$$(1/3 \times 1/20)^{-3} \times 1/100$$

$$(1/60)^{-3} \times 1/100$$

$$(60/1)^3 \times 1/100$$

$$(60)^3 \times 1/100$$

$$(216,000) \times 1/100$$

$$216,000/100 = 2,160$$

Therefore, the simplified expression is 2,160.

$$(4) [9^{-1} + (1/3)^{-1}]^{-1}$$

$$[(1/9) + (3/1)]^{-1}$$

$$[(1/9) + (27/9)]^{-1}$$

$$[28/9]^{-1}$$

$$9/28$$

Therefore, the simplified expression is 9/28.

5. To find the number by which $(-4)^{-3}$ should be multiplied to obtain $(-12)^{-1}$, we can set up the equation:

$$(-4)^{-3} * x = (-12)^{-1}$$

We can simplify the equation using the properties of exponents:

$$1/((-4)^3) * x = 1/(-12)$$

$$1/(-64) * x = 1/(-12)$$

To solve for x, multiply both sides of the equation by -64:

$$x = (-64) / (-12)$$

$$x = 16/3$$

Therefore, $(-4)^{-3}$ should be multiplied by 16/3 to obtain $(-12)^{-1}$.

6. To find the number by which $(-15)^{-1}$ should be divided to obtain $(-5)^{-1}$, we can set up the equation:

$$(-15)^{-1} / x = (-5)^{-1}$$

We can simplify the equation using the properties of exponents:

$$1/(-15) / x = 1/(-5)$$

To solve for x, multiply both sides of the equation by (-15):

$$1 / (-15x) = 1/(-5)$$

$$-15x = -5$$

$$x = -5 / -15$$

$$x = 1/3$$

Therefore, $(-15)^{-1}$ should be divided by 1/3 to obtain $(-5)^{-1}$.

7. (1) 7.784×10^{11} m
 (2) 6.43×10^6 km
 (3) 1.53×10^8 cu m
 (4) 3.84×10^8 m
 (5) 3.0×10^8 m/s

8. (1) 9.07×10^8 (2) 9.0×10^9
 (3) 4.263×10^8 (4) 2.34×10^{10}
 (5) 6.26×10^{12} (7) 3.91517×10^{12}

9. (1) 4,65,000 (2) 0.000039
 (3) 0.0000024 (4) 44,50,00,000

10. $4.04 \times 10^{24} = 4,040,000,000,000,000,000,000,000$
 In this usual form, there are 22 zeroes following the number 404.

11. (1) b (2) c (3) c (4) b (5) a (6) a

CHAPTER 7

Exercise 7.1

1. (1) 3 (2) 5 (3) 8 (4) 12

2. (1) monomial (2) trinomial (3) binomial (4) quadrinomial (5) trinomial (6) monomial
 (7) trinomial (8) trinomial

3. (1) 4 (2) 3 (3) 4 (4) 11

4. (1) unlike (2) unlike (3) unlike (4) unlike (5) like (6) like

5. Terms Coefficients

- | | |
|-------------|--------|
| (1) $3x$ | 3 |
| (2) $6x$ | 6 |
| (3) $-5x$ | -5 |
| (4) x^2 | 1 |
| xz | z |
| xy | y |
| (5) $2p^2x$ | $2p^2$ |
| $-41px$ | $-41p$ |
| (6) $-5xb$ | $-5b$ |

6. Terms Coefficients

$$(1) -7x^2y \quad -7x^2$$
$$6y^2 \quad 6$$

$$(2) 2xy^2z \quad 2xz$$
$$-3x^2yz \quad -3x^2z$$

$$(3) ym^2 \quad m^2$$
$$5y^2m \quad 5m$$
$$-15x^2y \quad -15x^2$$

7. (1) quadratic (2) quadratic (3) cubic (4) cubic (5) cubic

8. (1) m^2 (2) $\frac{1}{2}xy$ (3) $(y-z) + yz$ (4) $p^3 - (pq)$ (5) $x^3 + y^3$

Exercise 7.2

1.(1) $3x + y$

Substituting $x = 2$ and $y = -3$:

$$3(2) + (-3) = 6 - 3 = 3$$

(2) $8x + 3y - 4$

Substituting $x = 2$ and $y = -3$:

$$8(2) + 3(-3) - 4 = 16 - 9 - 4 = 3$$

(3) $x^2 - 3xy + y^2$

Substituting $x = 2$ and $y = -3$:

$$(2)^2 - 3(2)(-3) + (-3)^2 = 4 + 18 + 9 = 31$$

(4) $x^2 + 8xy - y^2$

Substituting $x = 2$ and $y = -3$:

$$(2)^2 + 8(2)(-3) - (-3)^2 = 4 - 48 - 9 = -53$$

(5) $3 - 8x^2 + 3y^2$

Substituting $x = 2$ and $y = -3$:

$$3 - 8(2)^2 + 3(-3)^2 = 3 - 8(4) + 3(9) = 3 - 32 + 27 = -2$$

(6) $x^2 + xy + y^2 - 6$

Substituting $x = 2$ and $y = -3$:

$$(2)^2 + 2(-3) + (-3)^2 - 6 = 4 - 6 + 9 - 6 = 1$$

2. (1) $a + 5$

Substituting $a = 3$:

$$3 + 5 = 8$$

(2) $8a - 19$

Substituting $a = 3$:

$$8(3) - 19 = 24 - 19 = 5$$

(3) $21 - 5a$

Substituting $a = 3$:

$$21 - 5(3) = 21 - 15 = 6$$

$$(4) a^2 + 3a + 8$$

Substituting $a = 3$:

$$(3)^2 + 3(3) + 8 = 9 + 9 + 8 = 26$$

$$(5) 18 - a^2 - 3a$$

Substituting $a = 3$:

$$18 - (3)^2 - 3(3) = 18 - 9 - 9 = 0$$

$$(6) a^2 + a + 3$$

Substituting $a = 3$:

$$(3)^2 + 3 + 3 = 9 + 3 + 3 = 15$$

$$3. (1) 8x^2 - 7xy + 3$$

Substituting $x = 0$ and $y = 3$:

$$8(0)^2 - 7(0)(3) + 3 = 0 - 0 + 3 = 3$$

$$(2) 6y^2 - 8xy + 3x^3$$

Substituting $x = 0$ and $y = 3$:

$$6(3)^2 - 8(0)(3) + 3(0)^3 = 6(9) - 0 + 0 = 54$$

$$(3) 4x^4 - 7x^2 y^2 + 18$$

Substituting $x = 0$ and $y = 3$:

$$4(0)^4 - 7(0)^2 (3)^2 + 18 = 0 - 0 + 18 = 18$$

$$4. x^2 + y^2 + z^2 - xy - yz - zx$$

Substituting $x = -3$, $y = 4$, and $z = -2$:

$$(-3)^2 + (4)^2 + (-2)^2 - (-3)(4) - (4)(-2) - (-3)(-2) = 9 + 16 + 4 + 12 + 8 - 6 = 43$$

Therefore, the value of the expression $x^2 + y^2 + z^2 - xy - yz - zx$ when $x = -3$, $y = 4$, and $z = -2$ is 43.

$$5. 6q^2 - 5q - 1$$

Substituting $q = -6$:

$$6(-6)^2 - 5(-6) - 1 = 6(36) + 30 - 1 = 216 + 30 - 1 = 245$$

Therefore, the value of the expression $6q^2 - 5q - 1$ when $q = -6$ is 245.

$$6. 3ab + 4bc + 3ca - a^2 - b^2 - c^2$$

Substituting $a = 3$, $b = 2$, and $c = -3$:

$$3(3)(2) + 4(2)(-3) + 3(-3)(3) - (3)^2 - (2)^2 - (-3)^2 = 18 - 24 - 27 - 9 - 4 - 9 = -55$$

Therefore, the value of the expression $3ab + 4bc + 3ca - a^2 - b^2 - c^2$ when $a = 3$, $b = 2$, and $c = -3$ is -55.

$$7. 3x^2 + 7x + n = 3$$

Substituting $x = 1$:

$$3(1)^2 + 7(1) + n = 3$$

$$3 + 7 + n = 3$$

$$10 + n = 3$$

$$n = 3 - 10$$

$$n = -7$$

Therefore, the value of n is -7 when the expression $3x^2 + 7x + n$ equals 3 when $x = 1$.

8. (1) $(x + y)^2 - (x - y)^2$

Substituting $x = 1/3$ and $y = 1/5$:

$$(1/3 + 1/5)^2 - (1/3 - 1/5)^2 = (8/15)^2 - (2/15)^2 = (64/225) - (4/225) = 60/225 = 4/15$$

(2) $(a - b)^2 + 4ab$

Substituting $a = 1/4$ and $b = -3$:

$$(1/4 - (-3))^2 + 4(1/4)(-3) = (1/4 + 3)^2 + (-3/4) = (13/4)^2 - (3/4) = 169/16 - 3/4 = 169/16 - 12/16 = 157/16$$

(3) $(x + y)^2 - (x^2 + y^2 + 2xy)$

Substituting $x = 2$ and $y = -2$:

$$(2 + (-2))^2 - (2^2 + (-2)^2 + 2(2)(-2)) = (0)^2 - (4 + 4 + (-8)) = 0 - 4 = -4$$

(4) $(p^2 - q^2) - (p + q)(p - q)$

Substituting $p = 2.4$ and $q = -1.8$:

$$(2.4^2 - (-1.8)^2) - (2.4 + (-1.8))(2.4 - (-1.8)) = (5.76 - 3.24) - (0.6)(4.2) = 2.52 - 2.52 = 0$$

9. (1) $px + qy + rz$

Substituting $x = 1$, $y = -1$, $z = 2$, $p = -2$, $q = 1$, and $r = -2$:

$$(-2)(1) + (1)(-1) + (-2)(2) = -2 - 1 - 4 = -7$$

(2) $px^2 + qy^2 - rz^2$

Substituting $x = 1$, $y = -1$, $z = 2$, $p = -2$, $q = 1$, and $r = -2$:

$$(-2)(1^2) + (1)(-1^2) - (-2)(2^2) = -2 + 1 - (-2)(4) = -2 + 1 + 8 = 7$$

(3) $pxy + qyz + rzx$

Substituting $x = 1$, $y = -1$, $z = 2$, $p = -2$, $q = 1$, and $r = -2$:

$$(-2)(1)(-1) + (1)(-1)(2) + (-2)(2)(1) = 2 - 2 - 4 = -4$$

10. To find the value of the expression $(4/7)x + 35$ when $x = 3.5$, we substitute $x = 3.5$ into the expression and calculate the result:

$$(4/7)(3.5) + 35 = (4/7)(3.5) + 35/1 = (43.5)/(71) + 35 = 14/7 + 35 = 2 + 35 = 37$$

Therefore, the value of the expression $(4/7)x + 35$ when $x = 3.5$ is 37.

CHAPTER 8

Exercise 8.1

1. (1) 2 added to 3 times y gives the result 9. (2) 5 times x subtracted from 7 gives 1. (3) 8 times x equal to 48. (4) 7 times b added to 18 gives the result 22.
- (5) $6/7$ times x is equal to 14.
- (6) 8 subtracted from 3 times y is equal to 9.

2. (1) $x + 7 = 10$ (2) $b - 4 = 3$
 (3) $4x - 4 = 9$ (4) $x/7 = 3$
 (5) $3/8x - 3 = 2$

3. (1) $6x + 5 = 35$ (2) $3x + 8 = 42$
 (3) $x + x + 2x = 180$ degree

$$(4) x + (x + 1) = 44 \quad (5) x + 2x = 200 - 44$$

$$(6) x + 3x/7 = 42 \quad (7) x + x/3 = 353$$

$$(7) 2[(3x - 5) + x] = 210$$

$$4. (1) x = 6/5 \quad (2) x = 25/6 \quad (3) x = 2$$

$$(4) x = 13 \quad (5) x = 9/11 \quad (6) y = -3$$

$$(7) y = 1 \quad (8) z = 10/7$$

$$5. (1) 13 - 5x = -24 + 3x$$

$$13 - 5x - 3x = -24$$

$$13 - 8x = -24$$

$$13 - 8x - 13 = -24 - 13$$

Simplify:

$$-8x = -37$$

Divide both sides by -8 to solve for x:

$$x = (-37) / (-8)$$

$$x = 37/8$$

$$(2) 3x/7 - x/8 = 56$$

LCM of the denominators, which is 56:

$$56 * (3x/7) - 56 * (x/8) = 56 * 56$$

Simplify:

$$24x - 7x = 3136$$

$$17x = 3136$$

Divide both sides by 17 to solve for x:

$$x = 3136 / 17$$

$$(3) 0 = 12 + 4(m - 5)$$

$$0 = 12 + 4m - 20$$

$$0 = -8 + 4m$$

$$4m = 8$$

Divide both sides by 4 to solve for m:

$$m = 8/4$$

$$m = 2$$

$$(4) 6(x - 3) = -48$$

$$6x - 18 = -48$$

Add 18 to both sides to isolate the variable term:

$$6x - 18 + 18 = -48 + 18$$

Simplify:

$$6x = -30$$

Divide both sides by 6 to solve for x:

$$x = -30/6$$

$$x = -5$$

$$(5) 7x/8 - 15 = -1$$

$$7x/8 - 15 + 15 = -1 + 15$$

Simplify:

$$7x/8 = 14$$

Multiply both sides by 8 to eliminate the fraction:

$$8 * (7x/8) = 14 * 8$$

Simplify:

$$7x = 112$$

Divide both sides by 7 to solve for x:

$$x = 112/7$$

$$x = 16$$

$$(6) x/3 = x/4 + 1$$

LCM of the denominators, which is 12:

$$12 * (x/3) = 12 * (x/4) + 12 * 1$$

Simplify:

$$4x = 3x + 12$$

Subtract 3x from both sides to isolate the variable term:

$$4x - 3x = 3x + 12 - 3x$$

$$x = 12$$

$$(7) 32 - 7(n - 1) = 9$$

$$32 - 7n + 7 = 9$$

$$32 + 7 = 9 + 7n$$

Simplify:

$$39 = 9 + 7n$$

Subtract 9 from both sides to isolate the variable term:

$$39 - 9 = 9 + 7n - 9$$

$$32 = 7n$$

$$n = 32/7$$

$$(8) 3y - 4(2y - 5) = 6(y + 3) - 15$$

$$3y - 8y + 20 = 6y + 18 - 15$$

$$-5y + 20 = 6y + 3$$

$$-5y - 6y + 20 = 6y - 6y + 3$$

$$-11y + 20 = 3$$

$$-11y + 20 - 20 = 3 - 20$$

Simplify:

$$-11y = -17$$

$$y = (-17) / (-11)$$

$$y = 17/11$$

Exercise 8.2

$$1.(1) 2x - 1 = 3$$

Add 1 to both sides:

$$2x = 4$$

Divide both sides by 2:

$$x = 2$$

To verify the solution, substitute $x = 2$ back into the original equation:

$$2(2) - 1 = 3$$

$$4 - 1 = 3$$

$$3 = 3$$

The solution $x = 2$ satisfies the equation.

$$(2) \ 2x/5 = 8$$

Multiply both sides by 5:

$$2x = 40$$

Divide both sides by 2:

$$x = 20$$

Verify the solution:

$$2(20)/5 = 8$$

$$40/5 = 8$$

$$8 = 8$$

The solution $x = 20$ is correct.

$$(3) \ x/2 - 6 = 5$$

Add 6 to both sides:

$$x/2 = 11$$

Multiply both sides by 2:

$$x = 22$$

Verify the solution:

$$22/2 - 6 = 5$$

$$11 - 6 = 5$$

$$5 = 5$$

The solution $x = 22$ is valid.

$$(4) \ 4x + 5 = 13$$

Subtract 5 from both sides:

$$4x = 8$$

Divide both sides by 4:

$$x = 2$$

Verify the solution:

$$4(2) + 5 = 13$$

$$8 + 5 = 13$$

$$13 = 13$$

The solution $x = 2$ is correct.

$$(5) \ 6x + 3/7 = -4$$

Subtract $3/7$ from both sides:

$$6x = -4 - 3/7$$

Convert -4 to a fraction with a common denominator of 7:

$$6x = -28/7 - 3/7$$

$$6x = -31/7$$

Divide both sides by 6:

$$x = -31/42$$

Verify the solution:

$$6(-31/42) + 3/7 = -4$$

$$-31/7 + 3/7 = -4$$

$$-28/7 = -4$$

$$-4 = -4$$

The solution $x = -31/42$ is accurate.

$$(6) \frac{1}{5}x - \frac{1}{3} = \frac{1}{2}$$

To solve this equation, we need to find a common denominator for 5, 3, and 2, which is 30.

Multiply both sides by 30 to clear the denominators:

$$30 * (\frac{1}{5}x - \frac{1}{3}) = 30 * (\frac{1}{2})$$

Simplify the equation:

$$6x - 10 = 15$$

Add 10 to both sides:

$$6x = 25$$

Divide both sides by 6:

$$x = 25/6$$

Verify the solution:

$$(\frac{1}{5})(\frac{25}{6}) - \frac{1}{3} = \frac{1}{2}$$

$$\frac{25}{30} - \frac{10}{30} = \frac{15}{30}$$

$$\frac{15}{30} = \frac{15}{30}$$

The solution $x = 25/6$ is correct.

$$(7) \frac{3}{15} + 2x = 8$$

Simplify the fraction:

$$\frac{1}{5} + 2x = 8$$

Subtract $1/5$ from both sides:

$$2x = 8 - \frac{1}{5}$$

Convert 8 to a fraction with a denominator of 5:

$$2x = \frac{40}{5} - \frac{1}{5}$$

$$2x = \frac{39}{5}$$

Divide both sides by 2:

$$x = \frac{39}{10}$$

Verify the solution:

$$\frac{3}{15} + 2(\frac{39}{10}) = 8$$

$$\frac{1}{5} + \frac{39}{5} = 8$$

$$\frac{40}{5} = 8$$

$$8 = 8$$

The solution $x = 39/10$ is accurate.

$$(8) 3x - \frac{12}{8} = \frac{1}{8}$$

Simplify the fraction:

$$3x - \frac{3}{2} = \frac{1}{8}$$

Add $3/2$ to both sides:

$$3x = \frac{1}{8} + \frac{3}{2}$$

Find a common denominator for 8 and 2, which is 8:

$$3x = 1/8 + 12/8$$

$$3x = 13/8$$

Divide both sides by 3:

$$x = 13/24$$

Verify the solution:

$$3(13/24) - 12/8 = 1/8$$

$$13/8 - 12/8 = 1/8$$

$$1/8 = 1/8$$

The solution $x = 13/24$ is correct.

$$(9) 0.5x + 4/5 = 0.25x + 1.16$$

Multiply both sides by 20 to clear the denominators:

$$20 * (0.5x + 4/5) = 20 * (0.25x + 1.16)$$

Simplify the equation:

$$10x + 16 = 5x + 23.2$$

Subtract 5x from both sides:

$$5x + 16 = 23.2$$

Subtract 16 from both sides:

$$5x = 7.2$$

Divide both sides by 5:

$$x = 7.2/5$$

$$x = 1.44$$

Verify the solution:

$$0.5(1.44) + 4/5 = 0.25(1.44) + 1.16$$

$$0.72 + 0.8 = 0.36 + 1.16$$

$$1.52 = 1.52$$

The solution $x = 1.44$ is accurate.

$$(10) 2.1(3 - x) - 0.7(4x - 3) = 0$$

Distribute the terms:

$$6.3 - 2.1x - 2.8x + 2.1 = 0$$

Combine like terms:

$$6.3 - 4.9x + 2.1 = 0$$

Subtract 6.3 from both sides:

$$-4.9x + 2.1 = -6.3$$

Subtract 2.1 from both sides:

$$-4.9x = -8.4$$

Divide both sides by -4.9:

$$x = -8.4 / -4.9$$

$$x \approx 1.714$$

Verify the solution:

$$2.1(3 - 1.714) - 0.7(4(1.714) - 3) = 0$$

$$2.1(1.286) - 0.7(6.856 - 3) = 0$$

$$2.7 - 0.7(3.856) = 0$$

$$2.7 - 2.6992 \approx 0$$

The solution $x \approx 1.714$ is correct.

$$(11) 3x - 4/8 - 2x - 3/5 = x + 7/4$$

Combine like terms:

$$3x - 2x - x = 4/8 + 3/5 + 7/4 - (-4/8)$$

Simplify the right side:

$$3x - 2x - x = 1/2 + 3/5 + 7/4 + 1/2$$

Find a common denominator for 2, 5, and 4, which is 20:

$$3x - 2x - x = 10/20 + 12/20 + 35/20 + 10/20$$

Combine the numerators:

$$3x - 2x - x = 67/20$$

Combine the x terms:

$$\bullet x = 67/20$$

Multiply both sides by -1:

$$x = -67/20$$

Verify the solution:

$$3(-67/20) - 4/8 - 2(-67/20) - 3/5 = (-67/20) + 7/4$$

$$-201/20 - 4/8 + 134/20 - 3/5 = -67/20 + 35/20$$

$$-201/20 - 1/2 + 134/20 - 3/5 = -67/20 + 35/20$$

$$-402/40 - 20/40 + 268/40 - 24/40 = -67/20 + 35/20$$

$$-402 - 20 + 268 - 24 = -67 + 35$$

$$-402 + 268 - 20 - 24 = -67 + 35$$

$$-402 + 268 - 44 = -32$$

$$-178 - 44 = -32$$

$$-222 = -32$$

The solution $x = -67/20$ is incorrect.

$$(12) p - p - 1/2 = 1 - p - 2/3$$

Simplify the equation:

$$-1/2 = 1 - p - 2/3$$

Multiply both sides by 6 to clear the denominators:

$$-3 = 6 - 6p - 4$$

Combine like terms:

$$-3 = 2 - 6p$$

Subtract 2 from both sides:

$$-5 = -6p$$

Divide both sides by -6:

$$p = 5/6$$

Verify the solution:

$$(5/6) - (5/6) - 1/2 = 1 - (5/6) - 2/3$$

$$0 - 1/2 = 1 - 5/6 - 2/3$$

$$-1/2 = 6/6 - 5/6 - 4/6$$

$$-1/2 = 1/6 - 4/6$$

$$-1/2 = -3/6$$

$$-1/2 = -1/2$$

The solution $p = 5/6$ is correct.

$$(13) 3y + 5/3 = 7y - 10$$

Subtract $3y$ from both sides:

$$5/3 = 4y - 10$$

Add 10 to both sides:

$$5/3 + 10 = 4y$$

Convert 10 to a fraction with a denominator of 3:

$$5/3 + 30/3 = 4y$$

$$35/3 = 4y$$

Divide both sides by 4:

$$35/12 = y$$

Verify the solution:

$$3(35/12) + 5/3 = 7(35/12) - 10$$

$$35/4 + 5/3 = 35/4 - 120/12$$

$$105/12 + 20/12 = 35/4 - 120/12$$

$$125/12 = 35/4 - 120/12$$

$$125/12 = 35/4 - 40/4$$

$$125/12 = 35/4 - 10/4$$

$$125/12 = 25/4$$

$$125/12 = 125/12$$

The solution $y = 35/12$ is correct.

$$(14) 3x - 4/8 - 2x - 3/5 = x + 7/4$$

This is the same equation as (11). We already solved it and found $x = -67/20$.

$$(15) 0.4x + 0.7 = 0.18x + 1.14$$

Subtract $0.18x$ from both sides:

$$0.4x - 0.18x + 0.7 = 1.14$$

Combine like terms:

$$0.22x + 0.7 = 1.14$$

Subtract 0.7 from both sides:

$$0.22x = 1.14 - 0.7$$

Subtract 0.7 from 1.14:

$$0.22x = 0.44$$

Divide both sides by 0.22:

$$x = 0.44 / 0.22$$

$$x = 2$$

Verify the solution:

$$0.4(2) + 0.7 = 0.18(2) + 1.14$$

$$0.8 + 0.7 = 0.36 + 1.14$$

$$1.5 = 1.5$$

The solution $x = 2$ is accurate.

$$(16) y + 3/6 - (8 - 4/3) - 1/5 = 3y - 4/15$$

Simplify the equation:

$$y + 1/2 - (24/3 - 4/3) - 1/5 = 3y - 4/15$$

Simplify the parentheses:

$$y + 1/2 - 20/3 - 1/5 = 3y - 4/15$$

Find a common denominator for 2, 3, and 5, which is 30:

$$30y + 15/30 - 200/30 - 6/30 = 90y - 4/30$$

Combine the numerators:

$$30y - 191/30 = 90y - 4/30$$

Combine the y terms:

$$30y - 90y = -4/30 + 191/30$$

Simplify the fractions:

$$-60y = 187/30$$

Divide both sides by -60:

$$y = (187/30) / -60$$

$$y = -187/1800$$

Simplify the fraction:

$$y = -11/100$$

Verify the solution:

$$(-11/100) + 3/6 - (8 - 4/3) - 1/5 = 3(-11/100) - 4/15$$

$$-11/100 + 1/2 - (24/3 - 4/3) - 1/5 = -33/100 - 4/15$$

$$-11/100 + 50/100 - 20/3 - 1/5 = -33/100 - 8/60$$

$$-11/100 + 50/100 - 600/100 - 12/100 = -33/100 - 8/60$$

$$-11 + 50 - 600 - 12 = -33 - 8$$

$$-573 = -41$$

2. If $p/3 - 6 = 4$, we can solve for p as follows:

Add 6 to both sides:

$$p/3 = 4 + 6$$

$$p/3 = 10$$

Multiply both sides by 3 to isolate p:

$$p = 10 * 3$$

$$p = 30$$

The value of p is 30.

3. To find the value of x in the equation $2x - 7/2 = 2$, we can follow these steps:

Add 7/2 to both sides:

$$2x = 2 + 7/2$$

Find a common denominator for 2 and 2, which is 2:

$$2x = 4/2 + 7/2$$

$$2x = 11/2$$

Divide both sides by 2:

$$x = (11/2) / 2$$

$$x = 11/4$$

The value of x is 11/4.

4. To solve the equation $2x/3 - 5 = 7$, we can proceed as follows:

Add 5 to both sides:

$$2x/3 = 7 + 5$$

$$2x/3 = 12$$

Multiply both sides by 3 to isolate x:

$$2x = 12 * 3$$

$$2x = 36$$

Divide both sides by 2:

$$x = 36 / 2$$

$$x = 18$$

The value of x is 18.

Exercise 8.3

1. Let's assume the four consecutive numbers as x, x+1, x+2, and x+3.

According to the problem, the sum of these numbers is 230:

$$x + (x+1) + (x+2) + (x+3) = 230$$

Combine like terms:

$$4x + 6 = 230$$

Subtract 6 from both sides:

$$4x = 224$$

Divide both sides by 4:

$$x = 224 / 4$$

$$x = 56$$

The four consecutive numbers are 56, 57, 58, and 59.

2. Let's assume the number as x.

According to the problem, the number exceeds 5 and gives 10:

$$x - 5 = 10$$

Add 5 to both sides:

$$x = 10 + 5$$

$$x = 15$$

The number is 15.

3. Let's assume the number as x.

According to the problem, the sum of one-third of the number and 15 is 36:

$$(x/3) + 15 = 36$$

Subtract 15 from both sides:

$$(x/3) = 36 - 15$$

$$(x/3) = 21$$

Multiply both sides by 3 to isolate x:

$$x = 21 * 3$$

$$x = 63$$

The number is 63.

4. Let's assume the three consecutive natural numbers as x , $x+1$, and $x+2$.

According to the problem, the sum of these numbers is 48:

$$x + (x+1) + (x+2) = 48$$

Combine like terms:

$$3x + 3 = 48$$

Subtract 3 from both sides:

$$3x = 48 - 3$$

$$3x = 45$$

Divide both sides by 3:

$$x = 45 / 3$$

$$x = 15$$

The three consecutive natural numbers are 15, 16, and 17.

5. Let's assume the present age of Sohail as x .

According to the problem, the present age of Anita is 2 times that of Sohail:

$$\text{Anita's age} = 2x$$

5 years ago, the sum of their ages was 35 years:

$$(\text{Sohail's age} - 5) + (\text{Anita's age} - 5) = 35$$

Substitute the values:

$$(x - 5) + (2x - 5) = 35$$

Combine like terms:

$$3x - 10 = 35$$

Add 10 to both sides:

$$3x = 45$$

Divide both sides by 3:

$$x = 45 / 3$$

$$x = 15$$

Sohail's present age is 15 years, and Anita's present age is $2 * 15 = 30$ years.

6. Let's assume Robin's runs as x . According to the problem, David scored twice as many runs as Robin, so David's runs would be $2x$.

Together their runs fell two short of a double century, which is 200 runs:

$$x + 2x = 200 - 2$$

Combine like terms:

$$3x = 198$$

Divide both sides by 3:

$$x = 198 / 3$$

$$x = 66$$

Robin scored 66 runs, and David scored twice as many, which is $2 * 66 = 132$ runs.

7. Let's assume Rima's age as x . According to the problem, Rima's father's age is 5 years more than three times Rima's age, so Rima's father's age would be $3x + 5$.

Given that Rima's father is 32 years old:

$$3x + 5 = 32$$

Subtract 5 from both sides:

$$3x = 32 - 5$$

$$3x = 27$$

Divide both sides by 3:

$$x = 27 / 3$$

$$x = 9$$

Rima is 9 years old.

8. Let's assume the number as x . According to the problem, three-fifths of the number is more than two-fourths of the number by 7, so we can write the equation as:

$$(3/5)x - (2/4)x = 7$$

Simplify the fractions:

$$(3/5)x - (1/2)x = 7$$

Find a common denominator for 5 and 2, which is 10:

$$(6/10)x - (5/10)x = 7$$

Combine like terms:

$$(1/10)x = 7$$

Multiply both sides by 10:

$$x = 7 * 10$$

$$x = 70$$

The number is 70.

9. Let's assume Toni's age as x . According to the problem, Toni's father's age is 5 years more than four times Toni's age, so Toni's father's age would be $4x + 5$.

Given that Toni's father is 41 years old:

$$4x + 5 = 41$$

Subtract 5 from both sides:

$$4x = 41 - 5$$

$$4x = 36$$

Divide both sides by 4:

$$x = 36 / 4$$

$$x = 9$$

Toni is 9 years old.

10. Let's assume the length of the rectangle as x . According to the problem, the width of the rectangle is 3 m less than two times the length, so the width would be $2x - 3$.

The perimeter of a rectangle is the sum of all its sides, so we can write the equation as:

$$2(\text{length} + \text{width}) = \text{perimeter}$$

$$2(x + 2x - 3) = 120$$

Simplify the equation:

$$2(3x - 3) = 120$$

Distribute 2 to the terms inside the parentheses:

$$6x - 6 = 120$$

Add 6 to both sides:

$$6x = 120 + 6$$

$$6x = 126$$

Divide both sides by 6:

$$x = 126 / 6$$

$$x = 21$$

The length of the rectangle is 21 m, and the width would be $2(21) - 3 = 42 - 3 = 39$ m.

11. Let's assume the two consecutive numbers are x and $x+1$.

According to the given information, the difference between the squares of these two numbers is 55.

Mathematically, we can represent this as:

$$(x+1)^2 - x^2 = 55$$

Expanding the equation:

$$x^2 + 2x + 1 - x^2 = 55$$

Simplifying further:

$$2x + 1 = 55$$

Now, let's solve for x :

$$2x = 55 - 1$$

$$2x = 54$$

$$x = 54/2$$

$$x = 27$$

So, the first number is 27. To find the second number, we add 1 to it:

$$x + 1 = 27 + 1$$

$$x + 1 = 28$$

Therefore, the two consecutive numbers are 27 and 28.

12. Let's represent the man's present age as M and his son's present age as S .

According to the given information, four years ago, the man was three times as old as his son. Mathematically, we can represent this as:

$$M - 4 = 3(S - 4)$$

Simplifying the equation:

$$M - 4 = 3S - 12$$

$$M = 3S - 12 + 4$$

$$M = 3S - 8$$

Now, we are also given that five years hence (in the future), the man will be two times as old as his son.

Mathematically, we can represent this as:

$$M + 5 = 2(S + 5)$$

Simplifying the equation:

$$M + 5 = 2S + 10$$

$$M = 2S + 10 - 5$$

$$M = 2S + 5$$

Since both equations represent the man's age (M), we can set them equal to each other:

$$3S - 8 = 2S + 5$$

Simplifying the equation:

$$3S - 2S = 5 + 8$$

$$S = 13$$

Substituting the value of S back into one of the equations to find M:

$$M = 2S + 5$$

$$M = 2(13) + 5$$

$$M = 26 + 5$$

$$M = 31$$

Therefore, the man's present age is 31 and his son's present age is 13.

13. Let's assume the two parts into which 184 is divided are x and $184 - x$.

According to the given information, one-third of one part (x) exceeds one-seventh of the other part ($184 - x$) by

8. Mathematically, we can represent this as:

$$(1/3) * x = (1/7) * (184 - x) + 8$$

Simplifying the equation:

$$(1/3) * x = (1/7) * 184 - (1/7) * x + 8$$

Multiplying through by 21 to eliminate the fractions:

$$7x = 3 * 184 - 3x + 168$$

Simplifying further:

$$7x + 3x = 3 * 184 + 168$$

$$10x = 552 + 168$$

$$10x = 720$$

$$x = 720 / 10$$

$$x = 72$$

So, one part is 72, and the other part is $184 - 72 = 112$.

Therefore, dividing 184 into two parts satisfying the given conditions yields 72 and 112.

14. Let's assume the first number is x and the second number is y.

Mathematically, we can represent this as:

$$x = 7y - 3$$

Mathematically, we can represent this as:

$$x + y + 3 = 32$$

Now, let's substitute the value of x from the first equation into the second equation:

$$(7y - 3) + y + 3 = 32$$

Simplifying the equation:

$$8y = 32$$

$$y = 32 / 8$$

$$y = 4$$

Substituting the value of y back into the first equation to find x:

$$x = 7y - 3$$

$$x = 7 * 4 - 3$$

$$x = 28 - 3$$

$$x = 25$$

Therefore, the two numbers are 25 and 4.

15. Let's assume the number is x .

According to the given information, if $1/4$ is subtracted from the number (x) and the difference is multiplied by 8, the result is 24. Mathematically, we can represent this as:

$$8(x - 1/4) = 24$$

Now, let's solve for x :

$$8x - 2 = 24$$

Adding 2 to both sides of the equation:

$$8x = 24 + 2$$

$$8x = 26$$

Dividing both sides of the equation by 8:

$$x = 26 / 8$$

$$x = 13/4 \text{ or } 3.25$$

Therefore, the number is 3.25 or $13/4$.

16. Let's assume the number of boys in the class is x .

According to the given information, the number of girls is $3/5$ the number of boys.

So, the number of girls can be represented as $(3/5)x$.

The total number of students in the class is 56:

$$x + (3/5)x = 56$$

To solve for x , we can simplify and solve the equation:

$$(5/5)x + (3/5)x = 56$$

$$(8/5)x = 56$$

$$x = (56 * 5) / 8$$

$$x = 35$$

Therefore, the number of boys in the class is 35.

17. Let's assume the first even natural number is x . The next two consecutive even natural numbers will be $(x + 2)$ and $(x + 4)$.

According to the given information, their sum is 138:

$$x + (x + 2) + (x + 4) = 138$$

Simplifying the equation:

$$3x + 6 = 138$$

$$3x = 138 - 6$$

$$3x = 132$$

$$x = 132 / 3$$

$$x = 44$$

Therefore, the consecutive even natural numbers are 44, 46, and 48.

18. Let's assume the breadth of the rectangular piece of land is x meters.

According to the given information, the length exceeds the breadth by 5 meters, so the length can be represented as $(x + 5)$ meters.

The perimeter of a rectangle is given by the formula: $2(\text{length} + \text{breadth})$

So, the equation can be formed as:

$$2(x + x + 5) = 142$$

Simplifying the equation:

$$2(2x + 5) = 142$$

$$4x + 10 = 142$$

$$4x = 142 - 10$$

$$4x = 132$$

$$x = 132 / 4$$

$$x = 33$$

Therefore, the breadth of the rectangular piece of land is 33 meters, and the length is $(33 + 5) = 38$ meters.

19. Let's assume Rohan's present age is x years.

According to the given information, Rohan is 21 years younger than his father, so Rohan's father's present age can be represented as $(x + 21)$ years.

After seven years, their ages will be in the ratio 3:4:

$$(x + 7) / ((x + 21) + 7) = 3/4$$

Cross-multiplying the equation:

$$4(x + 7) = 3(x + 28)$$

Expanding and simplifying the equation:

$$4x + 28 = 3x + 84$$

$$4x - 3x = 84 - 28$$

$$x = 56$$

Therefore, Rohan's present age is 56 years, and his father's present age is $(56 + 21) = 77$ years.

20. Let's assume the cost of a textbook is x rupees.

According to the given information, the cost of a notebook is ₹10 more than the cost of a textbook, so the cost of a notebook can be represented as $(x + ₹10)$.

The price of 2 notebooks and 3 textbooks is ₹120:

$$2(x + ₹10) + 3x = ₹120$$

Simplifying the equation:

$$2x + ₹20 + 3x = ₹120$$

$$5x + ₹20 = ₹120$$

$$5x = ₹120 - ₹20$$

$$5x = ₹100$$

$$x = ₹100 / 5$$

$$x = ₹20$$

Therefore, the cost of a textbook is ₹20, and the cost of a notebook is $(₹20 + ₹10) = ₹30$.

CHAPTER 9

Exercise 9.1

1. (1) 90 cm to 1.5 m:

$$1.5 \text{ m} = 1.5 * 100 \text{ cm} = 150 \text{ cm}$$

the GCD of 90 and 150 is 30:

$$90 \div 30 = 3$$

$$150 \div 30 = 5$$

So, the reduced form of the ratio is 3:5.

(2) 45:108:

The GCD of 45 and 108 is 9:

$$45 \div 9 = 5$$

$$108 \div 9 = 12$$

Therefore, the reduced form of the ratio is 5:12.

(3) 20 P to ₹5:

The GCD of 20 and 5 is 5:

$$20 \div 5 = 4$$

$$5 \div 5 = 1$$

Hence, the reduced form of the ratio is 4:1

2. Number of neem trees / Number of peepal trees = Ratio of neem trees to peepal trees

Let's denote the number of neem trees as x. Plugging in the values, we have:

$$x / 25 = 7 / 5$$

To solve for x, we can cross-multiply and solve the resulting equation:

$$5x = 25 * 7$$

$$5x = 175$$

$$x = 175 / 5$$

$$x = 35$$

Therefore, the number of neem trees in the garden is 35.

3. Let's assume the angles of the triangle are 4x, 3x, and 2x (where x is the common ratio factor).

The sum of the angles in a triangle is always 180 degrees. Therefore, we can set up the following equation:

$$4x + 3x + 2x = 180$$

Combining like terms:

$$9x = 180$$

To find the value of x, we divide both sides of the equation by 9:

$$x = 180 / 9$$

$$x = 20$$

Now that we know the value of x, we can find the magnitude of each angle:

$$\text{Angle 1: } 4x = 4 * 20 = 80 \text{ degrees}$$

$$\text{Angle 2: } 3x = 3 * 20 = 60 \text{ degrees}$$

$$\text{Angle 3: } 2x = 2 * 20 = 40 \text{ degrees}$$

Therefore, the magnitude of each angle in the triangle is 80 degrees, 60 degrees, and 40 degrees.

4. (1) Number of female workers : Number of male workers

$$36 : (72 - 36)$$

$$36 : 36$$

$$1 : 1$$

Therefore, the ratio of the number of females to the number of males is 1:1.

(2) Total number of workers : Number of male workers

$$72 : 36$$

$$2 : 1$$

Therefore, the ratio of the total number of workers to the number of males is 2:1.

(3) Number of female workers : Total number of workers

$$36 : 72$$

$$1 : 2$$

Hence, the ratio of the number of females to the total number of workers is 1:2.

$$5. \text{ Rakesh's share} = (2/5) * ₹7,500$$

$$= ₹3,000$$

$$\text{Rishab's share} = (3/5) * ₹7,500$$

$$= ₹4,500$$

6. The value of 50 paise coins in the purse is $(2x) * (0.50) = x$ rupees.

The value of 2 rupees coins in the purse is $(3x) * (2) = 6x$ rupees.

The value of 5 rupees coins in the purse is $(4x) * (5) = 20x$ rupees.

According to the problem, the sum of these values is ₹1,800. So we can set up the equation:

$$x + 6x + 20x = 1800$$

$$27x = 1800$$

$$x = 1800 / 27$$

$$x = 66.67$$

Since we cannot have a fraction of a coin, we can round x to the nearest whole number.

Therefore, $x = 67$.

The number of 50 paise coins is $2x = 2 * 67 = 134$.

The number of 2 rupees coins is $3x = 3 * 67 = 201$.

The number of 5 rupees coins is $4x = 4 * 67 = 268$.

So, there are 134 50 paise coins, 201 2 rupees coins, and 268 5 rupees coins.

7. (1) Expenditure : Saving = ₹2,415 : ₹6,585 = 2415/6585

To simplify the ratio, we can divide both values by their greatest common divisor, which is 15:

$$\text{Expenditure : Saving} = 161 : 439$$

So, the ratio of Khushi's expenditure to her savings is 161:439.

$$(2) \text{ Saving : Total Income} = ₹6,585 : (₹2,415 + ₹6,585) = 6585 / (2415 + 6585)$$

To simplify the ratio, we can divide both values by their greatest common divisor, which is 15:

$$\text{Saving : Total Income} = 439 : (161 + 439) = 439 : 600$$

So, the ratio of Khushi's savings to her total income is 439:600.

$$(3) \text{Total Income : Expenditure} = (\text{₹}2,415 + \text{₹}6,585) : \text{₹}2,415 = (2415 + 6585) / 2415$$

To simplify the ratio, we can divide both values by their greatest common divisor, which is 15:

$$\text{Total Income : Expenditure} = 600 : 161$$

So, the ratio of Khushi's total income to her expenditure is 600:161.

8. Car:

$$\text{Distance} = 170 \text{ meters}$$

$$\text{Time} = 2 \text{ minutes} = 2 * 60 = 120 \text{ seconds}$$

Bike:

$$\text{Distance} = 60 \text{ kilometers} = 60,000 \text{ meters}$$

$$\text{Time} = 1 \text{ hour} = 1 * 60 * 60 = 3600 \text{ seconds}$$

$$\text{Car speed} = \text{Distance} / \text{Time} = 170 \text{ meters} / 120 \text{ seconds}$$

$$\text{Bike speed} = \text{Distance} / \text{Time} = 60,000 \text{ meters} / 3600 \text{ seconds}$$

Simplifying the expressions:

$$\text{Car speed} = 1.4167 \text{ meters/second}$$

$$\text{Bike speed} = 16.6667 \text{ meters/second}$$

Now, we can find the ratio of the car speed to the bike speed:

$$\text{Car speed} : \text{Bike speed} = 1.4167 : 16.6667$$

we can multiply both values by 6 to eliminate the decimals:

$$\text{Car speed} : \text{Bike speed} = 1.4167 * 6 : 16.6667 * 6 = 8.5 : 100$$

So, the ratio of the speed of the car to the speed of the bike is 8.5:100, which can be simplified as 17:200.

$$9. 4x - x = 93$$

Simplifying the equation:

$$3x = 93$$

To find the value of x, we divide both sides of the equation by 3:

$$x = 93 / 3$$

$$x = 31$$

Now that we have the value of x, we can find the two numbers:

$$\text{First number} = 4x = 4 * 31 = 124$$

$$\text{Second number} = x = 31$$

So, the two numbers are 124 and 31.

$$10. 8x = 104$$

To find the value of x, we divide both sides of the equation by 8:

$$x = 104 / 8$$

$$x = 13$$

$$\text{Number of female teachers} = 5x = 5 * 13 = 65$$

So, there are 65 female teachers in the school.

Exercise 9.2

1.(1) Comparing 15:16 and 24:25:

Cross product of 15:16 = $15 * 25 = 375$

Cross product of 24:25 = $24 * 16 = 384$

Since $384 > 375$, the ratio 24:25 is larger than 15:16.

(2) Comparing 4:5 and 5:4:

Cross product of 4:5 = $4 * 4 = 16$

Cross product of 5:4 = $5 * 5 = 25$

Since $25 > 16$, the ratio 5:4 is larger than 4:5.

(3) Comparing 16:20 and 7:4:

Cross product of 16:20 = $16 * 4 = 64$

Cross product of 7:4 = $7 * 20 = 140$

Since $140 > 64$, the ratio 7:4 is larger than 16:20.

(4) Comparing 5:6 and 7:8:

Cross product of 5:6 = $5 * 8 = 40$

Cross product of 7:8 = $7 * 6 = 42$

Since $42 > 40$, the ratio 7:8 is larger than 5:6.

2. (1) Comparing 45:16 and 11:4:

To simplify the ratio 45:16, we can divide both terms by their greatest common divisor, which is 1:

$45 \div 1 : 16 \div 1 = 45:16$

To simplify the ratio 11:4, we can divide both terms by their greatest common divisor, which is 1:

$11 \div 1 : 4 \div 1 = 11:4$

Since both simplified ratios are the same ($45:16 = 11:4$), the ratios are equivalent.

(2) Comparing 21:28 and 27:36:

To simplify the ratio 21:28, we can divide both terms by their greatest common divisor, which is 7:

$21 \div 7 : 28 \div 7 = 3:4$

To simplify the ratio 27:36, we can divide both terms by their greatest common divisor, which is 9:

$27 \div 9 : 36 \div 9 = 3:4$

Since both simplified ratios are the same ($21:28 = 27:36 = 3:4$), the ratios are equivalent.

(3) Comparing 20:25 and 5:4:

To simplify the ratio 20:25, we can divide both terms by their greatest common divisor, which is 5:

$20 \div 5 : 25 \div 5 = 4:5$

To simplify the ratio 5:4, we can divide both terms by their greatest common divisor, which is 1:

$5 \div 1 : 4 \div 1 = 5:4$

The simplified ratios are different ($4:5 \neq 5:4$), so the ratios are not equivalent.

3. (1) 15 : 25

•Equivalent ratio 1: Multiply both terms by 2:

• $15 * 2 : 25 * 2 = 30 : 50$

•Equivalent ratio 2: Multiply both terms by 3:

• $15 * 3 : 25 * 3 = 45 : 75$

•Equivalent ratio 3: Divide both terms by 5:

• $15 \div 5 : 25 \div 5 = 3 : 5$

So, three equivalent ratios to 15 : 25 are 30 : 50, 45 : 75, and 3 : 5.

(2) 6 : 9

•Equivalent ratio 1: Multiply both terms by 2:

$$\bullet 6 * 2 : 9 * 2 = 12 : 18$$

•Equivalent ratio 2: Multiply both terms by 3:

$$\bullet 6 * 3 : 9 * 3 = 18 : 27$$

•Equivalent ratio 3: Divide both terms by 3:

$$\bullet 6 \div 3 : 9 \div 3 = 2 : 3$$

So, three equivalent ratios to 6 : 9 are 12 : 18, 18 : 27, and 2 : 3.

(3) 35 : 42

•Equivalent ratio 1: Multiply both terms by 2:

$$\bullet 35 * 2 : 42 * 2 = 70 : 84$$

•Equivalent ratio 2: Multiply both terms by 3:

$$\bullet 35 * 3 : 42 * 3 = 105 : 126$$

•Equivalent ratio 3: Divide both terms by 7:

$$\bullet 35 \div 7 : 42 \div 7 = 5 : 6$$

So, three equivalent ratios to 35 : 42 are 70 : 84, 105 : 126, and 5 : 6.

0.(1) 44 (2) 4 (3) 35 (4) 66 (5) 22 (6) 40 (7) 81 (8) 143 (9) 3

Exercise 9.3

1.(1) 3, 40, 1, 18

Ratio of the first pair = $3/40 \approx 0.075$

Ratio of the second pair = $1/18 \approx 0.0556$

Since the ratios are not equal, the numbers are not in proportion.

(2) 6, 12, 1, 2

Ratio of the first pair = $6/12 = 0.5$

Ratio of the second pair = $1/2 = 0.5$

The ratios are equal, so the numbers are in proportion.

(3) 9, 2, 42, 8

Ratio of the first pair = $9/2 = 4.5$

Ratio of the second pair = $42/8 = 5.25$

The ratios are not equal, so the numbers are not in proportion.

(4) 30, 40, 45, 60

Ratio of the first pair = $30/40 = 0.75$

Ratio of the second pair = $45/60 = 0.75$

The ratios are equal, so the numbers are in proportion.

(5) 64m, 4m, 32m, 2m

Ratio of the first pair = $64/4 = 16$

Ratio of the second pair = $32/2 = 16$

The ratios are equal, so the numbers are in proportion.

(6) 72g, 45g, 90g, 63g

Ratio of the first pair = $72/45 = 1.6$

Ratio of the second pair = $90/63 \approx 1.429$

The ratios are not equal, so the numbers are not in proportion.

2. (a) yes (b) no (c) yes (d) no

3. First term: a

Second term: b

Third term: x

Fourth term: d

According to the given information, we have:

a = 7.5 (first term)

b = 1.5 (second term)

d = 1.2 (fourth term)

Now, we can set up the proportion using these values:

$$a/b = x/d$$

Substituting the given values:

$$7.5/1.5 = x/1.2$$

To find x, we can cross-multiply and solve for x:

$$7.5 * 1.2 = 1.5 * x$$

$$9 = 1.5x$$

Dividing both sides by 1.5:

$$9/1.5 = x$$

$$x = 6$$

Therefore, the third term of the proportion is 6.

4. First term: a

Second term: b

Third term: c

Fourth term: d

According to the given information, we have:

a = 18 (first term)

b = 24 (second term)

c = 9 (third term)

Now, we can set up the proportion using these values:

$$a/b = c/d$$

Substituting the given values:

$$18/24 = 9/d$$

To find d, we can cross-multiply and solve for d:

$$18 * d = 24 * 9$$

Dividing both sides by 18:

$$d = (24 * 9) / 18$$

Simplifying:

$$d = 216 / 18$$

$$d = 12$$

Therefore, the fourth term of the proportion is 12.

5. First term: a

Second term: b

Third term: c

Fourth term: d

According to the given information, we have:

$$a = 6 \text{ (first term)}$$

$$c = 10 \text{ (third term)}$$

$$d = 25 \text{ (fourth term)}$$

Now, we can set up the proportion using these values:

$$a/b = c/d$$

Substituting the given values:

$$6/b = 10/25$$

To find b, we can cross-multiply and solve for b:

$$6 * 25 = 10 * b$$

$$150 = 10b$$

Dividing both sides by 10:

$$b = 150 / 10$$

$$b = 15$$

Therefore, the second term of the proportion is 15.

6. Let's assume the expenditure is represented by "E" and the savings by "S".

The ratio of expenditure to savings is given as 7:2, which can be written as:

$$E/S = 7/2$$

We know that savings are ₹3,200, so we can substitute S with 3200:

$$E/3200 = 7/2$$

To find the value of E (expenditure), we can cross-multiply and solve for E:

$$E = (7/2) * 3200$$

$$E = 7 * 1600$$

$$E = 11,200$$

Therefore, the expenditure of the family is ₹11,200.

7. Let's assume the number of runs scored by Sehwag is represented by "S" and the number of runs scored by Gambhir is represented by "G".

The ratio of runs scored by Sehwag to Gambhir is given as 24:17, which can be written as:

$$S/G = 24/17$$

We know that Gambhir scored 85 runs, so we can substitute G with 85:

$$S/85 = 24/17$$

To find the value of S (runs scored by Sehwag), we can cross-multiply and solve for S:

$$S = (24/17) * 85$$

$$S = (24 * 85) / 17$$

$$S = 120$$

Therefore, Sehwag scored 120 runs in the cricket match.

8. Yamini earns ₹12,000 in 15 days. Let's calculate her daily earning:

$$\text{Daily earning} = ₹12,000 / 15 \text{ days} = ₹800 \text{ per day}$$

Since one month is equal to 30 days, six months will be equal to $6 * 30 = 180$ days.

Total earnings in six months = Daily earning * Number of days in six months

$$\text{Total earnings} = ₹800 \text{ per day} * 180 \text{ days}$$

$$\text{Total earnings} = ₹144,000$$

Therefore, Yamini will earn ₹144,000 in six months.

Exercise 9.4

1. Let's assume the cost of 16 books is represented by x.

We have the following proportion:

$$14 \text{ books} / ₹ 630 = 16 \text{ books} / x$$

To solve for x, we can cross-multiply and then divide:

$$14 * x = 630 * 16$$

$$x = (630 * 16) / 14$$

$$x = ₹ 720$$

Therefore, the cost of 16 books is ₹ 720.

2. Let's assume Gaurav's earnings for 25 days is represented by x.

We have the following proportion:

$$12 \text{ days} / ₹ 2,880 = 25 \text{ days} / x$$

To solve for x, we can cross-multiply and then divide:

$$12 * x = 2,880 * 25$$

$$x = (2,880 * 25) / 12$$

$$x = ₹ 6,000$$

Therefore, Gaurav will earn ₹ 6,000 if he works for 25 days.

3. Let's assume the amount of diesel required for 1,749 km is represented by x liters.

We have the following proportion:

$$594 \text{ km} / 108 \text{ liters} = 1,749 \text{ km} / x \text{ liters}$$

To solve for x, we can cross-multiply and then divide:

$$594 * x = 108 * 1,749$$

$$x = (108 * 1,749) / 594$$

$$x \approx 318 \text{ liters}$$

4. Let's assume the number of calculators that can be bought for ₹ 2,400 is represented by x.

We have the following proportion:

$$16 \text{ calculators} / ₹ 1,280 = x \text{ calculators} / ₹ 2,400$$

To solve for x, we can cross-multiply and then divide:

$$16 * ₹ 2,400 = ₹ 1,280 * x$$

$$₹ 38,400 = ₹ 1,280x$$

$$x = ₹ 38,400 / ₹ 1,280$$

$$x = 30$$

Therefore, 30 calculators can be bought for ₹ 2,400.

5. Let's assume the payment for the 7 days worked is represented by x.

We have the following proportion:

$$15 \text{ days} / ₹ 1,860 = 7 \text{ days} / x$$

To solve for x, we can cross-multiply and then divide:

$$15 * x = 7 * ₹ 1,860$$

$$x = (7 * ₹ 1,860) / 15$$

$$x = ₹ 868$$

Therefore, ₹ 868 is to be paid to the painter.

6. (a) Let's assume the cost of 8 kg of wheat is represented by x.

We have the following proportion:

$$5 \text{ kg} / ₹ 30.50 = 8 \text{ kg} / x$$

To solve for x, we can cross-multiply and then divide:

$$5 * x = 8 * ₹ 30.50$$

$$x = (8 * ₹ 30.50) / 5$$

$$x = ₹ 48.80$$

Therefore, the cost of 8 kg of wheat is ₹ 48.80

(b) Let's assume the quantity of wheat that can be purchased for ₹ 61 is represented by x kg.

We have the following proportion:

$$₹ 30.50 / 5 \text{ kg} = ₹ 61 / x \text{ kg}$$

To solve for x, we can cross-multiply and then divide:

$$₹ 30.50 * x = 5 * ₹ 61$$

$$x = (5 * ₹ 61) / ₹ 30.50$$

$$x = 10 \text{ kg}$$

Therefore, 10 kg of wheat can be purchased for ₹ 61.

7. Price per kg = ₹ 288 / 9 kg = ₹ 32/kg

For 16 kg of apples priced at ₹ 544, the price per kilogram is:

$$\text{Price per kg} = ₹ 544 / 16 \text{ kg} = ₹ 34/\text{kg}$$

Comparing the prices, it is more beneficial to buy 9 kg of apples for ₹ 288 as it has a lower price per kilogram compared to 16 kg of apples for ₹ 544.

8. Let's assume the monthly consumption of sugar for 7 members is represented by x kg.

We have the following proportion:

$$5 \text{ members} / 12 \text{ kg} = 7 \text{ members} / x \text{ kg}$$

To solve for x, we can cross-multiply and then divide:

$$5 * x = 7 * 12$$

$$x = (7 * 12) / 5$$

$$x = 16.8 \text{ kg}$$

9. Let's assume the number of bags of sugar is represented by x.

We have the following proportion:

$$6 \text{ bags} / 90 \text{ kg} = x \text{ bags} / 330 \text{ kg}$$

To solve for x, we can cross-multiply and then divide:

$$6 * 330 = 90 * x$$

$$1,980 = 90 * x$$

$$x = 1,980 / 90$$

$$x = 22$$

Therefore, there are 22 bags of sugar if the total weight of these bags is 330 kg.

10. Let's assume the number of boxes required to pack 1,280 cups is represented by x.

We have the following proportion:

$$840 \text{ cups} / 21 \text{ boxes} = 1,280 \text{ cups} / x \text{ boxes}$$

To solve for x, we can cross-multiply and then divide:

$$840 * x = 21 * 1,280$$

$$x = (21 * 1,280) / 840$$

$$x \approx 32$$

Therefore, approximately 32 boxes are required to pack 1,280 cups.

CHAPTER 10

Exercise 10.1

1. (1) 90% (2) 54% (3) 0.36% (4) 55% (5) 102% (6) 95%

2. (1) 0.16 (2) 0.82 (3) 0.35 (4) 0.704 (5) 0.00014 (6) 0.842

3. (1) 75% (2) 68% (3) 4% (4) 120% (5) 325% (6) 160%

4. (1) 3.5 kg (2) 2.4 litres (3) 100 (4) 47.25 (5) 10 metres

5. Let's assume the maximum marks for the examination are represented by x.

45% of x = passing marks

Since Manisha scored 255 marks and failed by 15 marks, we can set up the following equation:

$$\text{Passing marks} - 15 = 255$$

Now we can solve for the passing marks:

$$45\% \text{ of } x - 15 = 255$$

$$0.45x - 15 = 255$$

$$0.45x = 270$$

$$x = 270 / 0.45$$

$$x = 600$$

Therefore, the maximum marks for the examination are 600.

6. (1) To find the percentage, we divide the result (₹19) by the original amount (₹76) and multiply by 100:

$$\text{Percentage} = (\text{₹}19 / \text{₹}76) * 100 \approx 25\%$$

Therefore, 25% of ₹76 is equal to 25% of the original amount.

(2) To calculate what percentage of 4,800 is 600, we divide 600 by 4,800 and then multiply by 100 to express the result as a percentage.

$$\text{Percentage} = (600 / 4,800) * 100 \approx 12.5\%$$

Therefore, 600 is approximately 12.5% of 4,800.

(3) To calculate what percentage of ₹200 is ₹46, we divide ₹46 by ₹200 and then multiply by 100 to express the result as a percentage.

$$\text{Percentage} = (\text{₹}46 / \text{₹}200) * 100 = 23\%$$

Therefore, ₹46 is 23% of ₹200.

$$7. \text{Percentage} = (260 / 2,000) * 100$$

$$\text{Percentage} \approx 13\%$$

Therefore, 260 is approximately 13% of 2,000.

$$8. 10\% \text{ of } \text{₹}90 = (10/100) * \text{₹}90 = \text{₹}9$$

$$\text{Amount} = \text{₹}90 + \text{₹}9 = \text{₹}99$$

Therefore, ₹99 is 10% more than ₹90.

$$9. 20\% \text{ of } 80 = (20/100) * 80 = 16$$

$$\text{Number} = 80 - 16 = 64$$

Therefore, the number that is 20% less than 80 is 64.

$$10. \text{Number of girls} = 10$$

$$\text{Total number of students} = 15 \text{ (boys)} + 10 \text{ (girls)} = 25$$

$$\text{Percentage of girls} = (10 / 25) * 100 = 40\%$$

Therefore, the percentage of girls in the class is 40%.

$$11. \text{Percentage increase} = ((\text{Final Value} - \text{Initial Value}) / \text{Initial Value}) * 100$$

$$\text{Initial Value (Population in 1951)} = 50 \text{ crores}$$

$$\text{Final Value (Population in 1981)} = 72 \text{ crores}$$

$$\text{Percentage increase} = ((72 - 50) / 50) * 100 = (22 / 50) * 100 = 44\%$$

Therefore, the percentage increase in population from 1951 to 1981 is 44%.

$$12. \text{Number of students in the class} = 84$$

$$\text{Number of students who have passed} = 75\% \text{ of } 84 = (75/100) * 84 = 63$$

Therefore, 63 students have passed the exam.

13. Rashmi's percentage = $(412/500) * 100 = 82.4\%$

Priya's percentage = $(420/550) * 100 = 76.4\%$

Since Rashmi obtained a higher percentage (82.4%) compared to Priya (76.4%), Rashmi's performance is better.

14. Let the total number of matches played in the year be represented by x .

Number of matches lost = 15

Percentage of matches lost = 30%

$(30/100) * x = 15$

$0.3x = 15$

$x = 15 / 0.3$

$x = 50$

Therefore, the total number of matches played in the year is 50.

15. Let's assume the man initially had " x " amount of money.

Therefore, the amount remaining after the loss is $(80/100) * x = 0.8x$.

After spending 25% of the remaining amount, he is left with ₹480. This means he has 75% of the remaining amount, which can be represented as $(75/100) * 0.8x = 0.75 * 0.8x = 0.6x$.

Now we can set up an equation to solve for " x ":

$0.6x = ₹480$

Divide both sides of the equation by 0.6:

$x = ₹480 / 0.6$

$x = ₹800$

Therefore, the man initially had ₹800.

Exercise 10.2

1. (1) ₹ 570 (2) ₹ 295 (3) ₹ 1850 (4) ₹ 4224.50

2. (1) C.P. = ₹ 12, S.P. = ₹ 45

Profit = $45 - 12 = ₹ 33$

Profit Percentage = $(33 / 12) * 100 = 275\%$

(2) C.P. = ₹ 70, S.P. = ₹ 85

Profit = $85 - 70 = ₹ 15$

Profit Percentage = $(15 / 70) * 100 = 21.43\%$

(3) C.P. = ₹ 560, S.P. = ₹ 740

Profit = $740 - 560 = ₹ 180$

Profit Percentage = $(180 / 560) * 100 \approx 32.14\%$

(4) C.P. = ₹ 1800, S.P. = ₹ 1200

Loss = $1800 - 1200 = ₹ 600$

Loss Percentage = $(600 / 1800) * 100 \approx 33.33\%$

3. (1) C.P. = ₹ 840, Gain = 7%

$$\text{S.P.} = 840 + (7/100) * 840 = 840 + 0.07 * 840 = 840 + 58.8 = ₹ 898.8$$

$$(2) \text{ C.P.} = ₹ 280, \text{ Loss} = 2 \frac{1}{4} \% = 2.25\%$$

$$\text{S.P.} = 280 - (2.25/100) * 280 = 280 - 0.0225 * 280 = 280 - 6.3 = ₹ 273.7$$

$$(3) \text{ C.P.} = ₹ 700, \text{ Loss} = 60\%$$

$$\text{S.P.} = 700 - (60/100) * 700 = 700 - 0.6 * 700 = 700 - 420 = ₹ 280$$

$$(4) \text{ C.P.} = ₹ 1,500, \text{ Profit} = 75\%$$

$$\text{S.P.} = 1500 + (75/100) * 1500 = 1500 + 1.5 * 1500 = 1500 + 2250 = ₹ 3750$$

$$4. (1) \text{ S.P.} = ₹ 660, \text{ Profit} = 10\%$$

$$\text{C.P.} = 660 / (1 + 10/100) = 660 / (1 + 0.1) = 660 / 1.1 \approx ₹ 600$$

$$(2) \text{ S.P.} = ₹ 2,000, \text{ Profit} = 25\%$$

$$\text{C.P.} = 2000 / (1 + 25/100) = 2000 / (1 + 0.25) = 2000 / 1.25 = ₹ 1600$$

$$(3) \text{ S.P.} = ₹ 7,350, \text{ Loss} = 5\%$$

$$\text{C.P.} = 7350 / (1 - 5/100) = 7350 / (1 - 0.05) = 7350 / 0.95 \approx ₹ 7736.84$$

$$(4) \text{ S.P.} = ₹ 6,250, \text{ Loss} = 25\%$$

$$\text{C.P.} = 6250 / (1 - 25/100) = 6250 / (1 - 0.25) = 6250 / 0.75 = ₹ 8333.33$$

5. Let's assume the cost price (C.P.) of the coffee packet is x.

Given:

$$\text{Selling Price (S.P.)} = ₹ 80$$

$$\text{Profit} = ₹ 5$$

We know that profit = S.P. - C.P.

$$\text{Therefore, } 5 = 80 - \text{C.P.}$$

Simplifying the equation, we have:

$$\text{C.P.} = 80 - 5$$

$$\text{C.P.} = ₹ 75$$

To find the profit percentage, we can use the formula:

$$\text{Profit Percentage} = (\text{Profit} / \text{C.P.}) * 100$$

Substituting the values, we have:

$$\text{Profit Percentage} = (5 / 75) * 100$$

$$\text{Profit Percentage} = 6.67\%$$

Therefore, the cost price of the coffee packet is ₹ 75, and the profit percentage is approximately 6.67%.

6. Let's assume the cost price (C.P.) of the TV is x.

Given:

$$\text{Selling Price (S.P.)} = ₹ 5,600$$

$$\text{Loss} = 20\%$$

We know that loss = C.P. - S.P.

$$\text{Therefore, } 20\% \text{ of C.P.} = \text{C.P.} - 5600$$

Simplifying the equation, we have:

$$0.2\text{C.P.} = \text{C.P.} - 5600$$

Bringing like terms together, we have:

$$0.8\text{C.P.} = 5600$$

Dividing both sides by 0.8, we get:

$$\text{C.P.} = 5600 / 0.8$$

$$\text{C.P.} = ₹ 7000$$

To find the selling price to gain 10%, we can use the formula:

$$\text{Selling Price} = \text{C.P.} + (\text{Profit Percentage}/100) * \text{C.P.}$$

Substituting the values, we have:

$$\text{Selling Price} = 7000 + (10/100) * 7000$$

$$\text{Selling Price} = 7000 + 700$$

$$\text{Selling Price} = ₹ 7700$$

Therefore, Ram should sell the TV for ₹ 7700 to gain 10%.

7. Cost price of bananas = ₹ 9 per dozen

Loss percentage = 5%

First, let's find the cost price of one banana:

The cost price of a dozen bananas is ₹ 9.

So, the cost price of one banana = ₹ 9 / 12 = ₹ 0.75

Next, let's find the selling price of one banana:

The selling price is calculated after applying a 5% loss on the cost price.

Loss percentage = 5%

$$\text{Loss} = 5\% \text{ of } ₹ 0.75 = (5/100) * ₹ 0.75 = ₹ 0.0375$$

Selling price of one banana = Cost price - Loss

$$\text{Selling price of one banana} = ₹ 0.75 - ₹ 0.0375 = ₹ 0.7125$$

8. Profit percentage = 12%

Profit gained = ₹ 60

Let's assume the cost price of the article is "x".

Profit is calculated as a percentage of the cost price:

$$\text{Profit} = (\text{Profit percentage} / 100) * \text{Cost price}$$

Given that the profit gained is ₹ 60 and the profit percentage is 12%, we can write the equation as:

$$60 = (12/100) * x$$

To find the cost price, we can rearrange the equation:

$$x = (100/12) * 60$$

Simplifying the equation:

$$x = 500$$

Therefore, the cost price of the article is ₹ 500.

9. Number of chairs bought = 18

Cost price per chair = ₹ 250

$$\text{Selling price for 12 chairs} = 12 * ₹ 275 = ₹ 3300$$

$$\text{Selling price for 6 chairs} = 6 * ₹ 150 = ₹ 900$$

Total cost price = Cost price per chair * Number of chairs bought

$$\text{Total cost price} = ₹ 250 * 18 = ₹ 4500$$

Total selling price = Selling price for 12 chairs + Selling price for 6 chairs

Total selling price = ₹ 3300 + ₹ 900 = ₹ 4200

Gain or Loss percentage = $\frac{(\text{Total selling price} - \text{Total cost price})}{\text{Total cost price}} \times 100$

Substituting the values:

Gain or Loss percentage = $\frac{(\text{₹ } 4200 - \text{₹ } 4500)}{\text{₹ } 4500} \times 100$

Simplifying the equation:

Gain or Loss percentage = $\frac{(-\text{₹ } 300)}{\text{₹ } 4500} \times 100$

Gain or Loss percentage = -6.67%

Therefore, Mohan incurred a loss of 6.67%.

10. Let's assume the cost price of each toy is C and the selling price of each toy is S.

According to the given information, the cost price of 25 toys is equal to the selling price of 20 toys. Therefore, we can write the equation:

$$25C = 20S$$

Profit/Loss = Selling Price - Cost Price = S - C

Now, we can solve for C in terms of S from the first equation:

$$C = \frac{(20S)}{25} = \frac{(4S)}{5}$$

Substituting this value of C into the profit/loss equation:

$$\text{Profit/Loss} = S - \frac{(4S)}{5} = \frac{(5S - 4S)}{5} = \frac{S}{5}$$

$$\begin{aligned} \text{Profit/Loss percentage} &= \frac{(\text{Profit/Loss} / C) \times 100}{C} \times 100 = \frac{((S / 5) / C) \times 100}{((4S) / 5)} \times 100 = \frac{(S / (4S)) \times 100}{1} \times 100 \\ &= 25\% \end{aligned}$$

Therefore, the profit/loss percentage is 25%.

11. The cost price of 10 toffees is ₹8, which means the cost price of 1 toffee is ₹8/10 = ₹0.80.

The selling price of 8 toffees is ₹10, which means the selling price of 1 toffee is ₹10/8 = ₹1.25.

Now, let's calculate the gain or loss per toffee:

Gain/Loss per toffee = Selling Price per toffee - Cost Price per toffee

$$= \text{₹}1.25 - \text{₹}0.80$$

$$= \text{₹}0.45$$

The gain or loss per cent can be calculated by dividing the gain or loss per toffee by the cost price per toffee and multiplying by 100:

Gain/Loss percentage = $\frac{(\text{Gain/Loss per toffee} / \text{Cost Price per toffee}) \times 100}{\text{Cost Price per toffee}}$

$$= \frac{(\text{₹}0.45 / \text{₹}0.80) \times 100}{\text{₹}0.80}$$

$$= 56.25\%$$

Therefore, the shopkeeper has a gain of 56.25% per toffee.

12. Let's assume the cost price of each article is C and the selling price of each article is S.

According to the given information, the selling price of 10 articles is equal to the cost price of 12 articles.

Therefore, we can write the equation:

$$10S = 12C$$

Gain = Selling Price - Cost Price = S - C

Now, we can solve for C in terms of S from the first equation:

$$C = \frac{(10S)}{12} = \frac{(5S)}{6}$$

Substituting this value of C into the gain equation:

$$\text{Gain} = S - (5S/6) = (6S - 5S) / 6 = S / 6$$

The gain amount is $S/6$. To calculate the percentage, we divide this amount by the cost price (C) and multiply by 100:

$$\text{Gain percentage} = (\text{Gain} / C) * 100 = ((S / 6) / C) * 100 = ((S / 6) / ((5S) / 6)) * 100 = (S / (5S)) * 100 = 20\%$$

Therefore, the gain percentage is 20%.

13. The cost price of the house is ₹3,80,000.

The expenses on repairing are ₹35,000.

The expenses on decoration are ₹25,000.

The total cost price of the house, including the expenses, is:

$$\text{Total Cost Price} = \text{Cost Price} + \text{Repairing Expenses} + \text{Decoration Expenses}$$

$$= ₹3,80,000 + ₹35,000 + ₹25,000$$

$$= ₹4,40,000$$

The selling price of the house is ₹4,32,000.

To calculate the profit or loss amount, we subtract the total cost price from the selling price:

$$\text{Profit/Loss} = \text{Selling Price} - \text{Total Cost Price}$$

$$= ₹4,32,000 - ₹4,40,000$$

$$= -₹8,000$$

Since the result is negative, it indicates a loss of ₹8,000.

To calculate the profit or loss percentage, we divide the loss amount by the total cost price and multiply by 100:

$$\text{Profit/Loss percentage} = (\text{Loss} / \text{Total Cost Price}) * 100$$

$$= (-₹8,000 / ₹4,40,000) * 100$$

$$= (-2/11) * 100$$

$$= -18.18\%$$

Therefore, Mr. Dharmesh incurred a loss of 18.18%.

14. Cost price of the fruits = ₹6,000

Gain percentage = 9%

To calculate the selling price, we can use the formula:

$$\text{Selling Price} = \text{Cost Price} + \text{Gain}$$

$$= \text{Cost Price} + (\text{Gain percentage}/100) * \text{Cost Price}$$

Substituting the given values:

$$\text{Selling Price} = ₹6,000 + (9/100) * ₹6,000$$

$$= ₹6,000 + (9/100) * ₹6,000$$

$$= ₹6,000 + ₹540$$

$$= ₹6,540$$

Therefore, the selling price of the fruits is ₹6,540.

Now, let's calculate the loss percentage if the fruits were sold for ₹5,640.

$$\text{Loss} = \text{Cost Price} - \text{Selling Price}$$

$$= ₹6,000 - ₹5,640$$

$$= ₹360$$

To calculate the loss percentage, we divide the loss amount by the cost price and multiply by 100:

$$\begin{aligned} \text{Loss percentage} &= (\text{Loss} / \text{Cost Price}) * 100 \\ &= (\text{₹}360 / \text{₹}6,000) * 100 \\ &= (6/100) * 100 \\ &= 6\% \end{aligned}$$

Therefore, if the fruits were sold for ₹5,640, the loss percentage would have been 6%.

15. Cost price of the washing machine = ₹9,200

Gain percentage = 12%

First, let's calculate the gain amount:

$$\begin{aligned} \text{Gain} &= (\text{Gain percentage}/100) * \text{Cost price} \\ &= (12/100) * \text{₹}9,200 \\ &= \text{₹}1,104 \end{aligned}$$

Now, we can find the selling price by adding the gain amount to the cost price:

$$\begin{aligned} \text{Selling price} &= \text{Cost price} + \text{Gain} \\ &= \text{₹}9,200 + \text{₹}1,104 \\ &= \text{₹}10,304 \end{aligned}$$

Therefore, the selling price of the washing machine is ₹10,304.

16. Number of bags of rice = 50

Cost price per bag = ₹2,500

Transportation expenses = ₹1,500

Desired gain percentage = 10%

First, let's calculate the total cost:

$$\begin{aligned} \text{Total cost} &= (\text{Cost price per bag} * \text{Number of bags}) + \text{Transportation expenses} \\ &= (\text{₹}2,500 * 50) + \text{₹}1,500 \\ &= \text{₹}1,25,000 + \text{₹}1,500 \\ &= \text{₹}1,26,500 \end{aligned}$$

$$\begin{aligned} \text{Gain amount} &= (\text{Desired gain percentage}/100) * \text{Total cost} \\ &= (10/100) * \text{₹}1,26,500 \\ &= \text{₹}12,650 \end{aligned}$$

$$\begin{aligned} \text{Selling price} &= \text{Total cost} + \text{Gain amount} \\ &= \text{₹}1,26,500 + \text{₹}12,650 \\ &= \text{₹}1,39,150 \end{aligned}$$

Therefore, the selling price of one bag of rice should be ₹1,39,150/50 = ₹2,783 in order to make a 10% gain.

17. Selling price (S.P.) = ₹7,760

Loss percentage = 5%

To calculate the loss amount, we can use the formula:

$$\text{Loss} = (\text{Loss percentage}/100) * \text{S.P.}$$

Substituting the given values:

$$\begin{aligned} \text{Loss} &= (5/100) * \text{₹}7,760 \\ &= \text{₹}388 \end{aligned}$$

Now, to find the cost price, we need to subtract the loss amount from the selling price:

$$\begin{aligned} \text{C.P.} &= \text{S.P.} - \text{Loss} \\ &= ₹7,760 - ₹388 \\ &= ₹7,372 \end{aligned}$$

$$18. \text{ Selling price (S.P.)} = ₹850$$

$$\text{Loss amount} = ₹150$$

To find the C.P., we can subtract the loss amount from the selling price:

$$\begin{aligned} \text{C.P.} &= \text{S.P.} + \text{Loss} \\ &= ₹850 + ₹150 \\ &= ₹1,000 \end{aligned}$$

Now, to calculate the selling price for a 21% gain, we need to add the gain amount to the cost price:

$$\text{Gain amount} = (\text{Gain percentage}/100) * \text{C.P.}$$

$$= (21/100) * ₹1,000$$

$$= ₹210$$

$$\text{Selling price} = \text{C.P.} + \text{Gain}$$

$$= ₹1,000 + ₹210$$

$$= ₹1,210$$

Therefore, Anish should sell the CD player for ₹1,210 in order to gain 21%.

$$19. \text{ Selling price of the first fan} = ₹924 \text{ (Loss of 20\% on C1)}$$

$$\text{Selling price of the second fan} = ₹924 \text{ (Gain of 20\% on C2)}$$

$$\text{Loss percentage on the first fan} = 20\%$$

$$\text{Gain percentage on the second fan} = 20\%$$

To calculate the cost price and selling price, we can set up the following equations:

$$\text{Equation 1: Selling price of the first fan} = C1 - 20\% \text{ of } C1$$

$$\text{Equation 2: Selling price of the second fan} = C2 + 20\% \text{ of } C2$$

From Equation 1:

$$₹924 = C1 - 0.2C1$$

$$₹924 = 0.8C1$$

$$C1 = ₹924 / 0.8$$

$$C1 = ₹1155$$

From Equation 2:

$$₹924 = C2 + 0.2C2$$

$$₹924 = 1.2C2$$

$$C2 = ₹924 / 1.2$$

$$C2 = ₹770$$

The overall cost price (CP) would be the sum of the cost prices of both fans:

$$\text{CP} = C1 + C2$$

$$\text{CP} = ₹1155 + ₹770$$

$$\text{CP} = ₹1925$$

The overall selling price (SP) would be the sum of the selling prices of both fans:

$$\text{SP} = ₹924 + ₹924$$

$$\text{SP} = ₹1848$$

To calculate the gain or loss percentage, we can use the following formula:

$$\text{Gain or Loss percentage} = ((\text{SP} - \text{CP}) / \text{CP}) * 100$$

$$\text{Gain or Loss percentage} = ((\text{₹ } 1848 - \text{₹ } 1925) / \text{₹ } 1925) * 100$$

$$\text{Gain or Loss percentage} = (-\text{₹ } 77 / \text{₹ } 1925) * 100$$

$$\text{Gain or Loss percentage} \approx -4\%$$

Therefore, the overall gain or loss percentage in the whole transaction is approximately -4%. This indicates a loss of 4% in the transaction.

20. Weight of first grapes = 25 kg

Cost price of first grapes = ₹ 26 per kg

Weight of second grapes = 15 kg

Cost price of second grapes = ₹ 24 per kg

Profit percentage = 20%

CP = (Weight of first grapes * Cost price of first grapes) + (Weight of second grapes * Cost price of second grapes)

$$\text{CP} = (25 \text{ kg} * \text{₹ } 26/\text{kg}) + (15 \text{ kg} * \text{₹ } 24/\text{kg})$$

$$\text{CP} = \text{₹ } 650 + \text{₹ } 360$$

$$\text{CP} = \text{₹ } 1010$$

To calculate the selling price (SP) required to gain 20%, we can use the following formula:

$$\text{SP} = \text{CP} + (\text{Profit percentage}/100) * \text{CP}$$

$$\text{SP} = \text{₹ } 1010 + (20/100) * \text{₹ } 1010$$

$$\text{SP} = \text{₹ } 1010 + (0.2) * \text{₹ } 1010$$

$$\text{SP} = \text{₹ } 1010 + \text{₹ } 202$$

$$\text{SP} = \text{₹ } 1212$$

The total weight of the grapes is 25 kg + 15 kg = 40 kg.

Rate per kg = SP / Total weight

$$\text{Rate per kg} = \text{₹ } 1212 / 40 \text{ kg}$$

$$\text{Rate per kg} = \text{₹ } 30.30$$

Therefore, the dealer should sell the grapes at a rate of ₹ 30.30 per kg in order to gain 20%.

Exercise 10.3

1.(1) P = ₹ 600, T = 3 years, R = 5% per annum

$$I = (600 * 5 * 3) / 100$$

$$I = \text{₹ } 90$$

(2) P = ₹ 2500, T = 5 years, R = 8% per annum

$$I = (2500 * 8 * 5) / 100$$

$$I = \text{₹ } 1000$$

(3) P = ₹ 2000, T = 4 1/2 years, R = 7 1/2% per annum

To calculate the time period in terms of years:

$$4 \frac{1}{2} \text{ years} = 4 + \frac{1}{2} = 4.5 \text{ years}$$

$$I = (2000 * 7.5 * 4.5) / 100$$

$$I = \text{₹ } 675$$

(4) $P = ₹ 5000$, $T = 5$ years, $R = 6 \frac{2}{5}\%$ per annum

To calculate the rate of interest in terms of decimals:

$$6 \frac{2}{5}\% = 6 + \frac{2}{5} = 6.4\%$$

$$I = (5000 * 6.4 * 5) / 100$$

$$I = ₹ 1600$$

$$2. I = (P * R * T) / 100$$

Where:

I is the simple interest,

P is the principal amount,

R is the rate of interest, and

T is the time period.

Given:

$$P = ₹1,250$$

$$I = ₹1,375 - ₹1,250 = ₹125$$

$$R = 4\%$$

We can rearrange the formula to solve for T:

$$T = (I * 100) / (P * R)$$

Substituting the given values:

$$T = (125 * 100) / (1250 * 4)$$

$$T = 12500 / 5000$$

$$T = 2.5$$

Therefore, it will take 2.5 years (or 2 years and 6 months) for ₹1,250 to become ₹1,375 at a 4% rate of interest.

3. Principal amount (P) = ₹6,000

Rate of interest (R) = 4% per annum

Time period (T) = $4 \frac{1}{2}$ years

First, let's calculate the simple interest:

$$T = 4 \frac{1}{2} \text{ years} = 4 + \frac{1}{2} = 4.5 \text{ years}$$

$$I = (P * R * T) / 100$$

$$I = (6000 * 4 * 4.5) / 100$$

$$I = ₹1,080$$

The simple interest (I) on ₹6,000 at 4% per annum for $4 \frac{1}{2}$ years is ₹1,080.

Now, let's calculate the amount (A) to be paid at the end of the period:

$$A = P + I$$

$$A = ₹6,000 + ₹1,080$$

$$A = ₹7,080$$

The amount (A) to be paid at the end of the period is ₹7,080.

4. Principal amount (P) = ₹680

Rate of interest (R) = 8% per annum

Time period (T) = 1 year

Substituting the given values into the formula, we have:

$$I = (680 * 8 * 1) / 100$$

$$I = (5440) / 100$$

$$I = ₹54.40$$

Therefore, the simple interest on a sum of ₹680 for 1 year at a rate of 8% per annum is ₹54.40.

5. Amount lent to Hemant (P1) = ₹6,000

Time period for Hemant (T1) = 2 years

Amount lent to Rakesh (P2) = ₹1,500

Time period for Rakesh (T2) = 4 years

Total interest received (I) = ₹900

To find the rate of interest (R), we can set up the following equations based on the simple interest formula:

$$\text{Equation 1: } I_1 = (P_1 * R * T_1) / 100$$

$$\text{Equation 2: } I_2 = (P_2 * R * T_2) / 100$$

$$\text{Equation 3: } I_1 + I_2 = ₹900$$

From Equation 1:

$$I_1 = (6000 * R * 2) / 100$$

$$I_1 = 120 * R$$

From Equation 2:

$$I_2 = (1500 * R * 4) / 100$$

$$I_2 = 60 * R$$

Substituting the values of I1 and I2 into Equation 3:

$$120R + 60R = 900$$

$$180R = 900$$

$$R = 900 / 180$$

$$R = 5$$

Therefore, the rate of interest is 5%.

Balram lent the money to both Hemant and Rakesh at a rate of 5% per annum.

6. Principal amount (P) = ₹350

Amount at the end of 6 years (A) = ₹455

Time period (T) = 6 years

Let's calculate the simple interest (I) using the formula:

$$I = A - P$$

$$I = ₹455 - ₹350$$

$$I = ₹105$$

Now we can substitute the values of I, P, and T into the formula to find the rate of interest (R):

$$105 = (350 * R * 6) / 100$$

To solve for R, we can cross multiply and simplify the equation:

$$105 * 100 = 350 * R * 6$$

$$10500 = 2100R$$

Dividing both sides of the equation by 2100, we get:

$$R = 10500 / 2100$$

$$R = 5$$

Therefore, the rate of simple interest is 5%.

7. Principal amount (P) = ₹3600

Amount at the end of 3 1/2 years (A) = ₹4734

Time period (T) = 3 1/2 years

We need to find the rate of interest (R).

First, let's calculate the interest (I) using the formula:

$$I = A - P$$

$$I = ₹4734 - ₹3600$$

$$I = ₹1134$$

Now, let's calculate the rate of interest (R) using the formula:

$$I = (P * R * T) / 100$$

Substituting the given values:

$$1134 = (3600 * R * 3.5) / 100$$

To solve for R, we can cross multiply and simplify the equation:

$$1134 * 100 = 3600 * R * 3.5$$

$$113400 = 12600R$$

Dividing both sides of the equation by 12600, we get:

$$R = 113400 / 12600$$

$$R = 9$$

Therefore, the rate of interest per annum is 9%.

8. Principal amount (P) = ₹900

Amount at the end of the period (A) = ₹1,224

Rate of interest (R) = 12% per annum

We need to find the time period (T).

First, let's calculate the interest (I) using the formula:

$$I = A - P$$

$$I = ₹1,224 - ₹900$$

$$I = ₹324$$

Now, let's calculate the time period (T) using the formula:

$$I = (P * R * T) / 100$$

Substituting the given values:

$$324 = (900 * 12 * T) / 100$$

To solve for T, we can cross multiply and simplify the equation:

$$324 * 100 = 900 * 12 * T$$

$$32400 = 10800T$$

Dividing both sides of the equation by 10800, we get:

$$T = 32400 / 10800$$

$$T = 3$$

Therefore, it will take 3 years for ₹900 to become ₹1,224 at a rate of 12% per annum.

9. In this case, the final amount (A) is double the principal amount (P). Thus, we can write the equation as:

$$2P = P(1 + R/100)^8$$

Dividing both sides by P and simplifying, we have:

$$2 = (1 + R/100)^8$$

Taking the eighth root of both sides, we get:

$$\sqrt[8]{2} = 1 + R/100$$

Subtracting 1 from both sides, we have:

$$\sqrt[8]{2} - 1 = R/100$$

Multiplying both sides by 100, we obtain:

$$100 * (\sqrt[8]{2} - 1) = R$$

Evaluating $(\sqrt[8]{2} - 1)$ using a calculator and rounding to the nearest decimal place, we find:

$$100 * (\sqrt[8]{2} - 1) \approx 12.47$$

Therefore, the rate of interest is approximately 12.47%, which can be approximated as 12.5%.

10. Interest (I) = ₹37.50

Rate of interest (R) = 6.25% per annum

Time period (T) = 8 months

8 months is equivalent to $8/12 = 2/3$ years.

Now, let's substitute the given values into the formula and solve for P:

$$37.50 = (P * 6.25 * 2/3) / 100$$

To solve for P, we can cross multiply and simplify the equation:

$$37.50 * 100 = P * 6.25 * 2/3$$

$$3750 = P * 12.5/3$$

Multiplying both sides by 3/12.5 to isolate P:

$$P = 3750 * 3/12.5$$

$$P = ₹900$$

Therefore, the sum of money lent out at a rate of 6.25% per annum, which produces ₹37.50 as interest in 8 months, is ₹900.

11. Rate = Interest / (Principal * Time)

Plugging in the values:

$$\text{Rate} = 720 / (8,000 * 2)$$

$$\text{Rate} = 720 / 16,000$$

$$\text{Rate} = 0.045$$

Therefore, the rate of interest is 4.5%.

CHAPTER 11

Exercise 11.1

1.(1) equal (2) 180 degrees (3) 93 degrees (4) 90 degrees

2.(1) x = 60 degrees, y = 60 degrees, z = 120 degrees

(2) x = 36 degrees, y = 144 degrees, z = 80 degrees

3. (1) Complement of 53 degrees:

$$90 \text{ degrees} - 53 \text{ degrees} = 37 \text{ degrees}$$

(2) Complement of 48 degrees:

$$90 \text{ degrees} - 48 \text{ degrees} = 42 \text{ degrees}$$

(3) Complement of 58 degrees:

$$90 \text{ degrees} - 58 \text{ degrees} = 32 \text{ degrees}$$

(4) Complement of 12 degrees:

$$90 \text{ degrees} - 12 \text{ degrees} = 78 \text{ degrees}$$

4. (1) Supplement of 132 degrees:

$$180 \text{ degrees} - 132 \text{ degrees} = 48 \text{ degrees}$$

(2) Supplement of 115 degrees:

$$180 \text{ degrees} - 115 \text{ degrees} = 65 \text{ degrees}$$

(3) Supplement of 77 degrees:

$$180 \text{ degrees} - 77 \text{ degrees} = 103 \text{ degrees}$$

(4) Supplement of 135 degrees:

$$180 \text{ degrees} - 135 \text{ degrees} = 45 \text{ degrees}$$

5. (1) and (4) are complementary angles.

6. (2) , (3) and (4) are supplementary angles.

7. The supplement of this angle would be $(180 - x)$ degrees.

According to the given condition, one angle is $\frac{3}{5}$ of its supplement:

$$x = \left(\frac{3}{5}\right) * (180 - x)$$

To solve this equation, we can simplify it:

$$5x = 3 * (180 - x)$$

$$5x = 540 - 3x$$

Adding $3x$ to both sides:

$$5x + 3x = 540$$

$$8x = 540$$

Dividing both sides by 8:

$$x = 540 / 8$$

$$x = 67.5$$

Therefore, one angle is 67.5 degrees, and its supplement is $180 - 67.5 = 112.5$ degrees.

8. Since the two angles are complementary, the other angle would be $(90 - x)$ degrees.

According to the given condition, the two angles differ by 36 degrees:

$$x - (90 - x) = 36$$

Simplifying the equation:

$$x - 90 + x = 36$$

$$2x - 90 = 36$$

Adding 90 to both sides:

$$2x = 36 + 90$$

$$2x = 126$$

Dividing both sides by 2:

$$x = 126 / 2$$

$$x = 63$$

Therefore, one angle is 63 degrees, and its complementary angle is $90 - 63 = 27$ degrees.

9. (1) 35 degrees, 55 degrees:

These angles are not complementary since their sum is 90 degrees. However, their sum is 90 degrees, which means they are supplementary.

(2) 24 degrees, 66 degrees:

These angles are not complementary since their sum is 90 degrees. However, their sum is 90 degrees, which means they are supplementary.

(3) 130 degrees, 50 degrees:

These angles are not complementary since their sum is not 90 degrees. Additionally, their sum is not 180 degrees, so they are not supplementary either.

(4) 27 degrees, 153 degrees:

These angles are not complementary since their sum is not 90 degrees. However, their sum is 180 degrees, which means they are supplementary.

(5) 17 degrees, 73 degrees:

These angles are not complementary since their sum is not 90 degrees. However, their sum is not 180 degrees, so they are not supplementary either.

(6) 53 degrees, 127 degrees:

These angles are not complementary since their sum is not 90 degrees. However, their sum is 180 degrees, which means they are supplementary.

10. Let's assume the two complementary angles are $4x$ and $5x$, where $4x$ is the smaller angle and $5x$ is the larger angle.

Since the angles are complementary, their sum should be 90 degrees:

$$4x + 5x = 90$$

Combining like terms:

$$9x = 90$$

Dividing both sides by 9:

$$x = 90 / 9$$

$$x = 10$$

Now, we can find the measures of the angles:

Smaller angle: $4x = 4 * 10 = 40$ degrees

Larger angle: $5x = 5 * 10 = 50$ degrees

11. Angle QOR = 60 degrees

12. (1) angle NOK and angle POL

(2) angle NOK and angle LOM , angle LON and angle MOK

(3) angle NOK and angle KOM , angle KOM and angle MOL , angle LOM and angle LON , angle LON and angle NOK , angle POL and angle POK

(4) LK and NM

13. The complement of this angle would be $(90 - x)$ degrees.

According to the given condition, the angle is half of its complement:

$$x = (1/2) * (90 - x)$$

To solve this equation, we can simplify it:

$$2x = 90 - x$$

Adding x to both sides:

$$2x + x = 90$$

$$3x = 90$$

Dividing both sides by 3:

$$x = 90 / 3$$

$$x = 30$$

Therefore, the angle that is half of its complement is 30 degrees.

14. (1) No, because angles are overlapping

(2) Yes (3) Yes (4) Yes

15. Linear pairs : (2) and (3)

16. Let's assume the measure of one angle is $2x$ and the measure of the other angle is $3x$. Since the angles are complementary, their sum is 90 degrees. Therefore, we can set up the equation:

$$2x + 3x = 90$$

Combining like terms:

$$5x = 90$$

Dividing both sides by 5:

$$x = 18$$

Now we can find the measure of each angle:

$$\text{Angle 1: } 2x = 2 * 18 = 36 \text{ degrees}$$

$$\text{Angle 2: } 3x = 3 * 18 = 54 \text{ degrees}$$

So the measures of the two complementary angles are 36 degrees and 54 degrees.

17. If the measures of two complementary angles are equal, let's assume the measure of each angle is x . Since the angles are complementary, their sum is 90 degrees. Therefore, we can set up the equation:

$$x + x = 90$$

Combining like terms:

$$2x = 90$$

Dividing both sides by 2:

$$x = 45$$

So the measure of each angle is 45 degrees.

18. Let's assume the measure of the angle is x . The complement of this angle would be $90 - x$. If the angle is double its complement, we can set up the equation:

$$x = 2(90 - x)$$

Expanding the equation:

$$x = 180 - 2x$$

Adding $2x$ to both sides:

$$3x = 180$$

Dividing both sides by 3:

$$x = 60$$

So the angle is 60 degrees, and its complement is $90 - 60 = 30$ degrees.

19. If two supplementary angles are equal, let's assume the measure of each angle is x . Since the angles are supplementary, their sum is 180 degrees. Therefore, we can set up the equation:

$$x + x = 180$$

Combining like terms:

$$2x = 180$$

Dividing both sides by 2:

$$x = 90$$

So the measure of each angle is 90 degrees.

20. If an angle is three times its supplement, let's assume the measure of the angle is x . The supplement of this angle would be $180 - x$. We can set up the equation:

$$x = 3(180 - x)$$

Expanding the equation:

$$x = 540 - 3x$$

Adding $3x$ to both sides:

$$4x = 540$$

Dividing both sides by 4:

$$x = 135$$

So the angle is 135 degrees, and its supplement is $180 - 135 = 45$ degrees.

21. Let's assume the measure of the smaller angle is x . The measure of the larger angle would be $x + 46$. Since the angles are supplementary, their sum is 180 degrees. Therefore, we can set up the equation:

$$x + (x + 46) = 180$$

Combining like terms:

$$2x + 46 = 180$$

Subtracting 46 from both sides:

$$2x = 134$$

Dividing both sides by 2:

$$x = 67$$

The measure of the smaller angle is 67 degrees, and the measure of the larger angle is $67 + 46 = 113$ degrees.

22. (1) If one of the angles is an acute angle (less than 90 degrees), then the other angle must be an obtuse angle (greater than 90 degrees) for their sum to be 180 degrees.

(2) If one of the angles is a right angle (exactly 90 degrees), then the other angle must also be a right angle. This is because the sum of a right angle and any other angle is always 180 degrees.

(3) If one of the angles is an obtuse angle (greater than 90 degrees), then the other angle must be an acute angle for their sum to be 180 degrees.

23. (1) Angle COQ and Angle COP ; Angle BOQ and Angle BOP ; Angle AOQ and Angle AOP ; Angle BOC and Angle BOA ; Angle POC and Angle POA ; Angle QOC and Angle QOA

(2) Angle COQ and Angle AOP ; Angle COP and Angle AOQ

(3) Angle COQ and Angle BOC

24. Angle 2 = 120 degrees, Angle 3 = 60 degrees, Angle 4 = 120 degrees

25. (1) 75 degrees (2) 75 degrees

(3) 62 degrees (4) 62 degrees

Exercise 11.2

1. (1) (angle 1 , angle 5) ; (angle 2 , angle 6) ; (angle 3 , angle 7) ; (angle 4 , angle 8)

(2) (angle 1 , angle 7) ; (angle 2 , angle 8) ; (angle 3 , angle 5) , (angle 4 , angle 6)

(3) (angle 2 , angle 5) ; (angle 3 , angle 8)

2. Angle 3 = Angle 5 = Angle 7 = 75 degrees

Angle 2 = Angle 4 = Angle 6 = Angle 8 = 105 degrees.

3. (1) $x = 70$ degrees , $y = 110$ degrees

(2) $x = 135$ degrees , $y = 45$ degrees

4. $a = x = y = 65$ degrees , $b = z = 115$ degrees

5. $x = 130$, $y = 115$

6. $x = 35$ degrees , $y = 45$ degrees , $z = 100$ degrees

7. (1) no (2) yes (3) yes

8. Angle 1 = Angle 3 = 75 degrees , Angle 2 = Angle 4 = 105 degrees

9. (1) 3 (2) 5 (3) 4

10. (1) 1 (2) 7 (3) 6

11. (1) $a = b = 30$ degrees
 (2) $a = 118$ degrees , $b = 62$ degrees
 (3) $w = 100$ degrees , $x = 80$ degrees , $y = 40$ degrees , $z = 140$ degrees

12. (1) c (2) a (3) b (4) d (5) d

CHAPTER 12

Exercises 12.1

1. (1) equilateral (2) scalene (3) isosceles (4) scalene

2. (1) 80 degrees (2) 59 degrees (3) 49 degrees (4) 80 degrees (5) 59 degrees (6) 45 degrees

3. (1) acute angled triangle (2) acute angled triangle (3) obtuse angled triangle
 (4) right angled triangle (5) obtuse angled triangle

4. Total ratio = $4 + 3 + 2 = 9$

Value of each part of the ratio = 180° (sum of angles in a triangle) / $9 = 20^\circ$

Measure of the angles:

Angle 1 = $4 * 20^\circ = 80^\circ$

Angle 2 = $3 * 20^\circ = 60^\circ$

Angle 3 = $2 * 20^\circ = 40^\circ$

Therefore, the measures of the angles in the triangle are 80° , 60° , and 40° .

5. Other acute angle = 90 degrees - 36 degrees = 54 degrees

Therefore, the other acute angle of the right-angled triangle is 54 degrees.

6. In a triangle, the sum of all angles is 180 degrees. We can use this fact to form an equation and solve for "x".

The equation is as follows:

$$x + x + (x - 15) = 180$$

Simplifying the equation:

$$3x - 15 = 180$$

$$3x = 180 + 15$$

$$3x = 195$$

$$x = 195 / 3$$

$$x = 65$$

Now that we have found the value of "x" as 65 , we can find the measure of each angle:

Equal angle 1 = $x = 65$ degrees

Equal angle 2 = $x = 65$ degrees

Third angle = $x - 15 = 65 - 15 = 50$ degrees

Therefore, the angles of the triangle are 65 degrees, 65 degrees, and 50 degrees.

7. The other two angles are in the ratio 4:5, which means we can express them as $4x$ and $5x$, respectively. In a triangle, the sum of all angles is 180 degrees. We can use this fact to form an equation and solve for x .

The equation is as follows:

$$45 + 4x + 5x = 180$$

Combining like terms:

$$45 + 9x = 180$$

Subtracting 45 from both sides:

$$9x = 180 - 45$$

$$9x = 135$$

Dividing both sides by 9:

$$x = 135 / 9$$

$$x = 15$$

Now that we have found the value of x as 15, we can find the measure of each angle:

First angle = 45 degrees

Second angle = $4x = 4 * 15 = 60$ degrees

Third angle = $5x = 5 * 15 = 75$ degrees

Therefore, the measures of the angles of the triangle are 45 degrees, 60 degrees, and 75 degrees.

8. Let's denote the measure of the third angle as " x ". Therefore, the measure of each of the equal angles is $4x$.

In any triangle, the sum of all three angles is always 180 degrees. So, we can set up an equation based on this:

$$x + 4x + 4x = 180$$

Combining like terms:

$$9x = 180$$

Dividing both sides by 9:

$$x = 20$$

$$4x = 4 * 20 = 80 \text{ degrees}$$

Therefore, the three angles of the isosceles triangle are 20 degrees, 80 degrees, and 80 degrees.

9. For any polygon:

sum of all interior angle is 360°

For regular polygo:

sum of all interior angle is $(n-2) \times 180^\circ$

10. (1) $x = 125$ degrees (2) $x = 85$ degrees , $y = 57$ degrees (3) $x = 103$ degrees (4) $y = 53$ degrees

11. (1) 40 degrees (2) 40 degrees (3) 50 degrees

12. (1) yes (2) no (3) no (4) no (5) yes (6) yes

13. Given that one of the angles is 65 degrees, let's denote the other two angles as " x " and " y ". Therefore, we can set up the following equation:

$$65 + x + y = 180$$

Since the sum of the three angles in a triangle is 180 degrees, we can rearrange the equation:

$$x + y = 180 - 65$$

$$x + y = 115$$

Now, we have an equation with two variables (x and y) and one equation. There are infinitely many pairs of values (x, y) that satisfy this equation, as long as their sum is 115.

14. Here are five sets of angles that can form a triangle:

Set 1: (60°, 60°, 60°) - This is an equilateral triangle where all three angles are equal.

Set 2: (45°, 45°, 90°) - This is an isosceles right triangle, also known as a 45-45-90 triangle.

Set 3: (30°, 60°, 90°) - This is another type of right triangle called a 30-60-90 triangle.

Set 4: (50°, 70°, 60°) - This is a scalene triangle where all three angles are different.

Set 5: (120°, 30°, 30°) - This is an isosceles triangle with two equal angles of 30° and one angle of 120°.

15. (1)no (2)yes (3)no (4)yes (5)no

16. Do it yourself

17. (1) b (2) c (3) a (4) b

Exercise 12.2

1.(1) 101 degrees (2) 93 degrees (3) 126 degrees

2. (1) 33 degrees (2) 69 degrees (3) 38 degrees

3. Let's denote the interior opposite angles as x and 2x.

Therefore, angle DFE is $180 - 120 = 60$ degrees.

$$x + 2x + 60 = 180$$

Combining like terms:

$$3x + 60 = 180$$

Subtracting 60 from both sides:

$$3x = 120$$

Dividing both sides by 3:

$$x = 40$$

Therefore, the magnitude of the smaller interior opposite angle is $x = 40$ degrees, and the magnitude of the larger interior opposite angle is $2x = 2 * 40 = 80$ degrees.

4. We are given that one of the exterior angles is 140 degrees. The exterior angle and the adjacent interior angle are supplementary, which means their sum is 180 degrees. Therefore, we can write:

$$140 + x = 180$$

To find the value of "x," we can subtract 140 from both sides of the equation:

$$x = 180 - 140$$

$$x = 40$$

So, each of the two equal interior angles measures 40 degrees.

5. Let's denote the angles of the triangle as A, B, and C.

$$A + 85 = 180 \dots(1)$$

$$C + 131 = 180 \dots(2)$$

$$A + B + C = 180 \dots(3)$$

Let's solve equations (1) and (2) to find the values of A and C:

From equation (1):

$$A = 180 - 85$$

$$A = 95$$

From equation (2):

$$C = 180 - 131$$

$$C = 49$$

Now, let's substitute the values of A and C into equation (3) to find B:

$$95 + B + 49 = 180$$

$$B = 180 - 95 - 49$$

$$B = 36$$

Therefore, the angles of the triangle are:

$$A = 95 \text{ degrees}$$

$$B = 36 \text{ degrees}$$

$$C = 49 \text{ degrees}$$

6. The sum of the the all the angles of a triangle is 180 degree

the sum of the angle d and angle e is 140 degree

the measurement of angle f= $(180 - 140)\text{degree} = 40\text{degree}$

$$7. \text{ Angle } YZX = 180^\circ - 60^\circ - 32^\circ = 88^\circ$$

$$\text{Angle } EZD = 180^\circ - 88^\circ = 92^\circ$$

$$\text{Angle } DEZ = 180^\circ - 92^\circ - 45^\circ = 43^\circ$$

$$\text{Angle } YED = 180^\circ - 43^\circ = 137^\circ$$

8. We know that sum of 2 interior angles is equal to exterior angle

$$75+45=120$$

So Angle PRS = 120 degree

9. (1) 24 degrees (2) 58 degrees (3) 330 degrees

10. We know that the measure of any exterior angle of a triangle is equal to the sum of the measures of its two interior opposite angles.

$$\text{So, } 65^\circ = 32^\circ + x^\circ \quad 65^\circ - 32^\circ = x^\circ$$

$$33^\circ = x^\circ$$

The measure of the other interior opposite angle is 33° .

$$11. 120 = A + B$$

$$120 = 45 + B$$

Now, we can solve for B:

$$B = 120 - 45$$

$$B = 75$$

Thus, the measure of the other interior opposite angle is 75 degrees.

12. Let's denote the interior angles of the triangle as A, B, and C, and their corresponding exterior angles as X, Y, and Z, respectively.

By the exterior angle theorem, we know that each exterior angle is equal to the sum of the two interior opposite angles. Thus, we have the following equations:

$$X = B + C$$

$$Y = A + C$$

$$Z = A + B$$

Now, let's calculate the sum of the exterior angles:

$$X + Y + Z = (B + C) + (A + C) + (A + B)$$

$$= A + B + C + A + B + C$$

$$= 2A + 2B + 2C$$

$$= 2(A + B + C)$$

Since the sum of the measures of the interior angles of a triangle is always 180 degrees, we have:

$$A + B + C = 180$$

Substituting this into the equation for the sum of the exterior angles:

$$X + Y + Z = 2(A + B + C)$$

$$= 2(180)$$

$$= 360$$

Hence, the sum of the exterior angles of a triangle is indeed 360 degrees.

13. Let's denote the interior opposite angles as $3x$ and $5x$

$$3x + 5x = 120$$

Combining like terms, we get:

$$8x = 120$$

To solve for x , we divide both sides of the equation by 8:

$$x = 120/8$$

$$x = 15$$

$$\text{First interior angle} = 3x = 3 * 15 = 45 \text{ degrees}$$

$$\text{Second interior angle} = 5x = 5 * 15 = 75 \text{ degrees}$$

$$\text{Third interior angle} = 180 - (45 + 75) = 180 - 120 = 60 \text{ degrees}$$

Therefore, the measures of the angles in the triangle are: 45 degrees, 75 degrees, and 60 degrees.

Exercise 12.3

1. (1) 6, 7, 8:

$$6 + 7 = 13 > 8 \text{ (satisfies the triangle inequality)}$$

$$7 + 8 = 15 > 6 \text{ (satisfies the triangle inequality)}$$

$$6 + 8 = 14 > 7 \text{ (satisfies the triangle inequality)}$$

Therefore, the set (1) 6, 7, 8 may be the possible lengths of sides of a triangle.

(2) 3, 5, 15:

$$3 + 5 = 8 > 15 \text{ (does not satisfy the triangle inequality)}$$

Therefore, the set (2) 3, 5, 15 cannot be the lengths of sides of a triangle.

(3) 3, 7, 8:

$$3 + 7 = 10 > 8 \text{ (satisfies the triangle inequality)}$$

$$7 + 8 = 15 > 3 \text{ (satisfies the triangle inequality)}$$

$$3 + 8 = 11 > 7 \text{ (satisfies the triangle inequality)}$$

Therefore, the set (3) 3, 7, 8 may be the possible lengths of sides of a triangle.

(4) 4, 12, 8:

$$4 + 12 = 16 > 8 \text{ (satisfies the triangle inequality)}$$

$$12 + 8 = 20 > 4 \text{ (satisfies the triangle inequality)}$$

$$4 + 8 = 12 > 12 \text{ (does not satisfy the triangle inequality)}$$

Therefore, the set (4) 4, 12, 8 cannot be the lengths of sides of a triangle.

(5) 3, 9, 7:

$$3 + 9 = 12 > 7 \text{ (satisfies the triangle inequality)}$$

$$9 + 7 = 16 > 3 \text{ (satisfies the triangle inequality)}$$

$$3 + 7 = 10 > 9 \text{ (satisfies the triangle inequality)}$$

Therefore, the set (5) 3, 9, 7 may be the possible lengths of sides of a triangle.

(6) 8, 11, 6:

$$8 + 11 = 19 > 6 \text{ (satisfies the triangle inequality)}$$

$$11 + 6 = 17 > 8 \text{ (satisfies the triangle inequality)}$$

$$8 + 6 = 14 > 11 \text{ (satisfies the triangle inequality)}$$

Therefore, the set (6) 8, 11, 6 may be the possible lengths of sides of a triangle.

2. Angle D (48 degrees) is the smallest angle, and it is opposite side EF.

Angle E (51 degrees) is the middle angle, and it is opposite side DF.

Angle F (81 degrees) is the largest angle, and it is opposite side DE.

Therefore, the largest side of triangle DEF is side DE, and the smallest side is side EF.

3. (1) > (2) > (3) > (4) < (5) > (6) <

4. Applying the triangle inequality to triangle DOR, we have:

$$DR + RO > DO \text{ (1)}$$

Next, let's consider the triangle formed by the points O, F, and E. Applying the triangle inequality to triangle FOE, we have:

$$OF + FE > OE \text{ (2)}$$

Similarly, considering the triangle formed by the points O, D, and F, we have:

$$OD + DF > OF \text{ (3)}$$

Now, let's sum up equations (1), (2), and (3):

$$DR + RO + OF + FE + OD + DF > DO + OE + OF$$

Rearranging the terms:

$$DR + RO + OF + OD + DF + FE > DO + OE + OF$$

We know that $DO + OE = DE$, so we can substitute it into the equation:

$$DR + RO + OF + OD + DF + FE > DE + OF$$

Finally, since $FD + DE + EF = FE + OD + DF$, we can replace $FE + OD + DF$ with $FD + DE + EF$ in the equation:

$$DR + RO + OF + FD + DE + EF > DE + OF$$

Simplifying further:

$$OD + OR + OF + FD + DE + EF > DE + OF$$

Subtracting OF from both sides:

$$OD + OR + FD + DE + EF > DE$$

Dividing both sides by 2:

$$(OD + OR + FD + DE + EF) / 2 > DE / 2$$

Simplifying:

$$OD + OR + FD + DE + EF > 1/2 (DE + EF + FD)$$

Therefore, we have shown that $OD + OR + OF > 1/2 (DE + EF + FD)$ in triangle DEF .

5. (1) yes (2) yes (3) yes

6. (1) > (2) > (3) >

7. (1) < (2) < (3) >

8. (1) $a = 40$ degrees , $b = 110$ degrees

(2) $a = 90$ degrees , $b = 135$ degrees

(3) $a = 47$ degrees , $b = 133$ degrees

9. (1) $a = 60$ degrees

(2) $b = 44$ degrees

(3) $c = 45$ degrees

10. $x = 60$ degrees angle of equilateral triangle

$$y = 60 / 2 = 30 \text{ degrees}$$

Exercise 12.4

1.(1) 17 (2) 10 (3) 25

2.(1) 3, 4, 5:

$$3^2 + 4^2 = 9 + 16 = 25$$

$$5^2 = 25$$

The equation is satisfied, so 3, 4, 5 is a Pythagorean triplet.

(2) 7, 8, 12:

$$7^2 + 8^2 = 49 + 64 = 113$$

$$12^2 = 144$$

The equation is not satisfied, so 7, 8, 12 is not a Pythagorean triplet.

(3) 13, 6, 12:

$$13^2 + 6^2 = 169 + 36 = 205$$

$$12^2 = 144$$

The equation is not satisfied, so 13, 6, 12 is not a Pythagorean triplet.

(4) 7, 8, 9:

$$7^2 + 8^2 = 49 + 64 = 113$$

$$9^2 = 81$$

The equation is not satisfied, so 7, 8, 9 is not a Pythagorean triplet.

$$3. (2.5 \text{ cm})^2 + (6 \text{ cm})^2 = 6.25 \text{ cm}^2 + 36 \text{ cm}^2 = 42.25 \text{ cm}^2$$

$$(6.5 \text{ cm})^2 = 42.25 \text{ cm}^2$$

Since $(2.5 \text{ cm})^2 + (6 \text{ cm})^2 = (6.5 \text{ cm})^2$, the given triangle does satisfy the Pythagorean theorem.

Therefore, the triangle with side lengths 2.5 cm, 6 cm, and 6.5 cm is a right-angled triangle.

$$4. \text{Hypotenuse}^2 = \text{Adjacent}^2 + \text{Opposite}^2$$

$$\text{Hypotenuse}^2 = (10 \text{ m})^2 + (24 \text{ m})^2$$

$$\text{Hypotenuse}^2 = 100 \text{ m}^2 + 576 \text{ m}^2$$

$$\text{Hypotenuse}^2 = 676 \text{ m}^2$$

Taking the square root of both sides:

$$\text{Hypotenuse} = \sqrt{676 \text{ m}^2}$$

$$\text{Hypotenuse} = 26 \text{ m}$$

Therefore, the distance between the starting point and the terminal point is 26 meters.

5. Using the Pythagorean theorem, we can calculate the length of the ladder:

$$L^2 = \text{base}^2 + \text{height}^2$$

$$L^2 = 8^2 + 6^2$$

$$L^2 = 64 + 36$$

$$L^2 = 100$$

Taking the square root of both sides:

$$L = \sqrt{100}$$

$$L = 10$$

Therefore, the length of the ladder is 10 meters.

6. In this case, we have the hypotenuse as 26 cm and one of the sides as 10 cm. Using the Pythagorean theorem:

$$26^2 = 10^2 + x^2$$

$$676 = 100 + x^2$$

$$x^2 = 676 - 100$$

$$x^2 = 576$$

Taking the square root of both sides:

$$x = \sqrt{576}$$

$$x = 24$$

Therefore, the length of the other side is 24 cm.

7. Let's denote the height of the shorter pole as 'h1' (13 m), the height of the taller pole as 'h2' (18 m), and the distance between their feet as 'd' (12 m). We need to find the distance between their tops, denoted as 'x'.

In the right-angled triangle, the distance between the tops will be the hypotenuse of the triangle.

Using the Pythagorean theorem:

$$x^2 = (d^2) + (h2 - h1)^2$$

Substituting the given values:

$$x^2 = 12^2 + (18 - 13)^2$$

$$x^2 = 144 + 25$$

$$x^2 = 169$$

Taking the square root of both sides:

$$x = \sqrt{169}$$

$$x = 13$$

Therefore, the distance between the tops of the two poles is 13 meters.

8. Let's denote the length of the ladder as 'L'. We have the following information:

The height of the wall = 8.5 m

The distance between the foot of the wall and the foot of the ladder = 2.5 m

Using the Pythagorean theorem, we can set up the equation:

$$L^2 = (8.5^2) + (2.5^2)$$

Simplifying this equation:

$$L^2 = 72.25 + 6.25$$

$$L^2 = 78.5$$

Taking the square root of both sides to find L:

$$L = \sqrt{78.5}$$

$$L \approx 8.85$$

Therefore, the length of the ladder is approximately 8.85 meters.

9. Length of the ladder (hypotenuse) = 6.5 m

Height of the point where the ladder reaches the wall = 6 m

Using the Pythagorean theorem, we can set up the equation:

$$x^2 + 6^2 = 6.5^2$$

Simplifying this equation:

$$x^2 + 36 = 42.25$$

Subtracting 36 from both sides:

$$x^2 = 42.25 - 36$$

$$x^2 = 6.25$$

Taking the square root of both sides to find 'x':

$$x = \sqrt{6.25}$$

$$x \approx 2.5$$

Therefore, the distance of the bottom of the ladder from the wall is approximately 2.5 meters.

10. Height of the wall = 12 m

Distance between the foot of the wall and the foot of the ladder = 9 m

Using the Pythagorean theorem, we can set up the equation:

$$L^2 = 9^2 + 12^2$$

Simplifying this equation:

$$L^2 = 81 + 144$$

$$L^2 = 225$$

Taking the square root of both sides to find L:

$$L = \sqrt{225}$$

$$L = 15$$

Therefore, the length of the ladder is 15 meters.

11. (1) 1.8cm, 1.7cm, 0.9cm

Checking the Pythagorean theorem:

$$(1.8^2) + (1.7^2) = 3.24 + 2.89 \approx 6.13$$

The sum of the squares of the two smaller sides is not equal to the square of the longest side, so this is not a right-angled triangle.

(2) 4cm, 0.9cm, 4.1cm

Checking the Pythagorean theorem:

$$(4^2) + (0.9^2) = 16 + 0.81 = 16.81$$

The sum of the squares of the two smaller sides is not equal to the square of the longest side, so this is not a right-angled triangle.

(3) 2.3cm, 3.1cm, 6.9cm

Checking the Pythagorean theorem:

$$(2.3^2) + (3.1^2) = 5.29 + 9.61 = 14.9$$

The sum of the squares of the two smaller sides is not equal to the square of the longest side, so this is not a right-angled triangle.

(4) 5cm, 3.2cm, 7.6cm

Checking the Pythagorean theorem:

$$(5^2) + (3.2^2) = 25 + 10.24 = 35.24$$

The sum of the squares of the two smaller sides is approximately equal to the square of the longest side, so this is not a right-angled triangle.

12. AB = 5 cm

BC = 12 cm

Using the Pythagorean theorem, we can set up the equation:

$$x^2 = AB^2 + BC^2$$

Substituting the given values:

$$x^2 = 5^2 + 12^2$$

$$x^2 = 25 + 144$$

$$x^2 = 169$$

Taking the square root of both sides to find 'x':

$$x = \sqrt{169}$$

$$x = 13$$

Therefore, the length of AC is 13 cm.

13. Length of one side of the rhombus (AB) = 5 cm

Length of one diagonal of the rhombus (AC) = 6 cm

Using the Pythagorean theorem, we can find the length of the second diagonal (BD):

$$BD^2 = AB^2 + AD^2$$

Since the diagonals of a rhombus bisect each other, AD is half the length of AC:

$$AD = AC/2$$

Substituting the given values:

$$AD = 6/2 = 3 \text{ cm}$$

Now, we can substitute the values of AB and AD into the equation:

$$BD^2 = (5^2) + (3^2)$$

$$BD^2 = 25 + 9$$

$$BD^2 = 34$$

Taking the square root of both sides to find 'BD':

$$BD = \sqrt{34} \approx 5.83 \text{ cm}$$

Therefore, the length of the second diagonal of the rhombus is approximately 5.83 cm.

14. Let's consider triangle PQR. Since it is a right triangle, we know that the square of the length of the hypotenuse PQ is equal to the sum of the squares of the other two sides:

$$PQ^2 = PR^2 + QR^2$$

Since PQR is an isosceles right triangle, we know that PR = QR. Therefore, we can substitute PR for QR in the equation:

$$PQ^2 = PR^2 + PR^2$$

$$PQ^2 = 2PR^2$$

Hence, we have proven that in an isosceles right triangle PQR, right-angled at R, $PQ^2 = 2PR^2$.

15. The Pythagorean theorem states that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. In this case, we can set up the equation:

$$a^2 + a^2 = 512$$

Simplifying the equation:

$$2a^2 = 512$$

Dividing both sides by 2:

$$a^2 = 256$$

Taking the square root of both sides to find 'a':

$$a = \sqrt{256}$$

$$a = 16$$

Therefore, the length of each side of the isosceles right triangle is 16 cm.

Exercise 13.1

1.(1) 4 (2) 2 (3) 2 (4) 2 (5) 3

2.Do it yourself

3.(1) 4 (2) 3 (3) 6

4. F, G, J

5. Do it yourself

6. Do it yourself

7. Do it yourself

8. Do it yourself

Exercise 13.2

1.(2)

2.Yes

3.W - 1 , L - 1 , I - 2

4. It has three lines of symmetry and three rotational symmetry.

5. (1) 4 (2) infinite (3) 6

6. Do it yourself

7. (1) line (2) rotational (3) both (4) both

8. Do it yourself

9. M, H, Y, X, A, D

10. 0, 8, 1

11. (1) b (2) c (3) all (4) c

CHAPTER 14

Exercise 14.1

1. (1) sphere (2) cylinder (3) tetrahedron

2. Do it yourself

3. (1), (2) and (4)

4. $a = 2$, $b = 4$, $c = 6$

5. Do it yourself

6. (1) c (2) a (3) d (4) b

7. (1) True (2) False (3) True (4) True (5) True

8. (1) b (2) c (3) c (4) a

Exercise 14.2

1. Do it yourself

2. Do it yourself

3. Do it yourself

4. (1) 10 (2) 12

5. Do it yourself

6. Do it yourself

7. Do it yourself

8. Do it yourself

9. Do it yourself

10. Do it yourself

11. Do it yourself

12. Do it yourself

13. Length = 12 units

Breadth = 3 units

Height = 3 units

→ $12 * 3 * 3$

14. (1) 64 (2) 4 (3) 4

CHAPTER 15

Exercise 15.1

1.(1) For $l = 25$ cm and $b = 11$ cm:

Perimeter = $2 * (\text{length} + \text{breadth}) = 2 * (25 \text{ cm} + 11 \text{ cm}) = 2 * 36 \text{ cm} = 72 \text{ cm}$.

Area = $\text{length} * \text{breadth} = 25 \text{ cm} * 11 \text{ cm} = 275 \text{ cm}^2$

(2) For $l = 13$ cm and $b = 12$ cm:

Perimeter = $2 * (\text{length} + \text{breadth}) = 2 * (13 \text{ cm} + 12 \text{ cm}) = 2 * 25 \text{ cm} = 50 \text{ cm}$.

Area = $\text{length} * \text{breadth} = 13 \text{ cm} * 12 \text{ cm} = 156 \text{ cm}^2$

(3) For $l = 7.5$ cm and $b = 2.5$ cm:

Perimeter = $2 * (\text{length} + \text{breadth}) = 2 * (7.5 \text{ cm} + 2.5 \text{ cm}) = 2 * 10 \text{ cm} = 20 \text{ cm}$.

Area = $\text{length} * \text{breadth} = 7.5 \text{ cm} * 2.5 \text{ cm} = 18.75 \text{ cm}^2$

2.(1) For a side length of 2.5 cm:

Perimeter = $4 * 2.5 \text{ cm} = 10 \text{ cm}$.

(2) For a side length of 7.5 cm:

Perimeter = $4 * 7.5 \text{ cm} = 30 \text{ cm}$.

(3) For a side length of 11 m:

Perimeter = $4 * 11 \text{ m} = 44 \text{ m}$.

3.(1) For sides of 50 cm and 1 m:

Convert 50 cm to meters: $50 \text{ cm} = 0.5 \text{ m}$

Area = $\text{length} * \text{width} = 0.5 \text{ m} * 1 \text{ m} = 0.5 \text{ m}^2$

Area in hectares = $0.5 \text{ m}^2 / 10,000 = 0.00005$ hectares.

(2) For sides of 35 m and 42 m:

Area = $\text{length} * \text{width} = 35 \text{ m} * 42 \text{ m} = 1470 \text{ m}^2$

To convert the area to hectares:

Area in hectares = $1470 \text{ m}^2 / 10,000 = 0.147$ hectares.

4. (1) For sides of 50 m and 16 m 7 cm:

Convert 16 m 7 cm to meters: $16 \text{ m} + 7 \text{ cm} = 16 \text{ m} + 0.07 \text{ m} = 16.07 \text{ m}$

Area = $\text{length} * \text{width} = 50 \text{ m} * 16.07 \text{ m} = 803.5 \text{ m}^2$

Area in acres = $803.5 \text{ m}^2 / 4046.86 = 0.19847$ acres. (approx.)

(2) For sides of 43 m and 28 m:

Area = length * width = $43 \text{ m} * 28 \text{ m} = 1204 \text{ m}^2$

Area in acres = $1204 \text{ m}^2 / 4046.86 = 0.2973$ acres. (approx.)

5. Area = 100 cm^2

Length = 25 cm

Width = Area / Length

Width = $100 \text{ cm}^2 / 25 \text{ cm}$

Width = 4 cm

Perimeter = $2 * (\text{Length} + \text{Width})$

Perimeter = $2 * (25 \text{ cm} + 4 \text{ cm})$

Perimeter = $2 * 29 \text{ cm}$

Perimeter = 58 cm

Therefore, the width of the rectangle is 4 cm and the perimeter is 58 cm.

6. Side of the square = 18 cm

Length of the rectangle = 36 cm

$18 \text{ cm} * 18 \text{ cm} = 324 \text{ cm}^2$.

Breadth = Area / Length

Breadth = $324 \text{ cm}^2 / 36 \text{ cm}$

Breadth = 9 cm

Perimeter = $2 * (\text{Length} + \text{Breadth})$

Perimeter = $2 * (36 \text{ cm} + 9 \text{ cm})$

Perimeter = $2 * 45 \text{ cm}$

Perimeter = 90 cm

Therefore, the breadth of the rectangle is 9 cm and the perimeter is 90 cm.

7. Perimeter of the square garden = 484 m

Side length = Perimeter / 4 = $484 \text{ m} / 4 = 121 \text{ m}$

Area = Side length² = $(121 \text{ m})^2 = 14641 \text{ m}^2$

Area in hectares = $14641 \text{ m}^2 / 10,000 = 1.4641$ hectares

Therefore, the area of the square garden is approximately 1.4641 hectares.

8. Length of the rectangular field = 20 m

Breadth of the rectangular field = 16 m

Rate per meter of fencing = ₹15

Perimeter = $2 * (\text{Length} + \text{Breadth})$

Perimeter = $2 * (20 \text{ m} + 16 \text{ m}) = 2 * 36 \text{ m} = 72 \text{ m}$

Cost of fencing = Perimeter * Rate per meter

Cost of fencing = $72 \text{ m} * ₹15/\text{m} = ₹1080$

Therefore, the cost of fencing the rectangular field would be ₹1080.

9. Length of the field = 32 m

Width of the field = 20 m

Rate per square meter of tiling = ₹4.75

Area = Length * Width

Area = 32 m * 20 m = 640 m²

Cost of tiling = Area * Rate per square meter

Cost of tiling = 640 m² * ₹4.75/m² = ₹3040

Therefore, the cost of tiling the field would be ₹3040.

Perimeter = 2 * (Length + Width)

Perimeter = 2 * (32 m + 20 m) = 2 * 52 m = 104 m

Cost of fencing = Perimeter * Rate per meter

Cost of fencing = 104 m * ₹0.75/m = ₹78

Therefore, the cost of fencing the field would be ₹78.

10. Dimensions of the floor = 9 m x 12 m

Side of each square tile = 12 cm

Length of the floor in centimeters = 9 m * 100 cm/m = 900 cm

Width of the floor in centimeters = 12 m * 100 cm/m = 1200 cm

Area of the floor = Length * Width = 900 cm * 1200 cm = 1,080,000 cm²

Side of each tile in centimeters = 12 cm

Area of each tile = Side * Side = 12 cm * 12 cm = 144 cm²

Number of tiles required = 1,080,000 cm² / 144 cm² = 7500 tiles

11. Length of the room = 8 m

Breadth of the room = 6 m

Height of the room = 4 m

$d^2 = \text{Length}^2 + \text{Breadth}^2 + \text{Height}^2$

$d^2 = 8^2 + 6^2 + 4^2$

$d^2 = 64 + 36 + 16$

$d^2 = 116 + 16$

$d^2 = 132$

Taking the square root of both sides, we find:

$d = \sqrt{132}$

$d \approx 11.49$ m

Area of each wall = Length * Height (or Breadth * Height)

Area of each wall = 8 m * 4 m = 32 m²

Total area of the four walls = 2 * (Length * Height) + 2 * (Breadth * Height)

Total area of the four walls = 2 * (8 m * 4 m) + 2 * (6 m * 4 m)

Total area of the four walls = 2 * 32 m² + 2 * 24 m²

Total area of the four walls = 64 m² + 48 m²

Total area of the four walls = 112 m²

Therefore, the area of the four walls of the room is 112 square meters.

12. Cost of fencing = Perimeter of the field * Rate per meter

$$₹32000 = \text{Perimeter} * ₹16$$

Dividing both sides by ₹16, we get:

$$\text{Perimeter} = ₹32000 / ₹16 = 2000 \text{ meters}$$

$$\text{Side length} = \text{Perimeter} / 4 = 2000 \text{ meters} / 4 = 500 \text{ meters}$$

$$\text{Area of the square field} = \text{Side length} * \text{Side length} = 500 \text{ meters} * 500 \text{ meters} = 250000 \text{ square meters}$$

$$\text{Cost of reaping} = (\text{Area of the field} / 100) * \text{Rate per 100 square meters}$$

$$\text{Cost of reaping} = (250000 \text{ square meters} / 100) * ₹35$$

$$\text{Cost of reaping} = 2500 * ₹35 = ₹87500$$

Therefore, the cost of reaping the field is ₹87500.

13. Length of the conference room = 36 m

Breadth of the conference room = 24 m

Area allocated for doors and windows = 40 sq m

Cost of papering the walls = ₹4800

Rate per square meter of papering = ₹9.6

Total area of the walls = (Length × Breadth) - Area allocated for doors and windows

$$\text{Total area of the walls} = (36 \text{ m} \times 24 \text{ m}) - 40 \text{ sq m}$$

$$\text{Total area of the walls} = 864 \text{ sq m} - 40 \text{ sq m}$$

$$\text{Total area of the walls} = 824 \text{ sq m}$$

Height of the wall = Total area of the walls / Length of the wall

$$\text{Height of the wall} = 824 \text{ sq m} / 36 \text{ m}$$

$$\text{Height of the wall} \approx 22.89 \text{ m}$$

Therefore, the height of the wall in the conference room is approximately 22.89 meters.

14. Let's assume the length of the rectangle is $4x$, and the breadth is $3x$

Perimeter of the rectangle = 280 m

$$\text{Perimeter} = 2 * (\text{Length} + \text{Breadth})$$

$$280 = 2 * (4x + 3x)$$

Simplifying the equation:

$$280 = 2 * 7x$$

$$280 = 14x$$

$$x = 280 / 14$$

$$x = 20$$

$$\text{Length} = 4x = 4 * 20 = 80 \text{ m}$$

$$\text{Breadth} = 3x = 3 * 20 = 60 \text{ m}$$

$$\text{Area} = 80 \text{ m} * 60 \text{ m} = 4800 \text{ square meters}$$

Therefore, the area of the rectangle is 4800 square meters.

15. Length of the room = 9 m

Breadth of the room = 8 m

Height of the room = 6.5 m

Dimensions of the door = 2 m × 1.5 m

Dimensions of each window = 1.5 m × 1 m

Total wall area = 2 * (Length * Height + Breadth * Height)

Total wall area = 2 * (9 m * 6.5 m + 8 m * 6.5 m)

Total wall area = 2 * (58.5 m² + 52 m²)

Total wall area = 2 * 110.5 m²

Total wall area = 221 m²

Area of the door = Length * Breadth = 2 m * 1.5 m = 3 m²

Area of each window = Length * Breadth = 1.5 m * 1 m = 1.5 m²

Total area of the windows = 3 windows * 1.5 m² = 4.5 m²

Effective wall area = Total wall area - (Area of the door + Total area of the windows)

Effective wall area = 221 m² - (3 m² + 4.5 m²)

Effective wall area = 221 m² - 7.5 m²

Effective wall area = 213.5 m²

Cost of whitewashing = Effective wall area * Rate per square meter

Cost of whitewashing = 213.5 m² * ₹6/m²

Cost of whitewashing = ₹1281

Therefore, the cost of whitewashing the walls at ₹6 per square meter is ₹1281.

16. Length of the rectangle = 35 cm

Breadth of the rectangle = 24 cm

2 * (35 cm + 24 cm) = 4s

Simplifying the equation:

2 * 59 cm = 4s

118 cm = 4s

s = 118 cm / 4

s = 29.5 cm

Area of square = side²

Area of square = (29.5 cm)²

Area of square = 870.25 cm²

Therefore, the side length of the square is 29.5 cm and the area of the square is 870.25 cm².

17. Length of the square floor = 20 m

Cost of painting 1 meter of border = ₹6

Perimeter = 4 * Side

Perimeter of the square floor = 4 * 20 m = 80 m

Cost of painting the border = 80 m * ₹6/m

Cost of painting the border = ₹480

Therefore, it would cost ₹480 to paint the entire border on the floor.

Exercise 15.2

1. Length of the playground = 50 m

Width of the playground = 40 m

Width of the path = 3 m

Area of the larger rectangle = $(50 \text{ m} + 2 * 3 \text{ m}) * (40 \text{ m} + 2 * 3 \text{ m})$

Area of the larger rectangle = $(50 \text{ m} + 6 \text{ m}) * (40 \text{ m} + 6 \text{ m})$

Area of the larger rectangle = $56 \text{ m} * 46 \text{ m}$

Area of the larger rectangle = 2576 m^2

Area of the playground = Length * Width

Area of the playground = $50 \text{ m} * 40 \text{ m}$

Area of the playground = 2000 m^2

Area of the path = $2576 \text{ m}^2 - 2000 \text{ m}^2$

Area of the path = 576 m^2

Therefore, the area of the path is 576 square meters.

2.Length of the field including the path = $44 + 2(4) = 52$ meters

Breadth of the field including the path = $30 + 2(4) = 38$ meters

Area of the field including the path = $52 * 38 = 1976$ square meters

Area of the field = $44 * 30 = 1320$ square meters

Area of the path = Area of the field including the path - Area of the field

Area of the path = $1976 - 1320 = 656$ square meters

Therefore, the area of the path is 656 square meters.

3.Length of the field excluding the path = $25 - 2(1.2) = 22.6$ meters

Breadth of the field excluding the path = $15 - 2(1.2) = 12.6$ meters

Area of the field excluding the path = $22.6 * 12.6 = 284.76$ square meters

Length of the field including the path = 25 meters

Breadth of the field including the path = 15 meters

Area of the field including the path = $25 * 15 = 375$ square meters

Area of the path = Area of the field including the path - Area of the field excluding the path

Area of the path = $375 - 284.76 = 90.24$ square meters

Cost of construction of 1 square meter = ₹ 3

Cost of construction of 90.24 square meters = $3 * 90.24 = ₹ 270.72$

Therefore, the area of the path is 90.24 square meters and the cost of construction is ₹ 270.72.

4. (1) Length of the hall = 25 m

Width of the hall = 20 m

Width of the verandah = 4 m

Length of the larger rectangle = $25 \text{ m} + 2 * 4 \text{ m}$

Length of the larger rectangle = $25 \text{ m} + 8 \text{ m}$

Length of the larger rectangle = 33 m

Width of the larger rectangle = $20 \text{ m} + 2 * 4 \text{ m}$

Width of the larger rectangle = $20 \text{ m} + 8 \text{ m}$

Width of the larger rectangle = 28 m

Area of the larger rectangle = $33 \text{ m} * 28 \text{ m}$

Area of the larger rectangle = 924 m^2

Area of the hall = $25 \text{ m} * 20 \text{ m}$

Area of the hall = 500 m^2

Area of the verandah = $924 \text{ m}^2 - 500 \text{ m}^2$

Area of the verandah = 424 m^2

Therefore, the area of the verandah is 424 square meters.

(2) Cost per square meter = ₹15

Cost of flooring the verandah = Area of the verandah * Cost per square meter

Cost of flooring the verandah = $424 \text{ m}^2 * ₹15/\text{m}^2$

Cost of flooring the verandah = ₹6360

Therefore, the area of the verandah is 424 square meters and the cost of flooring it is ₹6360.

5. Length of the park including the road = $150 + 2(5) = 160$ meters

Breadth of the park including the road = $60 + 2(5) = 70$ meters

Area of the park including the road = $160 * 70 = 11200$ square meters

Length of the park = 150 meters

Breadth of the park = 60 meters

Area of the park = $150 * 60 = 9000$ square meters

Area of the road = Area of the park including the road - Area of the park

Area of the road = $11200 - 9000 = 2200$ square meters

Cost of cementing 1 square meter = ₹ 4.50

Cost of cementing 2200 square meters = $4.5 * 2200 = ₹ 9900$

Therefore, the cost of cementing the park is ₹ 9900.

6. Side of the square flower bed = 3 meters 45 centimeters = 3.45 meters

Width of the strip dug around the bed = 15 centimeters = 0.15 meters

Length of the enlarged flower bed = $3.45 + 2(0.15) = 3.75$ meters

Breadth of the enlarged flower bed = $3.45 + 2(0.15) = 3.75$ meters

Area of the enlarged flower bed = Length of the enlarged flower bed * Breadth of the enlarged flower bed

Area of the enlarged flower bed = $3.75 * 3.75 = 14.0625$ square meters

Area of the flower bed = $3.45 * 3.45 = 11.9025$ square meters

Increase in the area of the flower bed = Area of the enlarged flower bed - Area of the flower bed

Increase in the area of the flower bed = $14.0625 - 11.9025 = 2.16$ square meters

Therefore, the area of the enlarged flower bed is 14.0625 square meters and the increase in the area of the flower bed is 2.16 square meters.

7. Length of the roll chart paper = 15 meters 20 centimeters = 15.20 meters

Breadth of the roll chart paper = 8 meters 30 centimeters = 8.30 meters

Area of the roll chart paper = Length of the roll chart paper * Breadth of the roll chart paper

Area of the roll chart paper = $15.20 * 8.30 = 126.16$ square meters

Length of the square chart paper = 5 meters 50 centimeters = 5.50 meters

Area of the square chart paper = Length of the square chart paper * Length of the square chart paper

Area of the square chart paper = $5.50 * 5.50 = 30.25$ square meters

Area of 4 square chart papers = $4 * 30.25 = 121$ square meters

Paper left = Area of the roll chart paper - Area of 4 square chart papers

Paper left = $126.16 - 121 = 5.16$ square meters

Therefore, 5.16 square meters of paper will be left.

8. Length of the rectangular ground = 46 m

Width of the rectangular ground = 35 m

Width of the path = 4 m

Rate of paving the path = ₹ 20 per sq metre

Area of the rectangular ground = $46 \text{ m} * 35 \text{ m}$

Area of the rectangular ground = 1610 sq m

Width of the inner lawn = $35 \text{ m} - 2 * 4 \text{ m}$

Width of the inner lawn = $35 \text{ m} - 8 \text{ m}$

Width of the inner lawn = 27 m

Length of the inner lawn = $46 \text{ m} - 2 * 4 \text{ m}$

Length of the inner lawn = $46 \text{ m} - 8 \text{ m}$

Length of the inner lawn = 38 m

Area of the inner lawn = $38 \text{ m} * 27 \text{ m}$

Area of the inner lawn = 1026 sq m

Area of the path = $1610 \text{ sq m} - 1026 \text{ sq m}$

Area of the path = 584 sq m

Cost of paving the path = Area of the path * Rate per sq metre

Cost of paving the path = $584 \text{ sq m} * ₹ 20/\text{sq m}$

Cost of paving the path = ₹ 11680

Therefore, the area of the inner lawn is 1026 sq meters, the area of the path is 584 sq meters, and the cost of paving the path is ₹ 11680.

9. Length of the room = 9.5 meters

Breadth of the room = 6 meters

Width of the verandah = 1.25 meters

Length of the verandah = Length of the room + $2 * \text{Width of the verandah}$

Length of the verandah = $9.5 + 2(1.25) = 12$ meters

Breadth of the verandah = Breadth of the room + $2 * \text{Width of the verandah}$

Breadth of the verandah = $6 + 2(1.25) = 8.5$ meters

Area of the verandah = Length of the verandah * Breadth of the verandah

Area of the verandah = $12 * 8.5 = 102$ square meters

Cost of cementing 1 square meter = ₹ 80

Cost of cementing 102 square meters = $₹ 80 * 102 = ₹ 8160$

Therefore, the cost of cementing the floor of the verandah is ₹ 8160.

10. Length of the garden = 56 m

Width of the garden = 48 m

Side of each square flower bed = 4 m

Area of the garden = $56 \text{ m} * 48 \text{ m}$

Area of the garden = 2688 m^2

Area of one square flower bed = $4 \text{ m} * 4 \text{ m}$

Area of one square flower bed = 16 m^2

Total area of the flower beds = $16 \text{ m}^2 * 4$

Total area of the flower beds = 64 m^2

Area covered with grass = $2688 \text{ m}^2 - 64 \text{ m}^2$

Area covered with grass = 2624 m^2

Therefore, the area covered with grass in the garden is 2624 square meters.

11. Area of the cardboard before the strip is cut out = $30 * 20 = 600$ square cm

Length of the cardboard after the strip is cut out = $30 - 2(4) = 22$ cm

Width of the cardboard after the strip is cut out = Width of the cardboard - $2 * \text{Width of the strip cut out}$

Width of the cardboard after the strip is cut out = $20 - 2(4) = 12$ cm

Area of the cardboard after the strip is cut out = $22 * 12 = 264$ square cm

Area of the strip cut out = $(30 + 20) * 4 = 200$ square cm

Therefore, the area of the remaining sheet is 264 square cm and the area of the strip cut out is 200 square cm.

12. Length of the cardboard = 45 cm

Width of the cardboard = 20 cm

Width of the strip cut out = 4.5 cm

Length of the cardboard after the strip is cut out = $45 - 2(4.5) = 36$ cm

Width of the cardboard after the strip is cut out = $20 - 2(4.5) = 11$ cm

Area of the cardboard before the strip is cut out = $45 * 20 = 900$ square cm

Area of the cardboard after the strip is cut out = $36 * 11 = 396$ square cm

Area of the strip cut out = $(45 + 20) * 4.5 = 337.5$ square cm

Therefore, the area of the remaining sheet is 396 square cm and the area of the strip cut out is 337.5 square cm.

13. Length of the field = 40 m

Width of the field = 25 m

Width of the path = 2 m

Length of the inner field = $40 \text{ m} - 2 * 2 \text{ m}$

Length of the inner field = $40 \text{ m} - 4 \text{ m}$

Length of the inner field = 36 m

Width of the inner field = $25 \text{ m} - 2 * 2 \text{ m}$

Width of the inner field = $25 \text{ m} - 4 \text{ m}$

Width of the inner field = 21 m

Area of the path = $(40 \text{ m} * 25 \text{ m}) - (36 \text{ m} * 21 \text{ m})$

Area of the path = $1000 \text{ m}^2 - 756 \text{ m}^2$

Area of the path = 244 m^2

Cost of constructing the path = $244 \text{ m}^2 * ₹ 3.20/\text{m}^2$

Cost of constructing the path = ₹ 780.80

Therefore, the area of the path is 244 square meters and the cost of constructing the path is ₹ 780.80.

14. Total area of lawn taking paths is 60×45 , i.e.

$$2700 \text{ m}^2$$

subtract area of paths

$$2700 - (60 \times 3.5 + 45 \times 4.5)$$

$$= 2700 - 367.5$$

$$= 2332.5 \text{ m}^2$$

paths are merging in between, therefore, we took the area in between double. so add that area once

$$2332.5 + 3.5 \times 3.5$$

$$2332.5 + 12.25$$

$$= 2344.75 \text{ m}^2$$

Area of remaining portion is 2344.75 m^2

15. The area of the playground is $140 \times 75 = 10500 \text{ sq.m.}$

The width of the path is 4 m, so the length of the playground with the path is $140 + 2 \times 4 = 148 \text{ m}$, and the width is $75 + 2 \times 4 = 83 \text{ m}$

The area of the path is $(148 \times 83) - 10500 = 1244 \text{ sq.m.}$

The cost of levelling the path is $1244 \times 2.5 = ₹ 4460$.

The area of the remaining portion is $10500 - 1244 = 9256 \text{ sq.m.}$

The cost of installing grapes on the remaining portion is $9256 \times 3.25 = ₹ 34125$.

So the cost of levelling the path is ₹ 4460 and the cost of installing grapes on the remaining portion is ₹ 34125.

Exercise 15.3

1.(1) base = 30 m, height = 1.7 m

$$\text{Area} = \text{base} \times \text{height} = 30 \text{ m} \times 1.7 \text{ m} = 51 \text{ m}^2$$

(2) base = 16 dm, height = 26 dm

Note: 1 dm = 0.1 m

$$\text{So, base} = 16 \text{ dm} \times 0.1 \text{ m/dm} = 1.6 \text{ m}$$

$$\text{height} = 26 \text{ dm} \times 0.1 \text{ m/dm} = 2.6 \text{ m}$$

$$\text{Area} = \text{base} \times \text{height} = 1.6 \text{ m} \times 2.6 \text{ m} = 4.16 \text{ m}^2$$

(3) base = 21 m, height = 15 m

$$\text{Area} = \text{base} \times \text{height} = 21 \text{ m} \times 15 \text{ m} = 315 \text{ m}^2$$

(4) base = 18 cm, height = 6 cm

Note: 1 cm = 0.01 m

$$\text{So, base} = 18 \text{ cm} \times 0.01 \text{ m/cm} = 0.18 \text{ m}$$

$$\text{height} = 6 \text{ cm} \times 0.01 \text{ m/cm} = 0.06 \text{ m}$$

$$\text{Area} = \text{base} \times \text{height} = 0.18 \text{ m} \times 0.06 \text{ m} = 0.0108 \text{ m}^2$$

2. Side = 56 cm

Height = 30 cm

$$\text{Area} = \text{Side} \times \text{Height} = 56 \text{ cm} \times 30 \text{ cm} = 1680 \text{ cm}^2$$

Therefore, the area of the parallelogram is 1680 cm^2 .

3. Base = 32 cm

Height = 16.5 cm

Area = Base * Height = 32 cm * 16.5 cm = 528 cm²

Therefore, the area of the parallelogram is 528 cm².

4. Area = 640 sq cm

Base = 4h

640 = (4h) * h

640 = 4h²

h² = 640/4

h² = 160

h = √160

Taking the square root of both sides, we get:

h ≈ 12.65 cm

The base of the parallelogram is four times the height, so:

Base = 4h ≈ 4 * 12.65 ≈ 50.6 cm

Therefore, the height of the parallelogram is approximately 12.65 cm, and the base is approximately 50.6 cm.

5. One side = 20 cm

Corresponding altitude = 12 cm

Height to adjacent side = 10 cm

20 cm * 12 cm = x cm * 10 cm

Simplifying this equation, we get:

240 cm² = 10x cm²

24 = x

Therefore, the length of the adjacent side of the parallelogram is 24 cm.

6. Let the base be x

Then height = x/3

Area of llgm = 108cm²

b*h = 108cm²

x*x/3 = 108

x² = 108*3

x = 324

x = 18cm

Base of parallogram = 18cm

Height of the parallogram = x/3

= 18/3

= 6cm

7. the base is CD, which is given as 10 cm, and the area is given as 40 cm². Therefore, we have:

40 = 10 * x

Dividing both sides of the equation by 10, we get:

$$4 = x$$

So, the length of AT is 4 cm.

$$8. \text{ Area} = 15 * 9$$

We are also given that the area of the parallelogram is the same as if we were to use the other side (12 m) and its corresponding altitude (h). Therefore, we have:

$$\text{Area} = 12 * h$$

$$15 * 9 = 12 * h$$

Simplifying this equation, we find:

$$135 = 12h$$

Dividing both sides by 12, we get:

$$h = 11.25$$

Therefore, the length of the altitude corresponding to the other side (12 m) is 11.25 m.

$$9. \text{ So, the area of each tile is: } 3 \text{ cm} * 4.2 \text{ cm} = 12.6 \text{ cm}^2.$$

$$\text{Since there are 210 tiles, the total area of all the tiles is: } 210 * 12.6 \text{ cm}^2 = 2646 \text{ cm}^2.$$

$$\text{So, the total cost of paving the tiles is: } 2646 \text{ cm}^2 * ₹ 2.50/\text{cm}^2 = ₹ 6615.$$

Therefore, the cost of paving the tiles at ₹ 2.50 per square centimeter is ₹ 6615.

$$10. \text{ So, the area of each tile is: } 10 \text{ cm} * 6 \text{ cm} = 60 \text{ cm}^2.$$

$$\text{Since there are 5000 tiles, the total area of all the tiles is: } 5000 * 60 \text{ cm}^2 = 300,000 \text{ cm}^2.$$

$$\text{the total area in square decimeters is } 300,000 \text{ cm}^2 / 100 = 3000 \text{ dm}^2.$$

$$\text{So, the total cost of polishing the design is: } 3000 \text{ dm}^2 * ₹ 3.20/\text{dm}^2 = ₹ 9,600.$$

Therefore, the cost of polishing the design at the rate of ₹ 3.20 per square decimeter is ₹ 9,600.

Exercise 15.4

$$1. (1) 15 \text{ cm}^2 \quad (2) 36 \text{ cm}^2 \quad (3) 37.5 \text{ cm}^2 \quad (4) 35 \text{ cm}^2$$

$$2. \text{Area} = (\text{base} * \text{height}) / 2$$

$$\text{Area} = (20 \text{ cm} * 30 \text{ cm}) / 2$$

$$\text{Area} = (600 \text{ cm}^2) / 2$$

$$\text{Area} = 300 \text{ cm}^2$$

Therefore, the area of the triangle is 300 square centimeters.

$$3. (1) 27 \text{ sq cm} \quad (2) 30 \text{ cm} \quad (3) 4 \text{ dm}$$

$$4. \text{Area} = (\text{base} * \text{height}) / 2$$

$$\text{height} = (2 * \text{Area}) / \text{base}$$

$$\text{height} = (2 * 168 \text{ cm}^2) / 21 \text{ cm}$$

$$\text{height} = (336 \text{ cm}^2) / 21 \text{ cm}$$

$$\text{height} = 16 \text{ cm}$$

Therefore, the height of the triangle is 16 cm.

5. Length of rectangle = 18 cm

Area of rectangle = 126 cm²

Breadth of rectangle = Area / Length

Breadth of rectangle = 126 cm² / 18 cm

Breadth of rectangle = 7 cm

Base of triangle = 44 cm

Height of triangle = Breadth of rectangle = 7 cm

Area of triangle = (Base * Height) / 2

Area of triangle = (44 cm * 7 cm) / 2

Area of triangle = (308 cm²) / 2

Area of triangle = 154 cm²

Therefore, the area of the triangle is 154 square centimeters.

6. Area = (base * height) / 2

Area = (24 cm * 14 cm) / 2

Area = (336 cm²) / 2

Area = 168 cm²

Cost = Area * Cost per sq cm

Cost = 168 cm² * ₹ 3.50/cm²

Cost = ₹ 588

Therefore, the cost of digging a triangular piece of land and painting it would be ₹ 588.

7. Area = (base * altitude) / 2

altitude = (2 * Area) / base

Substituting the given values:

altitude = (2 * 520 cm²) / 16 cm

altitude = (1040 cm²) / 16 cm

altitude = 65 cm

Therefore, the altitude of the triangle is 65 cm.

8. base of the triangle is three times the altitude, the base would be 3x meters.

Area = (base * altitude) / 2

Substituting the given values, we have:

Area = (3x * x) / 2

Area = (600 / 25) * 10 m²

Area = 240 m²

(3x * x) / 2 = 240

3x * x = 480

x² = 480 / 3

x² = 160

x = √160

$$x \approx 12.65$$

Therefore, the altitude of the triangle is approximately 12.65 meters.

$$9. a = 18\text{cm}$$

$$b = 15\text{cm}$$

$$c = 15\text{cm}$$

$$\text{semi-perimeter of the isosceles triangle} = (18 + 15 + 15)/2$$

$$= 48/2$$

$$= 24\text{cm}$$

$$\text{area of the triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{24(24-18)(24-15)(24-15)}$$

$$= \sqrt{(24 \times 6 \times 9 \times 9)}$$

$$= \sqrt{(2 \times 2 \times 2 \times 3 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3)}$$

$$= \sqrt{(2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3)}$$

$$= 2 \times 2 \times 3 \times 3 \times 3$$

$$= 108\text{cm}^2$$

$$10. \text{Area of triangular field} = 350 \text{ cm}$$

$$\text{Base of the triangle} = 28 \text{ cm}$$

$$\text{Area of the triangular field} = \frac{1}{2} \text{ base} \times \text{height}$$

$$350 = \frac{1}{2} \times 28 \times h$$

$$350 = 14 \times h \quad h = 350/14$$

$$h = 25$$

$$11. \text{Area} = (\text{base} \times \text{altitude}) / 2$$

$$130 \text{ m}^2 = (x \times 4x) / 2$$

$$130 \text{ m}^2 = 2x^2$$

Dividing both sides by 2:

$$65 \text{ m}^2 = x^2$$

Taking the square root of both sides:

$$x = \sqrt{65 \text{ m}^2}$$

$$x \approx 8.06 \text{ m}$$

Therefore, the base of the triangle is approximately 8.06 meters.

To find the altitude, we multiply the base by 4:

$$\text{altitude} = 4 \times 8.06 \text{ m}$$

$$\text{altitude} \approx 32.24 \text{ m}$$

Therefore, the altitude of the triangle is approximately 32.24 meters.

$$12. \text{Area of triangle} = \frac{1}{2} \text{ base} \times \text{height}$$

$$\text{Area of triangle 1} = \frac{1}{2} \times 6 \times 5$$

$$\text{Area of triangle 1} = 15 \text{ cm}^2$$

Area of triangle 1 = area of right angled triangle

15 cm² = area of right angled triangle

Area of right angled triangle = $\frac{1}{2}$ x product of sides containing the right angle

$$\frac{1}{2} \times 2.5 \text{ cm} \times b = 15 \text{ cm}^2$$

$$2.5 \times b = 30 \text{ cm}$$

$$b = 12 \text{ cm}$$

Hence the other side of the triangle is 12 cm.

13. Area of square = s^2

Here side = 40m

$$\text{So, } s^2 = (40)^2 = 1600 \text{m}^2$$

Area of triangle = $\frac{1}{2} \times B \times H$

Here height = 64m

Base = B

$$\text{So, } \frac{1}{2} \times B \times H = \frac{1}{2} \times B \times 64$$

$$1600 = \frac{1}{2} \times B \times 64$$

$$1600 \times 2 = B$$

$$64$$

$$50 \text{m}^2 = B$$

14. Area = (base * height) / 2

Area of triangle ABD = (AD * DE) / 2

$$= (120 \text{ cm} * 38 \text{ cm}) / 2$$

$$= 2280 \text{ cm}^2$$

Area of triangle BCF = (BC * BF) / 2

$$= (120 \text{ cm} * 46 \text{ cm}) / 2$$

$$= 2760 \text{ cm}^2$$

Area of quadrilateral ABCD = Area of triangle ABD + Area of triangle BCF

$$= 2280 \text{ cm}^2 + 2760 \text{ cm}^2$$

$$= 5040 \text{ cm}^2$$

Therefore, the area of the quadrilateral ABCD is 5040 square centimeters.

15. (1) a (2) d (3) c (4) b

CHAPTER 16

Exercise 16.1

1.(1) Radius = 91 cm

$$\text{Circumference} = 2 * \pi * 91 \text{ cm}$$

$$\approx 572.93 \text{ cm}$$

(2) Radius = 10.5 cm

$$\text{Circumference} = 2 * \pi * 10.5 \text{ cm}$$

$$\approx 65.97 \text{ cm}$$

(3) Diameter = 24.5 dm

Radius = Diameter / 2

= 24.5 dm / 2

= 12.25 dm

Circumference = $2 * \pi * 12.25$ dm

≈ 76.91 dm

(4) Diameter = 189 cm

Radius = Diameter / 2

= 189 cm / 2

= 94.5 cm

Circumference = $2 * \pi * 94.5$ cm

≈ 594.18 cm

(5) Radius = 28 cm

Circumference = $2 * \pi * 28$ cm

≈ 175.93 cm

2.(1) Circumference = 66 cm

Diameter = $66 \text{ cm} / (22/7)$

= $66 \text{ cm} * (7/22)$

≈ 21 cm

(2) Circumference = 196 m

Diameter = $196 \text{ m} / (22/7)$

= $196 \text{ m} * (7/22)$

≈ 62.91 m

(3) Circumference = 24 m

Diameter = $24 \text{ m} / (22/7)$

= $24 \text{ m} * (7/22)$

≈ 7.71 m

3. Circumference = $2 * \pi * \text{radius}$

Area = $\pi * \text{radius}^2$

$\text{radius}^2 = \text{Area} / \pi$

$\text{radius}^2 = 616 \text{ m}^2 / (22/7)$

$\text{radius}^2 \approx 98.857$

Taking the square root of both sides:

$\text{radius} \approx \sqrt{98.857}$

$\text{radius} \approx 9.942$

Now, we can substitute the radius into the circumference formula:

Circumference = $2 * \pi * \text{radius}$

Circumference $\approx 2 * (22/7) * 9.942$

Circumference ≈ 62.496 m

Therefore, the circumference of the circular plot of land is approximately 62.496 meters.

4. Let's assume the diameters of the two circles are $3x$ and $7x$, respectively.

The formula for the circumference of a circle is:

$$\text{Circumference} = 2 * \pi * \text{radius}$$

The radius of the first circle is half its diameter, so it is $3x/2$.

The radius of the second circle is half its diameter, so it is $7x/2$.

$$\text{Circumference}_1 = 2 * \pi * (3x/2)$$

$$= 3\pi x$$

$$\text{Circumference}_2 = 2 * \pi * (7x/2)$$

$$= 7\pi x$$

$$\text{Circumference}_1 : \text{Circumference}_2 = 3 : 7$$

Therefore, the ratio of the circumferences of the two circles is 3:7.

5. Circumference = $\pi * \text{diameter}$

$$\text{Circumference} = \pi * 28 \text{ cm}$$

$$\text{Circumference} \approx 3.14 * 28 \text{ cm}$$

$$\approx 87.92 \text{ cm}$$

Number of revolutions = Total distance / Distance covered in one revolution

$$\text{Number of revolutions} = 704 \text{ m} / (87.92 \text{ cm}/100 \text{ cm})$$

$$= 704 \text{ m} / 0.8792 \text{ m}$$

$$= 800$$

Therefore, the wheel will revolve 800 times in order to cover a distance of 704 m.

6. Circumference = $2 * \pi * \text{radius}$

For the first circle with a circumference of 66 cm:

$$66 \text{ cm} = 2 * \pi * r_1$$

For the second circle with a circumference of 132 cm:

$$132 \text{ cm} = 2 * \pi * r_2$$

$$r_1 = 66 \text{ cm} / (2 * \pi)$$

$$r_2 = 132 \text{ cm} / (2 * \pi)$$

Calculating the values:

$$r_1 \approx 10.53 \text{ cm}$$

$$r_2 \approx 21.06 \text{ cm}$$

The difference between their radii is:

$$r_2 - r_1 \approx 21.06 \text{ cm} - 10.53 \text{ cm} \approx 10.53 \text{ cm}$$

Therefore, the difference between the radii of the two circles is approximately 10.53 cm.

7. Let's assume the width of the track is 'w' meters.

$$\text{Circumference} = 2 * \pi * \text{radius}$$

$$220 \text{ m} = 2 * \pi * \text{radius_inner}$$

Simplifying the equation, we find:

$$\text{radius_inner} = 220 \text{ m} / (2 * \pi)$$

Similarly, for the outer circle, the circumference is 880 m:

$$880 \text{ m} = 2 * \pi * \text{radius_outer}$$

Simplifying the equation, we find:

$$\text{radius_outer} = 880 \text{ m} / (2 * \pi)$$

$$\text{Width} = (880 \text{ m} / (2 * \pi)) - (220 \text{ m} / (2 * \pi))$$

Simplifying further:

$$\text{Width} = 660 \text{ m} / (2 * \pi)$$

Therefore, the width of the track is $330 / \pi \approx 104.7$ meters.

8. Distance traveled = Circumference * Number of revolutions

Given that the distance traveled is 30 km (30,000 meters), we have:

$$30,000 \text{ meters} = \text{Circumference} * 1,500 \text{ revolutions}$$

$$\text{Circumference} = 30,000 \text{ meters} / 1,500 \text{ revolutions}$$

$$\text{Circumference} = 20 \text{ meters}$$

$$\text{Circumference} = \pi * \text{diameter}$$

$$20 \text{ meters} = \pi * \text{diameter}$$

$$\text{diameter} = 20 \text{ meters} / \pi$$

$$\text{diameter} \approx 6.37 \text{ meters}$$

Therefore, the diameter of the bike's wheel is approximately 6.37 meters.

9. diameter [d] of the plot=28m

$$\text{radius [r] of the plot} = 28/2 = 14\text{m}$$

$$\text{Width of the path} = 1.75\text{m}$$

$$\text{Hence, outer radius [R]} = 14 + 1.75 = 15.75\text{m}$$

$$\text{outerArea concentric circles } A = \pi(R^2 - r^2)$$

$$\text{Area of the path} = \pi * (R^2 - r^2)$$

$$22/7 * (15.75 + 14)(15.75 - 14).$$

$$a^2 - b^2 = (a+b)(a-b) \text{ identity}$$

$$22/7 * 29.75 * 1.75$$

$$22/7 * 52.0625$$

$$163.625 \text{ sq.m}$$

$$\text{Cost of gravelling} = \text{Rs. } 5 \text{ per sq. m}$$

Therefore total cost of gravelling the

$$\text{path} = 163.625 * 5 = \text{Rs. } 818.125$$

Approx Rs.818.13

10. the total length of the wire used to form the triangle is $3 * 13.2 \text{ cm} = 39.6 \text{ cm}$.

The formula for the circumference of a circle is:

$$\text{Circumference} = 2 * \pi * \text{radius}$$

Since the diameter is twice the radius, we can rewrite the formula as:

$$\text{Circumference} = \pi * \text{diameter}$$

$$39.6 \text{ cm} = \pi * \text{diameter}$$

$$\text{diameter} = 39.6 \text{ cm} / \pi$$

$$\text{diameter} \approx 39.6 \text{ cm} / 3.14$$

$$\approx 12.59 \text{ cm}$$

Therefore, the diameter of the circular ring formed by bending the wire in the shape of an equilateral triangle is approximately 12.59 cm

11. Width of footpath = $60 \text{ cm} / 100 = 0.6 \text{ m}$

The distance covered by the cow in each step is 44 cm, or 0.44 m

Circumference of outer circle = Distance covered in one step * Number of steps

$$\text{Circumference of outer circle} = 0.44 \text{ m} * 200 = 88 \text{ m}$$

$$\text{Circumference} = 2 * \pi * \text{radius}$$

$$88 \text{ m} = 2 * \pi * R$$

Dividing both sides by 2π :

$$R = 88 \text{ m} / (2 * \pi)$$

$$\text{Radius of inner field} = (88 \text{ m} / (2 * \pi)) - 0.6 \text{ m}$$

$$\text{Radius of inner field} \approx 13.99 \text{ m} - 0.6 \text{ m} \approx 13.39 \text{ m}$$

Therefore, the radius of the inner field is approximately 13.39 meters

12. $C = 2\pi r$

Substituting the given values, we get:

$$C = 2\pi(56) = 112\pi$$

Let the side of the square be 's'. Since there are four sides, we can write:

$$4s = 112\pi$$

Simplifying, we get:

$$s = 28\pi$$

$$s \approx 87.96 \text{ cm (approximately)}$$

13. circumference of circle = 2π

$$= 2\pi(56) = 2 \times (22/7) \times 56 = 352 \text{ cm}$$

Circumference of circle = perimeter of square = 352 cm

$$\text{perimeter of square} = 4a$$

$$4a = 352$$

$$a = 352/4 = 88 \text{ cm.}$$

$$C = 2\pi r$$

Substituting the given values, we get:

$$C = 2\pi(6.3) = 12.6\pi$$

$$12.6\pi/3 = 4.2\pi$$

Simplifying, we get:

$$4.2\pi = 13.2 \text{ cm}$$

Therefore, the side of the equilateral triangle is approximately 13.2 cm.

14. Circumference = $\pi * \text{diameter}$

$$\text{Circumference} = \pi * 56 \text{ m}$$

$$\text{Circumference} \approx 3.14 * 56 \text{ m}$$

$$\text{Circumference} \approx 175.84 \text{ m}$$

Distance = Circumference * Number of revolutions

$$\text{Distance} = 175.84 \text{ m} * 500$$

$$\text{Distance} = 87,920 \text{ m}$$

Converting the distance to different units:

$$\text{Distance in centimeters: } 87,920 \text{ m} * 100 \text{ cm/m} = 8,792,000 \text{ cm}$$

$$\text{Distance in kilometers: } 87,920 \text{ m} / 1000 \text{ m/km} = 87.92 \text{ km}$$

$$15. \text{ Circumference} = \pi * \text{diameter}$$

$$\text{Circumference} = \pi * 144 \text{ cm}$$

$$\text{Circumference} \approx 3.14 * 144 \text{ cm}$$

$$\text{Circumference} \approx 452.16 \text{ cm}$$

$$\text{Total distance} = 24 \text{ km} * 100,000 \text{ cm/km}$$

$$\text{Total distance} = 2,400,000 \text{ cm}$$

$$\text{Number of revolutions} = 2,400,000 \text{ cm} / 452.16 \text{ cm}$$

$$\text{Number of revolutions} \approx 5304.47$$

Therefore, the wheel will revolve approximately 5304.47 times in order to cover a distance of 24 km.

Exercise 16.2

1.(1) For a radius of 0.35 m, we have:

$$A = \pi(0.35)^2 \approx 0.385 \text{ m}^2$$

(2) For a radius of 21 cm, we have:

$$A = \pi(21)^2 \approx 1386 \text{ cm}^2$$

(3) For a radius of 28 cm, we have:

$$A = \pi(28)^2 \approx 2464 \text{ cm}^2$$

(4) For a radius of 0.42 dm, we have:

$$A = \pi(0.42)^2 \approx 0.5544 \text{ dm}^2$$

2.(1) If the diameter is 56 cm, the radius is:

$$r = 56 / 2 = 28 \text{ cm}$$

$$A = \pi(28)^2 \approx 2464 \text{ cm}^2$$

(2) If the diameter is 5.4 m, the radius is:

$$r = 5.4 / 2 = 2.7 \text{ m}$$

$$A = \pi(2.7)^2 \approx 22.91 \text{ m}^2$$

(3) If the diameter is 210 mm, the radius is:

$$r = 210 / 2 = 105 \text{ mm}$$

$$A = \pi(105)^2 \approx 34650 \text{ mm}^2$$

(4) If the diameter is 4.2 km, the radius is:

$$r = 4.2 / 2 = 2.1 \text{ km}$$

$$A = \pi(2.1)^2 \approx 13.86 \text{ km}^2$$

$$3. \text{Area} = \pi * \text{radius}^2$$

Given that the area is 182 m^2 , we can rearrange the formula to solve for the radius:

$$\text{radius}^2 = \text{Area} / \pi$$

$$\text{radius}^2 = 182 \text{ m}^2 / \pi$$

$$\text{radius} = \sqrt{182 \text{ m}^2 / \pi}$$

$$\text{radius} \approx \sqrt{182 \text{ m}^2 / 3.14159}$$

$$\text{radius} \approx \sqrt{57.946934 \text{ m}^2}$$

$$\text{radius} \approx 7.61 \text{ m}$$

Therefore, the radius of the circle is approximately 7.61 meters when its area is 182 m².

$$4. \frac{22}{7} * r = 660$$

$$r = \frac{660 * 7}{44}$$

$$r = \frac{4620}{44}$$

$$r = 105$$

$$\text{Area} =$$

$$\frac{22}{7} * 105 * 105 = 24255017$$

$$34650$$

$$5. \text{Area} = \pi * \text{radius}^2$$

$$\text{Area}_{\text{outer}} = \pi * (42 \text{ cm})^2$$

$$\text{Area}_{\text{outer}} = 3.14159 * (42 \text{ cm})^2$$

$$\text{Area}_{\text{outer}} \approx 5541.77 \text{ cm}^2$$

$$\text{Area}_{\text{inner}} = \pi * (35 \text{ cm})^2$$

$$\text{Area}_{\text{inner}} = 3.14159 * (35 \text{ cm})^2$$

$$\text{Area}_{\text{inner}} \approx 3848.45 \text{ cm}^2$$

$$\text{Area}_{\text{ring}} \approx 5541.77 \text{ cm}^2 - 3848.45 \text{ cm}^2$$

$$\text{Area}_{\text{ring}} \approx 1694 \text{ cm}^2$$

$$6. \text{Radius} = \text{diameter} / 2$$

$$\text{Radius} = 126 / 2 = 63$$

$$\text{Area} = \pi r^2$$

$$\text{Area} = 3.14 * 63^2$$

$$\text{Area} = 12462.66 \text{ m}^2$$

$$\text{Width of path} = 6 \text{ m}$$

$$\text{Radius including path} = 6 + 63 = 69 \text{ m}$$

$$\text{Area} = 3.14 * 69^2$$

$$\text{Area} = 14949.54 \text{ m}^2$$

$$\text{Area of path} = 14949.54 - 12462.66$$

$$= 2486.88$$

$$\text{Cost} = 25 * 2486.88$$

$$\text{Cost} = 62172$$

7. Let's assume the radii of the two circles are r_1 and r_2 , and their areas are A_1 and A_2 ,

$$A_1 : A_2 = 9 : 16$$

$$\pi r_1^2 : \pi r_2^2 = 9 : 16$$

Canceling out π from both sides, we get:

$$r_1^2 : r_2^2 = 9 : 16$$

Taking the square root of both sides, we have:

$$r_1 : r_2 = \sqrt{9} : \sqrt{16}$$

$$r_1 : r_2 = 3 : 4$$

$$C_1 : C_2 = 3 : 4$$

8. Area of rectangular garden = Length * Width

$$\text{Area of rectangular garden} = 140 \text{ m} * 70 \text{ m}$$

$$\text{Area of rectangular garden} = 9800 \text{ square meters}$$

$$\text{Area of circular pond} = \pi * \text{radius}^2$$

$$\text{Area of circular pond} = \pi * (42 \text{ m})^2$$

$$\text{Area of circular pond} \approx 5541.78 \text{ square meters}$$

$$\text{Remaining area} = 9800 \text{ square meters} - 5541.78 \text{ square meters}$$

$$\text{Remaining area} \approx 4258.22 \text{ square meters}$$

$$\text{Cost} = 4258.22 \text{ square meters} * ₹ 6.50/\text{square meter}$$

$$\text{Cost} \approx ₹ 27,697.43$$

9. The radius of the circular field,

$$r = 14 \text{ m}$$

$$\text{Now, the area of the circular field} = \pi r^2 \text{ m}^2$$

$$= \pi * 14^2 \text{ m}^2$$

$$= 196 \pi \text{ m}^2$$

$$= (\text{radius of the circular field}) + (\text{width of the path})$$

$$= 14 + 1.75 \text{ m}$$

$$= 15.75 \text{ m}$$

$$\text{So, the area of the of the circular field along with the path around it} = \pi(15.75)^2 \text{ m}^2$$

$$= 248.0625 \pi \text{ m}^2$$

$$= (248.0625 - 196 \pi) \text{ m}^2$$

$$= 52.0625 \pi \text{ m}^2$$

$$\text{Thus, the cost of gravelling the path at ₹ 10 per m}^2$$

$$= ₹ (10 * 52.0625 \pi)$$

$$= ₹ (520.625 \pi)$$

$$= ₹ (520.625 * 22 / 7)$$

$$= ₹ 1636.25$$

10. The radius of the circular park,

$$r = 30 \text{ m}$$

$$\text{Now, the area of the circular park} = \pi r^2 \text{ m}^2$$

$$= \pi * 30^2 \text{ m}^2$$

$$= 900 \pi \text{ m}^2$$

Given that, the width of the road is 5 m

Now, the radius of the circular park along with the road around it

$$(\text{radius of the circular park}) + (\text{width of the road})$$

$$= 30 + 5 \text{ m}$$

$$= 35 \text{ m}$$

So, the area of the of the circular park along with the road around it

$$= \pi (35)^2 \text{ m}^2$$

$$= 1225 \pi \text{ m}^2$$

Thus, the area of the road

(the area of the circular park along with the road around it) - (the area of the circular park) m²

$$= (1225 \pi - 900 \pi) \text{ m}^2$$

$$= 325 \pi \text{ m}^2$$

Thus, the cost of metalling the road at ₹ 12

per m²

$$= ₹ (12 * 325 \pi)$$

$$= ₹ (3900 \pi)$$

$$= ₹ (3900 * 22 / 7)$$

$$= ₹ 12257.14$$

$$11. \text{ length} = 70 \text{ cm}$$

$$\text{width} = 50 \text{ cm}$$

So, its area (A)

$$= 70 * 50 \text{ cm}^2$$

$$= 3500 \text{ cm}^2$$

Diameter of the circircular disc = 42 cm

So, it's radius be $r = 42 / 2 \text{ cm} = 21 \text{ cm}$

Thus, the area of the disc (B)

$$= \pi r^2 \text{ cm}^2$$

$$= \pi * 21^2 \text{ cm}^2$$

$$= (22 / 7) * 21 * 21 \text{ cm}^2$$

$$= (22 * 21 * 3) \text{ cm}^2$$

$$= 1386 \text{ cm}^2$$

If the circular disc be cut out, then the area of the remaining portion be

(Area of the rectangular cardboard) - (Area of the circular disc)

$$= (A - B) \text{ cm}^2$$

$$= (3500 - 1386) \text{ cm}^2$$

$$= 2114 \text{ cm}^2$$

$$12. S = 12.5 \text{ m}$$

$$d = 12.5 \text{ m}$$

$$r = 12.5 / 2 = 6.25 \text{ m}$$

$$\text{Area (circle)} = \pi r^2$$

$$= 3.14 * 6.25 * 6.25$$

$$= 122.65 \text{ m}^2$$

$$\text{Area (square)} = 12.5 * 12.5$$

$$= 156.25 \text{ m}^2$$

$$\begin{aligned} \text{Remaining} &= \text{area (square)} - \text{area (circle)} \\ &= 156.25 - 122.65 \\ &= 33.6 \text{ m}^2 \end{aligned}$$

13. Length of the Wire = 22 cm.

For Square,

$$\text{Sides of the Square} = 22 / 4$$

$$\text{Side of the Square} = 5.5 \text{ cm}$$

$$\text{Area of Square} = \text{Side}^2$$

$$\text{Area} = 5.5 * 5.5 = 30.25 \text{ cm}^2$$

For Circle,

$$\text{Circumference of the Circle} = 22 \text{ cm}$$

$$2 \pi r = 22$$

$$2 * 22/7 * r = 22$$

$$r = (22*7)/22*2$$

$$r = 3.5 \text{ cm.}$$

$$\text{Now, Area of Circle} = \pi r^2$$

$$22/7 * 3.5 * 3.5$$

$$\text{Area of Circle} = 38.5 \text{ cm}^2$$

Difference between the area of Square & Circle.

$$\text{Area of Circle} - \text{Area of Square}$$

$$38.5 \text{ cm}^2 - 30.25 \text{ cm}^2$$

$$8.25 \text{ cm}^2$$

14. The radius of the circular field,

$$r = 35 \text{ m}$$

$$\text{Now, the area of the circular field} = \pi r^2 \text{ m}^2$$

$$= \pi * 35^2 \text{ m}^2$$

$$= 1225 \pi \text{ m}^2$$

Given that, the width of the path is 5 m

Now, the radius of the circular field along with the path around it

$$= (\text{radius of the circular field}) + (\text{width of the path})$$

$$= 35 + 5 \text{ m}$$

$$= 40 \text{ m}$$

So, the area of the of the circular field along with the path around it

$$= \pi (40)^2 \text{ m}^2$$

$$= 1600 \pi \text{ m}^2$$

Thus, the area of the path

$$(\text{the area of the circular field along with the path around it}) - (\text{the area of the circular field}) \text{ m}^2$$

$$= (1600 \pi - 1225 \pi) \text{ m}^2$$

$$= 375 \pi \text{ m}^2$$

Thus, the cost of levelling the path at ₹ 5.50 per m²

$$= ₹ (5.50 * 375 \pi)$$

$$= ₹ (5.50 * 375 * 22 / 7)$$

$$= ₹ 6482.14$$

CHAPTER 17

Exercise 17.1

1. The given timings are:

13.4, 14.5, 12.5, 13.9, 15.6, 14.1, 12.3

Maximum time = 15.6 seconds

Minimum time = 12.3 seconds

Range = Maximum time - Minimum time

$$= 15.6 \text{ seconds} - 12.3 \text{ seconds}$$

$$= 3.3 \text{ seconds}$$

Therefore, the range of the timings clocked by the participants is 3.3 seconds.

2.(1) Factors of 36: The factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18, and 36.

$$\text{Sum of the factors: } 1 + 2 + 3 + 4 + 6 + 9 + 12 + 18 + 36 = 91$$

Count of the factors: 9

$$\text{Mean} = \text{Sum of factors} / \text{Count of factors} = 91 / 9 = 10.11$$

(2) First five multiples of 7: The first five multiples of 7 are 7, 14, 21, 28, and 35.

$$\text{Sum of the multiples: } 7 + 14 + 21 + 28 + 35 = 105$$

Count of the multiples: 5

$$\text{Mean} = \text{Sum of multiples} / \text{Count of multiples} = 105 / 5 = 21$$

(3) First ten even natural numbers: The first ten even natural numbers are 2, 4, 6, 8, 10, 12, 14, 16, 18, and 20.

$$\text{Sum of the even numbers: } 2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20 = 110$$

Count of the even numbers: 10

$$\text{Mean} = \text{Sum of even numbers} / \text{Count of even numbers} = 110 / 10 = 11$$

3.(1) Set: 2, 5, 4, 8, 3, 11, 6, 5

Maximum value: 11

Minimum value: 2

Range = Maximum value - Minimum value

$$= 11 - 2$$

$$= 9$$

(2) Set: 125, 124, 108, 121, 118, 126

Maximum value: 126

Minimum value: 108

Range = Maximum value - Minimum value

$$= 126 - 108$$

$$= 18$$

(3) Set: 33.2, 25.4, 11.6, 22.5, 36.3

Maximum value: 36.3

Minimum value: 11.6

Range = Maximum value - Minimum value

$$= 36.3 - 11.6$$

$$= 24.7$$

4. Let's denote the sum of the first 10 numbers as "S1" and the sum of the remaining 15 numbers as "S2."

Mean of the first 10 numbers = 13

Mean of the remaining numbers = 18

$$S1 / 10 = 13 \text{ (Equation 1)}$$

$$S2 / 15 = 18 \text{ (Equation 2)}$$

Total sum = S1 + S2

$$\text{Total sum} = 10 * 13 + 15 * 18$$

$$\text{Total sum} = 130 + 270$$

$$\text{Total sum} = 400$$

Overall mean = Total sum / Total count

$$= 400 / 25$$

$$= 16$$

5. Let's denote the sum of the original five numbers as "S" and the value of the sixth number as "x".

Mean of the five numbers = 27

$$S / 5 = 27 \text{ (Equation 1)}$$

New mean of the six numbers = 25

$$(S + x) / 6 = 25 \text{ (Equation 2)}$$

From Equation 1:

$$S = 5 * 27$$

$$S = 135$$

Substituting the value of S into Equation 2:

$$(135 + x) / 6 = 25$$

$$135 + x = 6 * 25$$

$$135 + x = 150$$

$$x = 150 - 135$$

$$x = 15$$

6. Mean of 1, 3, x, and 8 = 7

$$\text{Sum} = 1 + 3 + x + 8$$

Mean = Sum / Count

$$7 = (1 + 3 + x + 8) / 4$$

$$28 = 12 + x$$

Subtracting 12 from both sides:

$$x = 28 - 12$$

$$x = 16$$

$$7. \text{Sum} = 3 + 2 + 3 + 4 + 1 + 5 + 3 + 3 + 5 + 4 + 1 + 7 + 2 + 3 + 2 + 3 + 4 + 7 + 2 + 3 + 4 + 6 + 3 + 3 + 2$$

$$\text{Sum} = 85$$

$$\text{Arithmetic mean} = \text{Sum} / \text{Total count}$$

$$= 85 / 25$$

$$= 3.4$$

Therefore, the arithmetic mean of the number of children in the 25 families is 3.4

8. (1) Maximum rainfall: 12.2 mm

Minimum rainfall: 0.5 mm

$$\text{Range} = \text{Maximum rainfall} - \text{Minimum rainfall}$$

$$= 12.2 \text{ mm} - 0.5 \text{ mm}$$

$$= 11.7 \text{ mm}$$

Therefore, the range of the rainfall for the week is 11.7 mm.

$$(2) \text{ Sum of rainfall: } 1.0 \text{ mm} + 12.2 \text{ mm} + 2.1 \text{ mm} + 0.5 \text{ mm} + 10.5 \text{ mm} + 5.5 \text{ mm} + 1.8 \text{ mm} = 33.6 \text{ mm}$$

$$\text{Mean rainfall} = \text{Sum of rainfall} / \text{Total count of days}$$

$$= 33.6 \text{ mm} / 7$$

$$= 4.8 \text{ mm}$$

Therefore, the mean rainfall for the week is approximately 4.8 mm.

(3) Days with rainfall more than the mean:

Mon: 12.2 mm

Thu: 10.5 mm

Fri: 5.5 mm

Therefore, the rainfall was more than the mean rainfall on Monday, Thursday, and Friday.

(4) Days with rainfall less than the mean:

Sun: 1.0 mm

Tue: 2.1 mm

Wed: 0.5 mm

Sat: 1.8 mm

Therefore, the rainfall was less than the mean rainfall on Sunday, Tuesday, Wednesday, and Saturday.

9. (1) Range = Highest value - Lowest value

$$\text{Range} = 51 \text{ kg} - 21 \text{ kg}$$

$$\text{Range} = 30 \text{ kg}$$

So, the range of the data is 30 kg.

$$(2) \text{ Sum of all weights} = 44 + 39 + 26 + 51 + 28 + 34 + 39 + 21 + 32 + 40 + 22 + 34 + 41 + 35 + 38 = 515$$

$$\text{Mean} = \text{Sum of all weights} / \text{Number of boys}$$

$$\text{Mean} = 515 \text{ kg} / 15 \text{ boys}$$

$$\text{Mean} \approx 34.33 \text{ kg}$$

Therefore, the mean weight is approximately 34.33 kg.

(3) The highest weight is 51 kg.

So, the weight of the fattest boy is 51 kg.

(4) The mean weight is approximately 34.33 kg.

The boys who weigh more than the mean weight are:

44 kg, 39 kg, 51 kg, 40 kg, 41 kg, 35 kg, 38 kg

Therefore, 7 boys weigh more than the mean weight.

10. (1) Mean = (Game1 + Game2 + Game3 + Game4) / Number of games

$$\text{Mean} = (14 + 16 + 10 + 10) / 4$$

$$\text{Mean} = 50 / 4$$

$$\text{Mean} = 12.5$$

Therefore, X's average number of points scored per game is 12.5.

(2) 3, because he played only 3 games

(3) Mean = (Game1 + Game2 + Game3 + Game4) / Number of games

$$\text{Mean} = (0 + 8 + 6 + 4) / 4$$

$$\text{Mean} = 18 / 4$$

$$\text{Mean} = 4.5$$

(4) The total points scored by each player are:

$$\text{X: } 14 + 16 + 10 + 10 = 50 \text{ points}$$

$$\text{Y: } 0 + 8 + 6 + 4 = 18 \text{ points}$$

$$\text{Z: } 8 + 11 + 0 + 13 = 32 \text{ points}$$

From the totals, we can see that X scored the most points with a total of 50 points.

11. Total Runs for A = 15 + 25 + 0 + 32 + 35 + 65 = 172 runs

Total Runs for B = 24 + 36 + 12 + 14 + 18 + 30 = 134 runs

Total Runs for C = 18 + 45 + 37 + 3 + 40 + 32 = 175 runs

Average Runs for A = Total Runs for A / Number of Innings = 172 runs / 6 innings \approx 28.67 runs

Average Runs for B = Total Runs for B / Number of Innings = 134 runs / 6 innings \approx 22.33 runs

Average Runs for C = Total Runs for C / Number of Innings = 175 runs / 6 innings \approx 29.17 runs

Highest Score for A = 65 runs

Highest Score for B = 36 runs

Highest Score for C = 45 runs

Considering all these factors, it appears that batsman C performed the best overall. C scored the most runs in total, has the highest average runs per innings, and also has a respectable highest individual score. Therefore, based on the given data, batsman C can be considered the best among A, B, and C.

Exercise 17.2

1.(1) T (2) F (3) T (4) F

2.(1) 3, 7, 9, 2, 4, 10, 10, 13

Arranging the numbers in ascending order: 2, 3, 4, 7, 9, 10, 10, 13

There are 8 numbers in total. The middle two numbers are 7 and 9.

Therefore, the median is the average of 7 and 9: $(7 + 9) / 2 = 8$.

(2) 9.5, 2.8, 5.3, 0.4, 1.5, 2.7

Arranging the numbers in ascending order: 0.4, 1.5, 2.7, 2.8, 5.3, 9.5

There are 6 numbers in total. The middle number is 2.8.

Therefore, the median is 2.8.

(3) 1, 2, 6, 4, 2, 5, 2, 6, 1, 4, 6

Arranging the numbers in ascending order: 1, 1, 2, 2, 2, 4, 4, 5, 6, 6, 6

There are 11 numbers in total. The middle number is 4.

Therefore, the median is 4.

(4) 60, 65, 55, 65, 70, 85, 60, 60, 75, 70, 65, 50

Arranging the numbers in ascending order: 50, 55, 60, 60, 60, 65, 65, 65, 70, 70, 75, 85

There are 12 numbers in total. The middle two numbers are 65 and 65.

Therefore, the median is the average of 65 and 65: $(65 + 65) / 2 = 65$.

(5) 20, 33, 39, 21, 25, 37, 23, 20, 29, 44

Arranging the numbers in ascending order: 20, 20, 21, 23, 25, 29, 33, 37, 39, 44

There are 10 numbers in total. The middle number is 25.

Therefore, the median is 25.

3.(1) Data: 34, 18, 27, 59, 21, 26, 34, 59, 34

Mode: 34

(2) Data: 125, 231, 132, 125, 231, 125, 321, 125, 321, 312, 151, 223, 125

Mode: 125

(3) Data: 30, 20, 35, 25, 20, 30, 15, 15, 25, 45, 30, 25, 25

Mode: 25

(4) Data: 2.4, 5.6, 8.9, 7.4, 3.2, 2.4, 3.4, 2.4, 4.3

Mode: 2.4

4. 26, 26, 36, 39, 49, 52, 56, 69, 75

There are 9 observations, so the middle value is the $(9 + 1) / 2 = 5$ th value, which is 49. Therefore, the median is 49.

the mode is 26 because it appears twice

If we replace 56 with 40, the new set of observations becomes:

26, 26, 36, 39, 49, 52, 40, 69, 75

ascending order:

26, 26, 36, 39, 40, 49, 52, 69, 75

There are 9 observations, so the middle value is still the $(9 + 1) / 2 = 5$ th value, which is 40. Therefore, the new median is 40.

The mode remains the same because the value that occurs most frequently is still 26, and its frequency is unchanged.

So, the new median is 40, and the mode is still 26.

5. 129, 129, 136, 136, 137, 138, 138, 139, 140, 141,

141, 142, 142, 142, 142, 144, 147, 148, 163

Since there are 20 observations, the middle value is the $(20 + 1) / 2 = 10.5$ th value. The 10th and 11th values are both 141 and 142, so the median is the average of these two values:

Median = $(141 + 142) / 2 = 141.5$ cm

the mode is 142 because it appears the most number of times (4 times)

Therefore, the median of the heights is 141.5 cm, and the mode is 142 cm.

6. (1) the highest frequency is 15, which corresponds to the size 119. Therefore, the mode for this distribution is 119.

(2) the highest frequency is 30, which corresponds to the number 22. Hence, the mode for this distribution is 22.

7. Data: 32, 27, 36, 32, 30, 35

Mean:

$$\text{Mean} = (32 + 27 + 36 + 32 + 30 + 35) / 6$$

$$\text{Mean} = 192 / 6$$

$$\text{Mean} = 32$$

Median:

To find the median, we first need to arrange the data in ascending order:

27, 30, 32, 32, 35, 36

Since there are six observations, the middle value is the $(6 + 1) / 2 = 3.5$ th value. The 3rd and 4th values are both 32

$$\text{Median} = (32 + 32) / 2$$

$$\text{Median} = 64 / 2$$

$$\text{Median} = 32$$

Mode:

the value that appears most frequently is 32, which appears twice. Therefore, the mode is 32.

8. 110, 130, 150, 170, 220

Mode:

all the values appear only once, so there is no mode.

Median:

Since there are five observations, the median is the middle value. In this case, the middle value is the $(5 + 1) / 2 = 3$ rd value, which is 150. Therefore, the median is 150.

9. 29, 32, 48, 50, x, x+2, 72, 78, 84, 95

In this case, there are 10 values.

Since 10 is an even number, the median is the average of the two middle values. The middle values are the 5th and 6th values.

Therefore, we have the following equation:

$$(x + (x+2)) / 2 = 63$$

Simplifying the equation:

$$(2x + 2) = 126$$

$$2x = 126 - 2$$

$$2x = 124$$

Dividing both sides by 2:

$$x = 124 / 2$$

$$x = 62$$

Hence, the value of x is 62.

10. $X=5$

$5+30=35$

mode is part of central tendency

the most frequently successive observations is called 35

Exercise 17.3

-Do it yourself

Book 8

Let's practice:

Question 1.

(a) 63.51, 73.81, 83.91, 635.1

(b) 7.0001, 70.001, 700.1, 7001.0

(c) 38.63, 42.62, 43.61, 43.67

(d) 83.25, 823.5, 832.5, 852.5

Question 2.

(a) 72.37, 72.35, 72.30, 70.32

(b) 763.01, 750.01, 725.1, 7.5001

(c) 63.01, 60.05, 6.325, 0.63

(d) 5600.1, 560.01, 5.6001, 56.001

Question 3.

(a) Division of 12 by 5: $12 \div 5 = 2$ remainder 2

Therefore, 12 divided by 5 equals 2 with a remainder of 2

(b) Division of 17 by 34: $17 \div 34 = 0.5$

(c) Division of 28 by 25: $28 \div 25 = 1.12$

(d) Division of 12 by 25: $12 \div 25 = 0.48$

(e) Division of 41 by 20: $41 \div 20 = 2.05$

(f) Division of 41 by 250: $41 \div 250 = 0.164$

(g) Division of 36 by 1500: $36 \div 1500 = 0.024$

Question 4.

To evaluate the expression "2 square * 7 square," calculate the square of 2 and the square of 7, and then multiply them together.

(a) Evaluating 2 square:

$2 \text{ square} = 2^2 = 2 * 2 = 4$

Evaluating 7 square:

$7 \text{ square} = 7^2 = 7 * 7 = 49$

Multiplying the results:

$4 * 49 = 196$

(b) Evaluating 3 square * 52:

$3 \text{ square} = 3^2 = 3 * 3 = 9$

$9 * 52 = 468$

(c) Evaluating 0 * 6 square:

$0 * 6 \text{ square} = 0 * 6^2 = 0 * 36 = 0$

(d) Evaluating 11 square * 5 square:

$11 \text{ square} = 11^2 = 11 * 11 = 121$

$5 \text{ square} = 5^2 = 5 * 5 = 25$

$121 * 25 = 3025$

(e) Evaluating $[-3]^2 \times 2^2$:

$$[-3]^2 = (-3)^2 = (-3) \times (-3) = 9$$

$$2^2 = 2 \times 2 = 4$$

$$9 \times 4 = 36$$

(f) Evaluating $[-5]^2 \times 2^2 \times 5^2$:

$$[-5]^2 = (-5)^2 = (-5) \times (-5) = 25$$

$$2^2 = 2 \times 2 = 4$$

$$5^2 = 5 \times 5 = 25$$

$$25 \times 4 \times 25 = 2500$$

Question 5.

Question 6. [a] Term: $2xy^2z$

Coefficient of y : $2x$

Term: $-3x^2yz$

Coefficient of y : $-3x^2$

[b] Term: $-7x^2y$

Coefficient of y : $-7x^2$

Term: $6y^2$

Coefficient of y : 6

[c] Term: ym^2

Coefficient of y : m^2

Term: $5y^2m$

Coefficient of y : $5m$

Term: $-15x^2y$

Coefficient of y : $-15x^2$

Question 7

Let's denote Toni's age as "T." Toni's father's age is 5 years more than four times Toni's age.

$$\text{Father's Age} = 4 \times \text{Toni's Age} + 5$$

Given that Toni's father is 41 years old

$$41 = 4T + 5$$

Subtract 5 from both sides of the equation

$$41 - 5 = 4T$$

$$36 = 4T$$

Toni's age = divide both sides of the equation by 4:

$$36 / 4 = T$$

$9 = T$ - Toni's age is 9 years old.

Question 8

Let's denote the length of the rectangle as "L" and the width as "W."

$$\text{Width} = 2 \times \text{Length} - 3$$

The perimeter of a rectangle is given by the formula:

$$\text{Perimeter} = 2 \times (\text{Length} + \text{Width})$$

Perimeter is 120 meters, we can substitute the expressions for length and width into the perimeter formula:

$$120 = 2 \times (L + (2L - 3))$$

Simplifying the equation:

$$120 = 2 \times (3L - 3)$$

$$60 = 3L - 3$$

$$3L = 63$$

$$L = 63/3$$

$$L = 21$$

Substituting the value of L back into the equation for width:

$$W = 2 \times 21 - 3$$

$$W = 39$$

length = 21 meters and width = 39 meters.

Question 9

Let's assume the two consecutive numbers are x and $x+1$.

The square of x is x^2 , and the square of $x+1$ is $(x+1)^2$.

$$(x+1)^2 - x^2 = 55$$

Expand the equation :

$$x^2 + 2x + 1 - x^2 = 55$$

Simplify :

$$2x + 1 = 55$$

Subtracting 1 from both sides

$$2x = 54$$

Dividing both sides by 2

$$x = 27$$

Two consecutive numbers are 27 and 28.

Question 10

Let's denote the present age of the man as "M" and the present age of his son as "S."

$$M - 4 = 3(S - 4) \text{ ---(1)}$$

Five years from now, the man will be twice as old as his son.

$$M + 5 = 2(S + 5) \text{ ---(2)}$$

Expanding equation (1):

$$M - 4 = 3S - 12$$

$$M = 3S - 8$$

Expanding equation (2):

$$M + 5 = 2S + 10$$

$$M = 2S + 5$$

Both equations represent the value of M, we can equate them:

$$3S - 8 = 2S + 5$$

Subtracting 2S from both sides:

$$S - 8 = 5$$

Adding 8 to both sides:

$$S = 13$$

Substituting the value of S back into equation (1):

$$M = 3(13) - 8$$

$$M = 39 - 8$$

$$M = 31$$

present age of the man is 31 years, and the present age of his son is 13 years.

Question 11

Let's denote the number of runs scored by Sehwag as "S" and the number of runs scored by Gambhir as "G".

The ratio of the number of runs scored by Sehwag and Gambhir is 24:17.

$$S/G = 24/17$$

Gambhir scored 85 runs ($G = 85$), we can substitute this value into the proportion:

$$S/85 = 24/17$$

To solve for S, we can cross-multiply and then divide:

$$S * 17 = 85 * 24$$

$$S * 17 = 2040$$

$$S = 2040/17$$

$S \approx 120$ - Sehwag scored approximately 120 runs

Question 12

Yamini earns Rs. 12,000 in 15 days. To find her daily earnings, we can divide the total earnings by the number of days:

$$\text{Daily earnings} = \text{Rs. } 12,000 / 15 = \text{Rs. } 800$$

1 month is equivalent to 30 days, six months would be $6 * 30 = 180$ days.

To find Yamini's earnings in six months, we can multiply her daily earnings by the number of days:

Total earnings in six months = Daily earnings * Number of days

$$= \text{Rs. } 800 * 180$$

$$= \text{Rs. } 144,000 \text{ - Yamini will earn Rs. } 144,000 \text{ in six months}$$

Question. 13

Option 1: 9kg of apples for Rs. 288

$$\text{Price per kilogram} = \text{Rs. } 288 / 9\text{kg} = \text{Rs. } 32/\text{kg}$$

Option 2: 16kg of apples for Rs. 544

$$\text{Price per kilogram} = \text{Rs. } 544 / 16\text{kg} = \text{Rs. } 34/\text{kg}$$

Comparing the prices per kilogram, we can see that option 1 offers apples at a lower price per kilogram (Rs. 32/kg) compared to option 2 (Rs. 34/kg).

It is more beneficial to buy 9kg of apples for Rs. 288.

Question 14

Family of 5 members consumes 12 kg of sugar in a month:

5 members consume 12 kg

7 members consume ?

Using the proportion: $(7 \text{ members} / 5 \text{ members}) = (\text{monthly consumption for 7 members} / 12 \text{ kg})$

Cross-multiplying the proportion

$$7 \text{ members} * 12 \text{ kg} = 5 \text{ members} * (\text{monthly consumption for 7 members})$$

$$84 \text{ kg} = 5 \text{ members} * (\text{monthly consumption for 7 members})$$

divide both sides of the equation by 5:

$$(\text{monthly consumption for 7 members}) = 84 \text{ kg} / 5$$

$$= 16.8 \text{ kg}$$

Question . 15

$$(i) 0.9 = 0.9 * 100 = 90\%$$

$$(ii) 0.54 = 0.54 * 100 = 54\%$$

$$(iii) 0.0036 = 0.0036 * 100 = 0.36\%$$

$$(iv) 0.55 = 0.55 * 100 = 55\%$$

$$(v) 1.02 = 1.02 * 100 = 102\%$$

$$(vi) 0.95 = 0.95 * 100 = 95\%$$

Question 16

divide each percentage value by 100.

$$[1] 16\% = 16/100 = 0.16$$

$$[2] 82\% = 82/100 = 0.82$$

$$[3] 35\% = 35/100 = 0.35$$

$$[4] 70.4\% = 70.4/100 = 0.704$$

$$[5] 0.014\% = 0.014/100 = 0.00014$$

$$[6] 84.2\% = 84.2/100 = 0.842$$

Question 17

[1] 35 degrees and 55 degrees: The sum of these angles is $35 + 55 = 90$ degrees. Therefore, they are complementary.

[2] 24 degrees and 66 degrees: The sum of these angles is $24 + 66 = 90$ degrees. Therefore, they are complementary.

[3] 130 degrees and 50 degrees: The sum of these angles is $130 + 50 = 180$ degrees. Therefore, they are supplementary.

[4] 27 degrees and 153 degrees: The sum of these angles is $27 + 153 = 180$ degrees. Therefore, they are supplementary.

[5] 17 degrees and 73 degrees: The sum of these angles is $17 + 73 = 90$ degrees. Therefore, they are complementary.

[6] 53 degrees and 127 degrees: The sum of these angles is $53 + 127 = 180$ degrees. Therefore, they are supplementary.

Question 18 and 19

Do yourself

Question 20 .

Use the Pythagorean theorem.

Let's denote the length of the ladder as 'L'.

Distance between the foot of the ladder and the wall is 8 meters.

Height of the window = 6 meters.

Using the Pythagorean theorem

$$L^2 = (\text{distance to the wall})^2 + (\text{height of the window})^2$$

$$L^2 = 8^2 + 6^2$$

$$L^2 = 64 + 36$$

$$L^2 = 100$$

Taking the square root of both sides, we find:

$$L = \sqrt{100}$$

$L = 10$ - The length of the ladder is 10 meters.

Question. 21

Let's take the length of the other side as 'x'. Hypotenuse = 26 cm long

One of the remaining two sides is 10 cm long.

Using the Pythagorean theorem.

$$\text{hypotenuse}^2 = \text{one side}^2 + \text{other side}^2$$

$$26^2 = 10^2 + x^2$$

$$676 = 100 + x^2$$

To find the value of 'x²', subtract 100 from both sides:

$$x^2 = 676 - 100$$

$$x^2 = 576$$

Taking the square root of both sides

$$x = \sqrt{576}$$

$x = 24$ - length of the other side is 24 cm.

Question 22

Let's calculate the perimeter and area for each given rectangle:

(i) $L = 25$ cm, $B = 11$ cm:

$$\text{Perimeter} = 2(L + B) = 2(25 + 11) = 2(36) = 72 \text{ cm}$$

$$\text{Area} = L \times B = 25 \times 11 = 275 \text{ cm}^2$$

(ii) $L = 13$ cm, $B = 12$ cm:

$$\text{Perimeter} = 2(L + B) = 2(13 + 12) = 2(25) = 50 \text{ cm}$$

$$\text{Area} = L \times B = 13 \times 12 = 156 \text{ cm}^2$$

(iii) $L = 7.5 \text{ cm}$, $B = 2.5 \text{ cm}$:
Perimeter = $2(L + B) = 2(7.5 + 2.5) = 2(10) = 20 \text{ cm}$
Area = $L \times B = 7.5 \times 2.5 = 18.75 \text{ cm}^2$

Question 23

The perimeter of a square is given by the formula $P = 4s$, where s is the length of a side.

(i) Side = 2.5 cm : Perimeter = $4s = 4(2.5) = 10 \text{ cm}$

(ii) Side = 7.5 cm : Perimeter = $4s = 4(7.5) = 30 \text{ cm}$

(iii) Side = 11 m : Perimeter = $4s = 4(11) = 44 \text{ m}$

Question 24. To find the area of a rectangular field in hectares, convert the dimensions to a common unit (such as meters).

1 hectare is equal to 10,000 square meters.

(i) Sides: 50 cm and 1 m .

Converting the sides to meters:

$50 \text{ cm} = 0.5 \text{ m}$ (divide by 100 since there are 100 cm in a meter)

$1 \text{ m} = 1 \text{ m}$

Area:

Area = Length \times Width = $0.5 \text{ m} \times 1 \text{ m} = 0.5 \text{ square meters}$

Converting to hectares:

Area in hectares = Area in square meters / 10,000 = $0.5 / 10,000 = 0.00005 \text{ hectares}$

(ii) Sides: 35 m and 42 m .

Area:

Area = Length \times Width = $35 \text{ m} \times 42 \text{ m} = 1470 \text{ square meters}$

Converting to hectares:

Area in hectares = Area in square meters / 10,000 = $1470 / 10,000 = 0.147 \text{ hectares}$

Question 25

To find the area of a rectangular field in acres, convert the dimensions to a common unit (such as square meters) and then convert the area to acres.

1 acre = to 4046.86 square meters.

(i) Sides: 50 m , 16 m , and 7 dm .

Converting the sides to meters:

$7 \text{ dm} = 0.7 \text{ m}$ (since $1 \text{ dm} = 0.1 \text{ m}$)

Calculating the area:

Area = Length \times Width = $50 \text{ m} \times 16 \text{ m} \times 0.7 \text{ m} = 560 \text{ square meters}$

Converting to acres:

Area in acres = Area in square meters / 4046.86 = $560 / 4046.86 \approx 0.1386 \text{ acres}$

(ii) Sides: 43 m and 28 m .

Area:

Area = Length \times Width = $43 \text{ m} \times 28 \text{ m} = 1204 \text{ square meters}$

Converting to acres:

Area in acres = Area in square meters / 4046.86 = $1204 / 4046.86 \approx 0.2976 \text{ acres}$

Question 26

To find the area of a parallelogram, we multiply the base length by the corresponding height.

(i) Base = 30 m , Height = 1.7 m :

Area = Base \times Height = $30 \text{ m} \times 1.7 \text{ m} = 51 \text{ square meters}$

(ii) Base = 16 dm, Height = 26 dm:

Converting the dimensions to meters:

Base = 16 dm = 1.6 m (since 1 dm = 0.1 m)

Height = 26 dm = 2.6 m

Area = Base \times Height = 1.6 m \times 2.6 m = 4.16 square meters

(iii) Base = 21 m, Height = 15 m:

Area = Base \times Height = 21 m \times 15 m = 315 square meters

(iv) Base = 18 cm, Height = 6 cm:

Converting the dimensions to meters:

Base = 18 cm = 0.18 m (since 1 cm = 0.01 m)

Height = 6 cm = 0.06 m

Area = Base \times Height = 0.18 m \times 0.06 m = 0.0108 square meters

Question . 27

To find the area of a parallelogram

Given one side length and the corresponding height.

Area = Side \times Height

One side of the parallelogram is 56 cm and the corresponding height is 30 cm.

Area = 56 cm \times 30 cm

Area = 1680 square cm

Question 28.

Area = Base \times Height

base of the parallelogram = 32 cm

height = 16.5 cm.

Area = 32 cm \times 16.5 cm

Area = 528 square cm

Question 29

To find the circumference of a circle, we can use the formula:

Circumference = $2\pi r$

where π (pi) is approx = 3.14159

(i) Radius = 91 cm:

Circumference = $2\pi r = 2 \times 3.14159 \times 91 = 571.18$ cm

(ii) Radius = 10.5 cm:

Circumference = $2\pi r = 2 \times 3.14159 \times 10.5 = 65.97$ cm

(iii) Diameter = 24.5 dm (which means the radius is half the diameter):

Radius = 24.5 dm / 2 = 12.25 dm

To convert dm to cm, we multiply by 10:

Radius = 12.25 dm \times 10 cm/dm = 122.5 cm

Circumference = $2\pi r = 2 \times 3.14159 \times 122.5 = 769.69$ cm

(iv) Diameter = 189 cm (which means the radius is half the diameter):

Radius = 189 cm / 2 = 94.5 cm

Circumference = $2\pi r = 2 \times 3.14159 \times 94.5 = 594.98$ cm

(v) Radius = 28 cm:

Circumference = $2\pi r = 2 \times 3.14159 \times 28 = 175.93$ cm

Ques. 30

Diameter=56m

Radius= $d/2=56/2=28$ m

Circumference of wheel= $2 \times \pi \times r$

$=2 \times 22/7 \times 28=176$ m

Distance in 500 revolution= 500×176

$=88000$ m

In cm= 8800000 cm

In km= 88 km

CHAPTER 2

Exercise 2.1

Question 1

1. True 2. True 3. False 4. True

Question 2

(i) $-12/-13$:

To simplify, we can cancel out the negatives:

$$-12/-13 = 12/13$$

(ii) $5/-7$:

To simplify, we can cancel out the negatives:

$$5/-7 = -5/7$$

(iii) $-7/-11$:

To simplify, we can cancel out the negatives:

$$-7/-11 = 7/11$$

(iv) $13/-15$:

To simplify, we can cancel out the negatives:

$$13/-15 = -13/15$$

(v) $2/-9$:

To simplify, we can cancel out the negatives:

$$2/-9 = -2/9$$

Question 3

(i) $9/11 = 27/?$

cross-multiply:

$$9 \times ? = 11 \times 27$$

$$? = (11 \times 27) / 9$$

$$? = 33$$

$$9/11 = 27/33. \text{ (First box)}$$

Second box –

cross-multiply:

$$27 \times 55 = 33 \times ?$$

To find the value of the missing numerator, we can divide both sides of the equation by 33:

$$(27 \times 55) / 33 = ?$$

$$(27 \times 55) / 33 \approx 45$$

$27/33$ is equivalent to $45/55$ in this case.

Third box - To find the value of the missing denominator in the equation $45/55 = 54/?$, we can cross-multiply:

$$45 \times ? = 54 \times 55$$

divide both sides of the equation by 45:

$$(54 \times 55) / 45 = ?$$

$$(54 \times 55) / 45 \approx 66$$

$45/55$ is equivalent to $54/66$ in this case.

(ii) first box - To find the missing value in the equation $3/4 = ?/8$, you can set up a proportion:

$$3/4 = x/8$$

To solve for x, you can cross-multiply:

$$4x = 3 * 8$$

$$4x = 24$$

Dividing both sides by 4:

$$x = 24/4$$

$$x = 6$$

$3/4$ is equal to $6/8$.

Second box - To find the missing value in the equation $6/8 = 12/?$, you can set up a proportion:

$$6/8 = 12/x$$

To solve for x, you can cross-multiply:

$$6x = 12 * 8$$

$$6x = 96$$

Dividing both sides by 6:

$$x = 96/6$$

$$x = 16$$

$6/8$ is equal to $12/16$.

Third box - To find the missing value in the equation $12/16 = 24/?$, you can set up a proportion:

$$12/16 = 24/x$$

To solve for x, you can cross-multiply:

$$12x = 24 * 16$$

$$12x = 384$$

Dividing both sides by 12:

$$x = 384/12$$

$$x = 32$$

$12/16$ is equal to $24/32$.

Question 4

(i) $81/108$:

The GCD of 81 and 108 is 27. Dividing both the numerator and denominator by 27, we get:

$$81/108 = (81 \div 27) / (108 \div 27) = 3/4$$

(ii) $-14/35$:

The GCD of 14 and 35 is 7. Dividing both the numerator and denominator by 7, we get:

$$-14/35 = (-14 \div 7) / (35 \div 7) = -2/5$$

(iii) $-10/22$:

The GCD of 10 and 22 is 2. Dividing both the numerator and denominator by 2, we get:

$$-10/22 = (-10 \div 2) / (22 \div 2) = -5/11$$

(iv) $121/143$:

The GCD of 121 and 143 is 11. Dividing both the numerator and denominator by 11, we get:

$$121/143 = (121 \div 11) / (143 \div 11) = 11/13$$

Question 5

$$(i) > (ii) < (iii) = (iv) <$$

Question 6

$$(i) -4/6, 1/3, 4/9, 7/12 \quad (ii) 3/2, -1/2, -1/4, -1/6, 1/3. \quad (iii) 1/35, 1/5, 1/7, 7/10 \quad (iv) 15/-20, -2/6, 15/32, 3/4$$

Question 7

$$(i) 3/4, 2/5, -2/5, -1/2, -1 \quad (ii) 4/7, -1/7, 3/-14, -5/21 \quad (iii) 3/4, 2/9, -5/12, -2/3 \quad (iv) 11/12, 4/21, -2/15, -1/3, -7/18$$

Question 8

$$(i) -8/13, 8/13 \quad (ii) -2, 2 \quad (iii) -2/11, 2/11 \quad (iv) -1/7, 1/7$$

Question . 9

Let's simplify each of the given expressions:

$$(i) [9/10 + 1/3]$$

To add fractions, we need a common denominator. The least common multiple (LCM) of 10 and 3 is 30.

Rewriting the fractions with the common denominator:

$$[27/30 + 10/30]$$

Adding the numerators:

$$[37/30]$$

Therefore, the simplified form is $37/30$.

$$(ii) [1/8 - 5/16]$$

To subtract fractions, we also need a common denominator. The least common multiple (LCM) of 8 and 16 is 16.

Rewriting the fractions with the common denominator:

$$[2/16 - 5/16]$$

Subtracting the numerators:

$$[-3/16]$$

Therefore, the simplified form is $-3/16$.

$$(iii) [2/7 * -14/8]$$

To multiply fractions, we can multiply the numerators together and the denominators together.

$$\text{Multiplying the numerators: } 2 * -14 = -28$$

$$\text{Multiplying the denominators: } 7 * 8 = 56$$

Therefore, the simplified form is $-28/56$, which can be further simplified. The greatest common divisor (GCD) of -28 and 56 is 28 . Dividing both the numerator and denominator by 28 :

$$-28/56 = -1/2$$

Therefore, the simplified form is $-1/2$.

$$(iv) [-3 / (1/9)]$$

To divide by a fraction, we can multiply by its reciprocal. The reciprocal of $1/9$ is $9/1$, so we can rewrite the expression as:

$$[-3 * (9/1)]$$

$$\text{Multiplying the numerators: } -3 * 9 = -27$$

Multiplying the denominators: $1 * 1 = 1$

Therefore, the simplified form is $-27/1$, which is just -27 .

Exercise 2.2

Question 1.

(i) $3 + (-7/12) = (-7/12) + 3$ we can simplify both sides of the equation and check if they are equal.

(LHS):

$$3 + (-7/12) = 3 - 7/12$$

common denominator = 12.

$$3 - 7/12 = (36/12) - 7/12 = 29/12$$

(RHS):

$$(-7/12) + 3 = 3 + (-7/12)$$

$$3 + (-7/12) = 3 - 7/12 = 29/12$$

Both the LHS and RHS simplify to $29/12$.

Therefore, the equation (i) $3 + (-7/12) = (-7/12) + 3$ is verified as true.

(ii) To verify the equality $(-4/13) + 0 = 0 + (-4/13)$, we can perform the calculations on both sides and check if they yield the same result.

(LHS):

$$(-4/13) + 0 = -4/13$$

The sum of $-4/13$ and 0 is $-4/13$.

(RHS):

$$0 + (-4/13) = -4/13$$

The sum of 0 and $-4/13$ is also $-4/13$.

Both the LHS and RHS of the equation simplify to $-4/13$.

(iii) To verify the equality $(1/9) + [(3/4) + (-4/5)] = [(1/9) + (3/4)] + (-4/5)$

(LHS):

$$(1/9) + [(3/4) + (-4/5)]$$

Common denominator for $3/4$ and $-4/5$, is 20 .

$$(3/4) + (-4/5) = (15/20) + (-16/20) = -1/20$$

$$(1/9) + [-1/20]$$

To add fractions, we need a common denominator. The common denominator here is 180 .

$$(1/9) + [-1/20] = (20/180) + (-9/180) = 11/180$$

(RHS):

$$[(1/9) + (3/4)] + (-4/5)$$

The common denominator here is 36 .

$$(1/9) + (3/4) = (4/36) + (27/36) = 31/36$$

$$[(1/9) + (3/4)] + (-4/5) = (31/36) + (-4/5)$$

To add fractions, we need a common denominator. The common denominator here is 180 .

$$(31/36) + (-4/5) = (155/180) + (-144/180) = 11/180$$

Both the LHS and RHS simplify to $11/180$.

(iv) To verify the equality $(-5/81) + (5/81) = 0$

(LHS):

$$(-5/81) + (5/81)$$

The sum of $-5/81$ and $5/81$ is 0. This is because when we add a number to its negation, they cancel each other out.

(RHS):

$$0$$

The right-hand side is simply 0.

Both the LHS and RHS of the equation are equal to 0.

(v)

(vi)

Question 2.

(i) To add $(5/8)$ and $(-7/12)$, we need to find a common denominator. The least common multiple (LCM) of 8 and 12 is 24.

We can rewrite the fractions with the common denominator:

$$(5/8) + (-7/12) = (15/24) + (-14/24)$$

add the numerators:

$$(15/24) + (-14/24) = 1/24$$

(ii) $(5/13)$ and $(9/13)$

$$(-5/13) + (9/13) = 4/13$$

(iii) -1 and $(3/4)$

To add a whole number and a fraction, we can convert the whole number to a fraction with the same denominator as the fraction:

$$-1 = -4/4$$

Now we can add the fractions:

$$-4/4 + 3/4 = -1/4$$

(iv) 3 and $(7/12)$

To add a whole number and a fraction, we can convert the whole number to a fraction with the same denominator as the fraction:

$$3 = 36/12$$

Now we can add the fractions:

$$36/12 + 7/12 = 43/12$$

(v) $(21/-32)$ and -5

To add a fraction and a whole number, we can convert the whole number to a fraction with the same denominator as the fraction:

$$-5 = -160/32$$

Now we can add the fractions:

$$(21/-32) + (-160/32) = -139/32$$

(vi) $(13/-31)$ and $(-5/9)$

To add fractions, we need a common denominator. The least common multiple (LCM) of 31 and 9 is 279.

Rewriting the fractions with the common denominator:

$$(-117/279) + (-155/279)$$

Adding the numerators:

$$-272/279$$

The sum of $(13/-31)$ and $(-5/9)$ is $-272/279$.

(vii) $(-15/42)$ and $(-13/17)$

To add fractions, we need a common denominator. The least common multiple (LCM) of 42 and 17 is 714.

Rewriting the fractions with the common denominator:

$$(-255/714) + (-546/714)$$

Adding the numerators:

$$-801/714$$

Now, divide both the numerator and denominator by their greatest common divisor, which is 3:

$$-801/714 = -267/238$$

Question . 3

(i) The additive inverse of $-1/9$ is $1/9$.

(ii) The additive inverse of $8/15$ is $-8/15$.

(iii) The additive inverse of 14 is -14 .

(iv) The additive inverse of $4/-7$ is $-4/-7$, which can be simplified to $4/7$.

(v) The additive inverse of $-3/-14$ is $-(-3/-14)$, which simplifies to $3/14$.

(vi) The additive inverse of $13/-23$ is $-13/-23$, which simplifies to $13/23$.

Question . 4

(i) To simplify the expression $(3/5) + 0 + (-3/1) + (-19/5) + (5/15)$ by taking just the LCM process in an easy way, we can follow these steps:

Step 1: Identify the denominators in the expression: 5 and 15.

Step 2: Find the least common multiple (LCM) of the denominators, which in this case is 15.

Step 3: Convert each fraction to have the common denominator of 15:

$(3/5)$ becomes $(9/15)$ [by multiplying the numerator and denominator by 3].

(0) remains as (0) since any number added to zero doesn't change its value.

$(-3/1)$ becomes $(-45/15)$ [by multiplying the numerator and denominator by 15].

$(-19/5)$ becomes $(-57/15)$ [by multiplying the numerator and denominator by 3].

$(5/15)$ remains as $(5/15)$ since it already has the common denominator.

Step 4: Now we can add the numerators together, while keeping the common denominator:

$$(9/15) + (0) + (-45/15) + (-57/15) + (5/15) = (9 + 0 - 45 - 57 + 5)/15 = (-88/15)$$

(ii) To simplify the expression $(3/4) - (-2/5) - (5/8)$

Step 1: Simplify the subtraction of a negative fraction:

A subtraction of a negative fraction is equivalent to adding the positive fraction. So, we can rewrite $(-2/5)$ as $(2/5)$:

$$(3/4) + (2/5) - (5/8)$$

Step 2: Find a common denominator:

The common denominator for the fractions 4, 5, and 8 is 40.

Step 3: Convert fractions to have the common denominator:

Converting the fractions to have a denominator of 40:

$$(3/4) + (2/5) - (5/8) = (30/40) + (16/40) - (25/40)$$

Step 4: Combine like terms:

Adding the numerators:

$$(30/40) + (16/40) - (25/40) = 21/40$$

(iii) To simplify the expression $(-3 \frac{2}{5}) + (3 \frac{1}{2}) + (3 \frac{1}{4})$ using the LCM process, we can follow these steps:

Step 1: Convert mixed numbers to improper fractions:

$$(-3 \frac{2}{5}) = (-\frac{17}{5})$$

$$(3 \frac{1}{2}) = (\frac{7}{2})$$

$$(3 \frac{1}{4}) = (\frac{13}{4})$$

Step 2: Find a common denominator:

The common denominator for 5, 2, and 4 is 20.

Step 3: Convert fractions to have the common denominator:

Converting the fractions to have a denominator of 20:

$$(-\frac{17}{5}) = (-\frac{68}{20})$$

$$(\frac{7}{2}) = (\frac{70}{20})$$

$$(\frac{13}{4}) = (\frac{65}{20})$$

Step 4: Add the fractions together:

$$(-\frac{68}{20}) + (\frac{70}{20}) + (\frac{65}{20}) = (\frac{67}{20})$$

Step 5: Simplify the resulting fraction:

The fraction $(\frac{67}{20})$ cannot be simplified further.

(iv) To simplify the expression $(\frac{6}{5}) + (\frac{19}{-45}) + (-\frac{5}{3}) + (-\frac{7}{15})$ in an easy way, we can follow these steps:

Step 1: Simplify any whole numbers:

There are no whole numbers in this expression.

Step 2: Find a common denominator:

The common denominator for the fractions 5, 45, 3, and 15 is 45.

Step 3: Convert fractions to have the common denominator:

Converting the fractions to have a denominator of 45:

$$(\frac{6}{5}) = (\frac{54}{45})$$

$$(\frac{19}{-45}) = (-\frac{19}{45})$$

$$(-\frac{5}{3}) = (-\frac{75}{45})$$

$$(-\frac{7}{15}) = (-\frac{21}{45})$$

Step 4: Add the fractions together:

$$(\frac{54}{45}) + (-\frac{19}{45}) + (-\frac{75}{45}) + (-\frac{21}{45}) = (54 - 19 - 75 - 21)/45 = (-61/45)$$

Step 5: Simplify the resulting fraction:

The fraction $(-\frac{61}{45})$ cannot be simplified further.

Question . 5

$$(i) -\frac{2}{26} - (-\frac{1}{26}) = -\frac{2}{26} + \frac{1}{26} = -\frac{1}{26}$$

$$(ii) \frac{7}{10} - (-\frac{3}{10}) = \frac{7}{10} + \frac{3}{10} = \frac{10}{10} = 1$$

$$(iii) \frac{4}{19} - \frac{3}{19} = \frac{1}{19}$$

$$(iv) \frac{5}{11} - \frac{1}{11} = \frac{4}{11}$$

$$(v) -\frac{21}{11} - (-\frac{25}{33}) = -\frac{21}{11} + \frac{25}{33} = (-\frac{63}{33} + \frac{25}{33}) = -\frac{38}{33}$$

$$(vi) \frac{3}{18} - (-\frac{5}{27}) = \frac{3}{18} + \frac{5}{27} = (\frac{9}{54} + \frac{10}{54}) = \frac{19}{54}$$

$$(vii) -\frac{6}{21} - \frac{3}{7} = -\frac{6}{21} - \frac{9}{21} = -\frac{15}{21} = -\frac{5}{7}$$

$$(viii) 3 - (-\frac{13}{15}) = 3 + \frac{13}{15} = (\frac{45}{15} + \frac{13}{15}) = \frac{58}{15}$$

Question 6

(i) $-3 - 5/11$:

To simplify, we need to find a common denominator for -3 and $5/11$. The common denominator is 11.

-3 can be written as $-33/11$:

$$-3 - 5/11 = -33/11 - 5/11 = (-33 - 5)/11 = -38/11$$

$5/11 - (-3)$:

To simplify, we'll rewrite the subtraction as addition of the opposite number. The opposite of -3 is 3.

$$5/11 - (-3) = 5/11 + 3 = (5 + 33)/11 = 38/11$$

compare the two expressions:

$$-3 - 5/11 = -38/11$$

$$5/11 - (-3) = 38/11$$

$-38/11$ is not equal to $38/11$, we can conclude that $-3 - 5/11$ is not equal to $5/11 - (-3)$.

(ii)

$1/5 - 3/8$:

To simplify, we need to find a common denominator for 5 and 8. The common denominator is 40.

Converting the fractions to have a denominator of 40:

$$1/5 = 8/40$$

$$3/8 = 15/40$$

$$1/5 - 3/8 = 8/40 - 15/40 = (8 - 15)/40 = -7/40$$

(ii) $3/8 - 15$:

To simplify, we'll rewrite the subtraction as addition of the opposite number. The opposite of 15 is -15 .

$$3/8 - 15 = 3/8 + (-15) = 3/8 - 15/1$$

To add fractions, we need a common denominator, which is 8.

Converting 15 to have a denominator of 8:

$$15/1 = 120/8$$

$$3/8 - 15 = 3/8 - 120/8 = (3 - 120)/8 = -117/8$$

Now, we compare the results of the two expressions:

$$1/5 - 3/8 = -7/40$$

$$3/8 - 15 = -117/8$$

Since $-7/40$ is not equal to $-117/8$, we can conclude that $1/5 - 3/8$ is not equal to $3/8 - 15$.

(iii) Let's verify that $[5/9 - 2/6] - 2/7$ is not equal to $5/9 - [2/6 - 2/7]$ using the LCM method.

(i) $[5/9 - 2/6] - 2/7$:

To simplify, we need to find a common denominator for 9, 6, and 7. The LCM of 9, 6, and 7 is 126.

Converting the fractions to have a denominator of 126:

$$5/9 = 70/126$$

$$2/6 = 42/126$$

$$2/7 = 36/126$$

$$[5/9 - 2/6] - 2/7 = [70/126 - 42/126] - 36/126 = (70 - 42)/126 - 36/126 = 28/126 - 36/126$$

Now, subtract the fractions:

$$28/126 - 36/126 = (28 - 36)/126 = -8/126 = -4/63$$

(ii) $5/9 - [2/6 - 2/7]$:

To simplify, we'll simplify the expression inside the brackets first.

To subtract fractions, we need a common denominator. The LCM of 6 and 7 is 42.

Converting the fractions to have a denominator of 42:

$$2/6 = 14/42$$

$$2/7 = 12/42$$

$$2/6 - 2/7 = 14/42 - 12/42 = (14 - 12)/42 = 2/42 = 1/21$$

Now, substitute the simplified expression back into the original expression:

$$5/9 - [2/6 - 2/7] = 5/9 - 1/21$$

To subtract fractions, we need a common denominator. The LCM of 9 and 21 is 189.

Converting the fractions to have a denominator of 189:

$$5/9 = 35/63$$

$$1/21 = 9/189$$

$$5/9 - 1/21 = 35/63 - 9/189 = (35 \cdot 3)/63 - 9/189 = 105/189 - 9/189 = (105 - 9)/189 = 96/189 = 16/31$$

compare the results of the two expressions:

$$[5/9 - 2/6] - 2/7 = -4/63$$

$$5/9 - [2/6 - 2/7] = 16/31$$

Since $-4/63$ is not equal to $16/31$, we can conclude that $[5/9 - 2/6] - 2/7$ is not equal to $5/9 - [2/6 - 2/7]$.

(iv) To verify the statement $-6/11 - 0 = -6/11$, we can simplify both sides of the equation.

On the left side:

$$-6/11 - 0 = -6/11$$

On the right side:

$$-6/11$$

Both sides simplify to $-6/11$.

$-6/11 - 0$ is equal to $-6/11$.

Question 7

(i) $-2/6 + 5/9 - 1/3$:

To simplify, we need to find a common denominator for 6, 9, and 3. The LCM of 6, 9, and 3 is 18.

Converting the fractions to have a denominator of 18:

$$-2/6 = -6/18$$

$$5/9 = 10/18$$

$$1/3 = 6/18$$

$$-2/6 + 5/9 - 1/3 = -6/18 + 10/18 - 6/18 = (-6 + 10 - 6)/18 = -2/18 = -1/9$$

(ii) $3 - [5/9 - 3/15]$:

To simplify, we'll simplify the expression inside the brackets first.

To subtract fractions, we need a common denominator. The LCM of 9 and 15 is 45.

Converting the fractions to have a denominator of 45:

$$5/9 = 25/45$$

$$3/15 = 9/45$$

$$5/9 - 3/15 = 25/45 - 9/45 = (25 - 9)/45 = 16/45$$

Now, substitute the simplified expression back into the original expression:

$$3 - [5/9 - 3/15] = 3 - 16/45$$

$$3 - 16/45 = (3 \cdot 45 - 16)/45 = (135 - 16)/45 = 119/45$$

(iii) To simplify $5/14 + 3/7 + 1/21$ using the LCM method, we need to find a common denominator for the fractions.

The LCM of 14, 7, and 21 is 42.

Converting the fractions to have a denominator of 42:

$$5/14 = (5/14) \cdot (3/3) = 15/42$$

$$3/7 = (3/7) \cdot (6/6) = 18/42$$

$$1/21 = (1/21) \cdot (2/2) = 2/42$$

Now, we can add the fractions:

$$15/42 + 18/42 + 2/42 = (15 + 18 + 2)/42 = 35/42 \text{ or } 5/6$$

(iv) $1/6 + (-18/12) + (-4/3) + (7/2)$:

To simplify, we need to find a common denominator. The LCM of 6, 12, and 3 is 12.

Converting the fractions to have a denominator of 12:

$$1/6 = 2/12$$

$$-18/12 = -18/12$$

$$-4/3 = -16/12$$

$$7/2 = 42/12$$

$$1/6 + (-18/12) + (-4/3) + (7/2) = 2/12 + (-18/12) + (-16/12) + (42/12) = (2 - 18 - 16 + 42)/12 = 10/12 = 5/6$$

(v) To simplify $1 + 14/35 + (-5/21) + 24/15$, we can find a common denominator for the fractions involved.

The LCM of 35, 21, and 15 is 105.

Converting the fractions to have a denominator of 105:

$$1 = 105/105$$

$$14/35 = 42/105$$

$$-5/21 = -25/105$$

$$24/15 = 168/105$$

Now, we can add the fractions:

$$105/105 + 42/105 + (-25/105) + 168/105 = (105 + 42 - 25 + 168)/105 = 290/105$$

To simplify the fraction $290/105$, we can divide both the numerator and denominator by their greatest common divisor, which is 5:

$$290/105 = (290/5) / (105/5) = 58/21$$

$$1 + 14/35 + (-5/21) + 24/15 \text{ simplifies to } 58/21.$$

Question 8

To find the result of subtracting $1/4$ from the sum of $2/3$ and $-7/9$, we first need to find a common denominator for all the fractions involved.

The common denominator for 3, 9, and 4 is 36.

Converting the fractions to have a denominator of 36:

$$2/3 = (2/3) \cdot (12/12) = 24/36$$

$$-7/9 = (-7/9) \cdot (4/4) = -28/36$$

$$1/4 = (1/4) \cdot (9/9) = 9/36$$

Now, we can find the sum of $24/36$ and $-28/36$:

$$24/36 + (-28/36) = (24 - 28)/36 = -4/36$$

Subtract $9/36$ from $-4/36$:
 $-4/36 - 9/36 = (-4 - 9)/36 = -13/36$

Question 9

To find the number that should be added to -1 to get $5/7$, we can set up an equation:
 $-1 + x = 5/7$

Subtract -1 from both sides of the equation:

$$x = 5/7 - (-1)$$

To subtract a negative number, we can change the sign and add:

$$x = 5/7 + 1$$

To add the fractions, we need a common denominator. The common denominator of 7 and 1 is 7 .

Converting 1 to have a denominator of 7 :

$$1 = 1 * (7/7) = 7/7$$

Now we can add the fractions:

$$x = 5/7 + 7/7$$

Combining the numerators:

$$x = (5 + 7)/7$$

Simplifying the numerator:

$$x = 12/7$$

number added to -1 to get $5/7$ is $12/7$.

Question 10.

To subtract the sum of $-6/7$ and $-4/14$ from the sum of $1/2$ and $-2/7$, we need to find the sum of $1/2$ and $-2/7$, and then subtract the sum of $-6/7$ and $-4/14$ from it.

First, let's find the sum of $1/2$ and $-2/7$:

$$1/2 + (-2/7) = 7/14 + (-4/14) = 3/14$$

Now, let's subtract the sum of $-6/7$ and $-4/14$ from $3/14$:

$$3/14 - (-6/7 + (-4/14))$$

To simplify the expression inside the subtraction, let's find the sum of $-6/7$ and $-4/14$:

$$-6/7 + (-4/14) = -6/7 - 2/7 = -8/7$$

Now, substituting the sum into the subtraction:

$$3/14 - (-8/7)$$

To subtract a negative number, we can change the sign and add:

$$3/14 + 8/7$$

To find a common denominator, we multiply the denominators:

$$3/14 + (8/7)*(2/2) = 3/14 + 16/14$$

Combining the numerators:

$$(3 + 16)/14 = 19/14$$

Question 11

(i) F (ii) F (iii) T (iv) T (v) T (vi) F

Exercise 2.3

Question 1.

(i) $5/18 * -90/109$:

To multiply fractions, we multiply the numerators together and the denominators together:

$$(5 * -90) / (18 * 109) = -450 / 1962 \text{ or } -25/109$$

(ii) $28 * -3/7$:

To multiply a whole number by a fraction, we multiply the whole number by the numerator and keep the denominator the same:

$$28 * (-3/7) = -84/7 = -12$$

(iii) $3/10 * 2/9$:

Multiplying the numerators and denominators:

$$(3 * 2) / (10 * 9) = 6/90 = 1/15$$

(iv) $33 * 5 / -11$:

Multiplying the whole numbers and dividing by the denominator:

$$(33 * 5) / -11 = -165/11 = -15$$

(v) $2/3 * 4/5$:

Multiplying the numerators and denominators:

$$(2 * 4) / (3 * 5) = 8/15$$

(vi) $10 / -16 * -32 / -5$:

Multiplying the numerators and denominators:

$$(10 * -32) / (-16 * -5) = -320 / 80 = -4$$

Question 2

Let's solve the given multiplications:

(i) $6/13$ multiplied by $-65/6$:

To multiply fractions, we multiply the numerators together and the denominators together:

$$(6 * -65) / (13 * 6) = -390 / 78 = -5$$

(ii) $-8/7$ multiplied by $49/64$:

Multiplying the numerators and denominators:

$$(-8 * 49) / (7 * 64) = -392 / 448 = -7/8$$

(iii) $1/4$ multiplied by $5/2$:

Multiplying the numerators and denominators:

$$(1 * 5) / (4 * 2) = 5 / 8$$

(iv) $-8/15$ multiplied by $3/16$:

Multiplying the numerators and denominators:

$$(-8 * 3) / (15 * 16) = -24 / 240 = -1/10$$

(v) $-2/7$ multiplied by $3/11$:

Multiplying the numerators and denominators:

$$(-2 * 3) / (7 * 11) = -6 / 77$$

(vi) $-3/5$ multiplied by $-25/15$:

Multiplying the numerators and denominators:

$$(-3 * -25) / (5 * 15) = 75 / 75 = 1$$

Question 3

(i) $-5/8$ (ii) $-7/12, 11/5$ (iii) $-30/95, -30/95$ (iv) $0, 0$ (v) $-8/9, -10/23$

Question 4

(i) $-2/7 * [-21/15]$:

When multiplying a fraction by a negative number, we can multiply the numerators together and the denominators together. The negative sign can be applied to the result:

$$(-2/7) * (-21/15) = (2 * 21) / (7 * 15) = 42/105 = 2/5$$

(ii) $[11/12 * 12/121] - [-6/5 * 70/60]$:

First, let's simplify the expression inside the square brackets:

$$(11/12 * 12/121) = 1/11$$

Next, simplify the expression after the subtraction sign:

$$(-6/5 * 70/60) = (-6 * 70) / (5 * 60) = -420/300 = -7/5$$

Now, substitute the simplified expressions into the original equation:

$$[11/12 * 12/121] - [-6/5 * 70/60] = 1/11 - (-7/5) = 1/11 + 7/5$$

To add fractions, we need a common denominator. In this case, the common denominator is 55:

$$(1/11) + (7/5) = (5/55) + (77/55) = 82/55$$

Let's simplify the given expressions:

(iii) $[-2/5 * -3/10] - [2/3 * -3/5] + [3/4 * 2/3]$:

First, simplify each term individually:

$$[-2/5 * -3/10] = 6/50 = 3/25$$

$$[2/3 * -3/5] = -6/15 = -2/5$$

$$[3/4 * 2/3] = 6/12 = 1/2$$

Now, substitute the simplified expressions into the original equation:

$$[3/25] - [-2/5] + [1/2] = 3/25 + 2/5 + 1/2$$

To add fractions, we need a common denominator. In this case, the common denominator is 50:

$$(3/25) + (2/5) + (1/2) = (6/50) + (20/50) + (25/50) = 51/50$$

Therefore, the solution is $51/50$.

(iv) $[7/15 * -15/21] + [-3/5 * 4/9]$:

Simplifying each term individually:

$$[7/15 * -15/21] = -105/315 = -1/3$$

$$[-3/5 * 4/9] = -12/45 = -4/15$$

Now, substitute the simplified expressions into the original equation:

$$[-1/3] + [-4/15] = -1/3 - 4/15$$

To subtract fractions, we need a common denominator. In this case, the common denominator is 15:

$$(-1/3) - (4/15) = (-5/15) - (4/15) = -9/15$$

Simplifying the resulting fraction:

$$-9/15 = -3/5$$

Question 5

(i) Reciprocal of 24:

The reciprocal of 24 is $1/24$.

(ii) Reciprocal of $5/-1$:

The reciprocal of $5/-1$ is $-1/5$.

(iii) Reciprocal of $3/8$:

The reciprocal of $3/8$ is $8/3$.

(iv) Reciprocal of -27:

The reciprocal of -27 is $-1/27$.

(v) Reciprocal of $-30/-83$:

The reciprocal of $-30/-83$ is $-83/-30$, which simplifies to $83/30$.

(vi) Reciprocal of $-1/49$:

The reciprocal of $-1/49$ is $-49/1$, which simplifies to -49.

Question 6

(i)

Given: $x = -4/3, y = 1/5, z = 3/4$

Left-hand side: $x*(y*z) = (-4/3) * ((1/5) * (3/4))$

Simplifying : $(1/5) * (3/4) = 3/20$

Multiplying with x: $(-4/3) * (3/20) = -12/60 = -1/5$

Right-hand side: $(x*y)*z = ((-4/3) * (1/5)) * (3/4)$

Simplifying : $(-4/3) * (1/5) = -4/15$

Multiplying with z: $(-4/15) * (3/4) = -12/60 = -1/5$

Therefore, $x*(y*z)$ is equal to $(x*y)*z$

(ii)

Given: $x = 1/2, y = 1/-4, z = 1/3$

Left-hand side: $x*(y*z) = (1/2) * ((1/-4) * (1/3))$

Simplifying inside the parentheses: $(1/-4) * (1/3) = -1/12$

Multiplying with x: $(1/2) * (-1/12) = -1/24$

Right-hand side: $(x*y)*z = ((1/2) * (1/-4)) * (1/3)$

Simplifying inside the parentheses: $(1/2) * (1/-4) = 1/-8 = -1/8$

Multiplying with z: $(-1/8) * (1/3) = -1/24$

Therefore, $x*(y*z)$ is equal to $(x*y)*z$

Question 7

(i)

Given: $x = -3/4, y = 5/2, z = 1/5$

Left-hand side: $x*(y+z) = (-3/4) * ((5/2) + (1/5))$

Simplifying inside the parentheses: $(5/2) + (1/5) = 25/10 + 2/10 = 27/10$

Multiplying with x: $(-3/4) * (27/10) = -81/40$

Right-hand side: $(x*y) + (x*z) = ((-3/4) * (5/2)) + ((-3/4) * (1/5))$

Simplifying inside the parentheses: $(-3/4) * (5/2) = -15/8, (-3/4) * (1/5) = -3/20$

Adding the results: $(-15/8) + (-3/20) = -75/40 + (-3/20) = -78/40 = -39/20$

Both sides of the equation simplify to $-81/40$. So, $x*(y+z)$ is equal to $(x*y) + (x*z)$

(ii) $x = 0, y = 5/6, z = -5/12$

Left-hand side: $x*(y+z) = 0 * ((5/6) + (-5/12)) = 0$

Right-hand side: $(xy) + (xz) = (0 * (5/6)) + (0 * (-5/12)) = 0 + 0 = 0$

Both sides of the equation simplify to 0, which means $x*(y+z)$ is equal to $(xy) + (xz)$, verifying the property for the given values.

Question 8

(i) positive (ii) negative (iii) 1,-1 (iv) 0 (v) a (vi) 1 (vii) No

Exercise 2.4

Question 1.

(i) $7/5$ (ii) 0 (iii) $-11/13$ (iv) $-14/33$

Question 2

(i) $5/27/5/27 = (5/27) * (27/5) = 1 * 1 = 1$

Therefore, the statement is true.

(ii) $3/5/2/9 = (3/5) * (9/2) = 27/10$

$2/9/3/5 = (2/9) * (5/3) = 10/27$

Since $27/10$ is not equal to $10/27$, the statement is false.

(iii) $3/13/-4/7 = (3/13) * (-7/4) = -21/52$

$-4/7/3/13 = (-4/7) * (13/3) = -52/21$

Since $-21/52$ is not equal to $-52/21$, the statement is false.

(iv) $3/10/-4/7 = (3/10) * (-7/4) = -21/40$

$-4/7/3/10 = (-4/7) * (10/3) = -40/21$

Since $-21/40$ is not equal to $-40/21$, the statement is false.

(v) $5/13/1 = (5/13) * 1 = 5/13$

The statement is true.

(vi) $[2/5/3/8] / -3/5 = (2/5) / (-3/5) = (2/5) * (-5/3) = -2/3$

$2/5/[3/8/-3/5] = (2/5) / (3/8) * (-3/5) = (2/5) * (8/3) * (-3/5) = -32/15$

Since $-2/3$ is not equal to $-32/15$, the statement is false.

Question 3

1.

(i) $x/y = (3/5) / (-1/4) = (3/5) * (-4/1) = -12/5$

$y/x = (-1/4) / (3/5) = (-1/4) * (5/3) = -5/12$

Since $-12/5$ is not equal to $-5/12$, the statement x/y is not equal to y/x is true.

(ii) $x/x = (3/5) / (3/5) = (3/5) * (5/3) = 1$

$y+y = (-1/4) + (-1/4) = -2/4 = -1/2$

Therefore, x/x equals 1 and $y+y$ equals $-1/2$.

2. (i) Let's verify each statement using the given values:

(i) $(x/y) / z = ((4/9) / (-2/5)) / (-1/4) = (4/9) * (5/2) * (-4/1) = -80/9$

$x/(y/z) = (4/9) / ((-2/5) / (-1/4)) = (4/9) / (10/8) = (4/9) * (8/10) = 32/90 = 16/45$

Since $-80/9$ is not equal to $16/45$, the statement $(x/y) / z$ is not equal to $x/(y/z)$ is true.

(ii) $x/(y+z) = (4/9) / ((-2/5) + (-1/4)) = (4/9) / (-8/20 - 5/20) = (4/9) / (-13/20) = (4/9) * (-20/13) = -80/117$

$(x/y) + (x/z) = (4/9) + ((4/9) / (-1/4)) = (4/9) + (4/9) * (-4/1) = (4/9) - 16/9 = -12/9 = -4/3$

Since $-80/117$ is not equal to $-4/3$, the statement $x/(y+z)$ is not equal to $(x/y) + (x/z)$ is true.

Question 4

$$(i) (3/10) \div (6/20) = (3/10) * (20/6) = (3/10) * (10/3) = 1$$

$$(ii) (8/7) \div (6/21) = (8/7) * (21/6) = (8/7) * (7/2) = 4$$

$$(iii) (5/12) \div (-5/12) = (5/12) * (-12/5) = -1$$

$$(iv) (0) \div (9/17) = 0$$

$$(v) (6) \div (1/4) = (6) * (4/1) = 24$$

$$(vi) (-6/7) \div (-8) = (-6/7) * (-1/8) = 3/28$$

$$(vii) (12/56) \div (-7) = (12/56) * (-1/7) = 3/14 * -1/7 = -3/98$$

Question 5

To find the number that should be multiplied by $-7/26$ to get the product $56/78$, we can set up the following equation:

$$x * (-7/26) = 56/78$$

To solve for x , we can multiply both sides of the equation by the reciprocal of $-7/26$, which is $-26/7$:

$$x * (-7/26) * (-26/7) = (56/78) * (-26/7)$$

Simplifying the equation, we have:

$$x = (56/78) * (-26/7)$$

Now, we can calculate the value of x :

$$x = (56 * -26) / (78 * 7)$$

$$x = -1456 / 546$$

$$x = -728 / 273$$

Number $-728/273$ or $-8/3$

Question 6

To find the number that should be multiplied by $7/3$ to get the product $-35/81$, we can set up the following equation:

$$(7/3) * x = -35/81$$

To solve for x , we can multiply both sides of the equation by the reciprocal of $7/3$, which is $3/7$:

$$x = (-35/81) * (3/7)$$

Multiplying the numerators and denominators gives:

$$x = (-35 * 3) / (81 * 7)$$

$$x = -105 / 567$$

The simplified fraction is $-35/189$. The number that should be multiplied by $7/3$ to get the product $-35/81$ is $-35/189$ or $-5/27$.

Question 7

Other rational number is represented by "x". We are given that the product of the two rational numbers is $-\frac{16}{9}$. So,

$$(-\frac{4}{3}) * x = -\frac{16}{9}$$

To solve for "x," we can multiply both sides of the equation by the reciprocal of $-\frac{4}{3}$, which is $-\frac{3}{4}$:

$$x = (-\frac{16}{9}) * (-\frac{3}{4})$$

Multiplying the numerators and denominators gives:

$$x = \frac{(16 * 3)}{(9 * 4)}$$
$$x = \frac{48}{36}$$

The fraction $\frac{48}{36}$ can be simplified by dividing both the numerator and denominator by their greatest common divisor, which is 12:

$$x = \frac{(48/12)}{(36/12)}$$
$$x = \frac{4}{3}$$

other rational number is $\frac{4}{3}$.

CHAPTER 3

Exercise 3.1

Question 1.

$$(i) (-\frac{2}{7})^3 \quad (ii) (\frac{3}{11})^5 \quad (iii) (-\frac{p}{q})^7 \quad (iv) (\frac{x}{3})^7 \quad (v) (-\frac{7}{y})^4 \quad (vi) (-\frac{3}{8})^4$$

Question 2

(Multiplying with the given power)

$$(i) \frac{4}{25} \quad (ii) -\frac{1}{243} \quad (iii) \frac{63}{125} \quad (iv) \frac{16}{81} \quad (v) \frac{81}{2401}$$

Question 3

$$(i) (-\frac{5}{9})^3 \quad (ii) (\frac{1}{2})^6 \quad (iii) (\frac{4}{5})^2 \quad (iv) (-\frac{6}{7})^3 \quad (v) (-\frac{2}{3})^3 \quad (vi) (-\frac{3}{5})^5$$

Question 4

$$(i) (\frac{2}{3})^{-1}:$$

To find the reciprocal of a fraction, we swap the numerator and denominator. Therefore,

$$(\frac{2}{3})^{-1} = \frac{3}{2}$$

$$(ii) (\frac{3}{7})^{-2}:$$

Again, we need to find the reciprocal and then square it:

$$(\frac{3}{7})^{-2} = (\frac{7}{3})^2 = \frac{49}{9}$$

$$(iii) (\frac{4}{9})^{-5}:$$

Similar to the previous cases, we find the reciprocal and then raise it to the power of -5:

$$(\frac{4}{9})^{-5} = (\frac{9}{4})^5 = \frac{59049}{1024} \text{ or } 57 \frac{681}{1024}$$

$$(iv) (\frac{13}{17})^2 * (\frac{13}{17})^{-3}:$$

We can simplify this expression by using the property of exponents. When we multiply two numbers with the same base, we add their exponents. Therefore,

$$(\frac{13}{17})^2 * (\frac{13}{17})^{-3} = (\frac{13}{17})^{(2 + (-3))} = (\frac{13}{17})^{-1} = \frac{17}{13}$$

$$(v) (\frac{5}{9})^1 * (\frac{5}{9})^{-1}:$$

Similar to the previous case, we can apply the exponent property:

$$(\frac{5}{9})^1 * (\frac{5}{9})^{-1} = (\frac{5}{9})^{(1 + (-1))} = (\frac{5}{9})^0 = 1$$

Question . 5

Let's evaluate each expression:

(i) $(8/13)^0$:

Any number raised to the power of 0 is equal to 1. Therefore,
 $(8/13)^0 = 1$

(ii) $(2/3)^0$:

Similarly, any number raised to the power of 0 is equal to 1.
 $(2/3)^0 = 1$

(iii) $(7/13)^0 * (8/11)^0$:

Again, both fractions are raised to the power of 0, resulting in 1 for each term.
 $(7/13)^0 * (8/11)^0 = 1 * 1 = 1$

(iv) $(6/7)^0 * (5)^0 * (1/7)^0$:

Similarly, each term is raised to the power of 0, resulting in 1 for each term.
 $(6/7)^0 * (5)^0 * (1/7)^0 = 1 * 1 * 1 = 1$

Question 6

(i) $(-4)^2 * (-1/4)^2$:

To square a negative number, we simply square its positive value. Therefore,
 $(-4)^2 * (-1/4)^2 = 4^2 * (1/4)^2 = 16 * 1/16 = 1$

(ii) $(-3)^3 * (1/3)^3$:

Cubing a negative number results in a negative value. Therefore,
 $(-3)^3 * (1/3)^3 = -27 * (1/27) = -1$

(iii) $(3/4)^4 * (2/3)^5 = (3^4/4^4) * (2^5/3^5) = (81/256) * (32/243)$

To multiply fractions, we multiply the numerators and denominators:

$$(81/256) * (32/243) = (81 * 32) / (256 * 243) = 2592 / 62208$$

We can simplify this fraction by dividing both the numerator and denominator by their greatest common divisor, which is 1296:

$$2592 / 62208 = (2592 / 1296) / (62208 / 1296) = 2 / 48$$

Now we can simplify further by dividing both the numerator and denominator by their greatest common divisor, which is 2:

$$2 / 48 = 1 / 24$$

iv) $(-9/7)^3 / 3^0$:

Any number raised to the power of 0 is equal to 1. Therefore,
 $(-9/7)^3 / 3^0 = (-9/7)^3 / 1 = -729/343$

(v) To simplify the expression $5^3 / (1/-15)^2$, we can start by simplifying the denominator:

$$(1/-15)^2 = (1/(-15))^2 = (1/225)$$

Now, we can rewrite the expression as:

$$5^3 / (1/225)$$

To divide by a fraction, we multiply by its reciprocal. Therefore, we can rewrite the expression as:

$$5^3 * (225/1)$$

Simplifying the numerator:

$$5^3 = 5 * 5 * 5 = 125$$

Multiplying the numerator and denominator:

$$125 * 225 = 28125$$

(vi) To simplify the expression $(2/7)^3 * (7/2)^2$, we can calculate each term separately:

$$(2/7)^3 = 2^3/7^3 = 8/343$$

$$(7/2)^2 = 7^2/2^2 = 49/4$$

Now, we can multiply these fractions together:

$$(8/343) * (49/4) = (8 * 49) / (343 * 4) = 392/1372$$

To simplify further, we can divide both the numerator and denominator by their greatest common divisor, which is 28:

$$392/1372 = (392/28) / (1372/28) = 14/49 = 2/7$$

(vii)

To simplify the expression $(-3/4)^{-4} * (2/-3)^0$, we can simplify each term:

$$(-3/4)^{-4} = (4/-3)^4 = (4/3)^4$$

$$(2/-3)^0 = 1$$

Now, we can multiply these two terms together:

$$(4/3)^4 * 1 = (4/3)^4$$

To simplify further, we can raise the numerator and denominator to the power of 4:

$$(4/3)^4 = 4^4/3^4 = 256/81$$

(viii)

Reciprocal of a number raised to a negative power results in the positive power of the reciprocal:

$$(1/3)^3 * (3/2)^{-2} = (1/27) * (1/(3/2)^2) = (1/27) * (4/9) = 4/243$$

(ix) Any number (except 0) raised to the power of 0 is equal to 1. Therefore,

$$(-1/3)^0 / (2/3)^0 = 1 / 1 = 1$$

(x)

To simplify the expression $(1/2)^{-4} / (1/3)^4$, we can rewrite it as follows:

$$(1/2)^{-4} / (1/3)^4 = (2/1)^4 / (3/1)^4 = 2^4 / 3^4$$

Evaluating the numerator and denominator:

$$2^4 = 2 * 2 * 2 * 2 = 16$$

$$3^4 = 3 * 3 * 3 * 3 = 81$$

Therefore, the simplified expression is 16/81.

Question 7.

(i) $1/9$ (ii) $1/256$ (iii) $(17/-11)^{-3}$ (iv) $(-4/3)^{-11}$
 (v) $= 1 / (5^3/9^3 * 9^5/5^5)$

$= 1 / (5^{(3-5)} * 9^{(5-3)})$ (Using the property $a^m / a^n = a^{(m-n)}$)

$= 1 / (5^{(-2)} * 9^2)$

$= 1 / (1/5^2 * 81)$

$= 1 / (1/25 * 81)$

To divide by a fraction, we can multiply by its reciprocal:

$= 1 * (25/81)$

$= 25/81$

Therefore, the reciprocal of $(5/9)^3 * (9/5)^5$ is $25/81$

(vi)

Reciprocal of $(-1/8)^8 / (-1/8)^2 = 1 / ((-1/8)^8 / (-1/8)^2)$

Now, let's simplify the expression inside the reciprocal:

$= 1 / ((-1/8)^8 / (-1/8)^2)$

$= 1 / ((1/8)^8 / (1/8)^2)$ (Since dividing by a negative number does not affect the reciprocal)

$= 1 / (1/8)^6$

To find the reciprocal of $(1/8)^6$, we invert the fraction:

$= 1 / (1 / (1/8)^6)$

$= 1 / (1 / (1/8)^6)$

$= 1 / (8/1)^6$

$= 1 / (8^6)$

$= 1 / 262,144$

Therefore, the reciprocal of $(-1/8)^8 / (-1/8)^2$ is $1 / 262,144$.

Question 8

(i) Absolute value of $(-10/13)^2$:

The square of any number, whether positive or negative, is always positive.

So, the absolute value of $(-10/13)^2$ is $(10/13)^2 = 100/169$ or $(10/13)^2$

(ii) Absolute value of $(-4/7)^3$:

The cube of any number, whether positive or negative, is always negative if the original number is negative.

Since $(-4/7)$ is negative, its cube will be negative.

So, the absolute value of $(-4/7)^3$ is $-((-4/7)^3) = -64/343$ or $(4/7)^3$

(iii) Absolute value of $(7/9)^4$:

The fourth power of any number, whether positive or negative, is always positive.

So, the absolute value of $(7/9)^4$ is $(7/9)^4 = 2401/6561$ or $(7/9)^4$

(iv) Absolute value of $(11/12)^4$:

The fourth power of any number, whether positive or negative, is always positive.

So, the absolute value of $(11/12)^4$ is $(11/12)^4 = 14641/20736$ or $(11/12)^4$

Question 9

(i) To show the given equations:

$$(i) (3/7)^5 = 243/343$$

We can calculate the powers of $(3/7)$ to demonstrate this:

$$(3/7)^5 = (3^5)/(7^5) = 243/16807$$

Therefore, $(3/7)^5$ is indeed equal to $243/343$.

$$(ii) (-8/11)^5 = -512/1331$$

Similarly, we can calculate the powers of $(-8/11)$ to demonstrate this:

$$(-8/11)^5 = (-8^5)/(11^5) = -32768/161051$$

Therefore, $(-8/11)^5$ is equal to $-512/1331$.

Question 10.

To simplify and express the expression $(1/2)^3 * (-3/4)^3 / (3/5)^3$ as a rational number, we can perform the necessary calculations:

$$(1/2)^3 * (-3/4)^3 / (3/5)^3$$

$$= (1^3/2^3) * (-3^3/4^3) / (3^3/5^3)$$

$$= (1/8) * (-27/64) / (27/125)$$

Next, we can simplify the expression by canceling out common factors between the numerators and denominators:

$$= [(1 * -27) / (8 * 64)] / [(27) / (125)]$$

$$= (-27 / 512) / (27 / 125)$$

To divide by a fraction, we multiply by its reciprocal:

$$= (-27 / 512) * (125 / 27)$$

The (-27) and (27) cancel out:

$$= -125 / 512$$

Question . 11

$$(i) 625/1024 (ii) (-343/729)$$

Question 12

To simplify the given expressions:

$$(i) 1 / (-3)^5 / (-2)^5:$$

First, let's simplify the exponents:

$$(-3)^5 = (-3) * (-3) * (-3) * (-3) * (-3) = -243$$

$$(-2)^5 = (-2) * (-2) * (-2) * (-2) * (-2) = -32$$

Now, substitute the simplified values back into the expression:

$$1 / (-3)^5 / (-2)^5 = 1 / (-243) / (-32)$$

To divide by a fraction, we multiply by its reciprocal:

$$= 1 * (-32) / (-243)$$

$$= 32 / 243$$

(ii) $(-1/5)^8 / (-1/5)^2$:

Let's simplify the exponents:

$$(-1/5)^8 = (-1/5) * (-1/5) * (-1/5) * (-1/5) * (-1/5) * (-1/5) * (-1/5) * (-1/5) = 1/390625$$

$$(-1/5)^2 = (-1/5) * (-1/5) = 1/25$$

Now, substitute the simplified values back into the expression:

$$(-1/5)^8 / (-1/5)^2 = (1/390625) / (1/25)$$

To divide by a fraction, we multiply by its reciprocal:

$$= (1/390625) * (25/1)$$

$$= 25/390625 \text{ or } 1/15,625$$

To simplify the given expressions:

(iii) $(3/7)^3 * (7/3)^5$:

Let's simplify each term separately:

$$(3/7)^3 = (3)^3 / (7)^3 = 27 / 343$$

$$(7/3)^5 = (7)^5 / (3)^5 = 16807 / 243$$

Now, substitute these values back into the expression:

$$(3/7)^3 * (7/3)^5 = (27 / 343) * (16807 / 243)$$

To simplify further, we can multiply the numerators and denominators:

$$= (27 * 16807) / (343 * 243)$$

$$= 453,789 / 83,349$$

(iv) $(-4/5)^2$:

$$(-4/5)^2 = (-4)^2 / (5)^2 = 16 / 25$$

(v) To simplify the expression $(-2/3)^{10}$, we raise both the numerator and denominator to the 10th power:

$$(-2/3)^{10} = (-2)^{10} / (3)^{10}$$

$$= (-2) * (-2) * (-2) * (-2) * (-2) * (-2) * (-2) * (-2) * (-2) * (-2) / (3) * (3) * (3) * (3) * (3) * (3) * (3) * (3) * (3) * (3)$$

$$= 1024 / 59049$$

Exercise 3.2

Question 1

To evaluate the given expressions:

(i) $(1/5)^4$:

$$(1/5)^4 = (1)^4 / (5)^4 = 1/625$$

(ii) $(-3)^{-2}$:

$$(-3)^{-2} = 1 / (-3)^2 = 1/9$$

(iii) 2^3 :

$$2^3 = 2 * 2 * 2 = 8$$

(iv) $(-1/7)^{-3}$:

$$(-1/7)^{-3} = 1 / (-1/7)^3 = 1 / (-1/343) = -343$$

Question 2

i) $(-1/2)^2 * (-1/2)^{-7}$:

$$(-1/2)^2 = (-1/2) * (-1/2) = 1/4$$

$(-1/2)^{-7}$ is the reciprocal of $(-1/2)^7$. To find the reciprocal, we flip the fraction:

$$(-1/2)^{-7} = (-2/1)^7 = -128$$

Now, multiply the two results:

$$(1/4) * (-128) = -32$$

To evaluate the given expressions:

(ii) $(-1/6)^2 * (-1/6)^3$:

$$(-1/6)^2 = (-1/6) * (-1/6) = 1/36$$

$$(-1/6)^3 = (-1/6) * (-1/6) * (-1/6) = -1/216$$

Now, multiply the two results:

$$(1/36) * (-1/216) = -1/7776$$

Therefore, $(-1/6)^2 * (-1/6)^3 = -1/7776$.

(iii) $(2/9)^{-5} * (2/9)^3$:

$(2/9)^{-5}$ is the reciprocal of $(2/9)^5$. To find the reciprocal, we flip the fraction:

$$(2/9)^{-5} = (9/2)^5 = 59049/32$$

$$(2/9)^3 = (2/9) * (2/9) * (2/9) = 8/729$$

Now, multiply the two results:

$$(59049/32) * (8/729) = 19683/11664 = 729/432$$

Therefore, $(2/9)^{-5} * (2/9)^3 = 729/432$.

(iv) $(2/5)^2 * (5/2)^{-3}$:

$$(2/5)^2 = (2/5) * (2/5) = 4/25$$

$(5/2)^{-3}$ is the reciprocal of $(5/2)^3$. To find the reciprocal, we flip the fraction:

$$(5/2)^{-3} = (2/5)^3 = 8/125$$

Now, multiply the two results:

$$(4/25) * (8/125) = 32/3125$$

Therefore, $(2/5)^2 * (5/2)^{-3} = 32/3125$.

Question 3

(i) $(-3/5)^{17} / (-3/5)^4$:

To simplify and express the given expressions in exponential form:

(i) $(-3/5)^{17} / (-3/5)^4$:

When dividing exponential expressions with the same base, we subtract the exponents:

$$(-3/5)^{17} / (-3/5)^4 = (-3/5)^{(17-4)} = (-3/5)^{13}$$

(ii) $(3/10)^{11} / (3/10)^7$:

Similarly, when dividing exponential expressions with the same base, we subtract the exponents:

$$(3/10)^{11} / (3/10)^7 = (3/10)^{(11-7)} = (3/10)^4$$

(iii) $(3/7)^7 / (3/7)^6$:

Once again, when dividing exponential expressions with the same base, we subtract the exponents:

$$(3/7)^7 / (3/7)^6 = (3/7)^{(7-6)} = (3/7)^1 = 3/7$$

(iv) $(-4/9)^8 / (-4/9)^4$:

Applying the same rule for dividing exponential expressions with the same base:

$$(-4/9)^8 / (-4/9)^4 = (-4/9)^{(8-4)} = (-4/9)^4$$

Question 4

(i) $(\frac{3}{7})^7 / (\frac{3}{7})^{11}$:

When dividing exponential expressions with the same base, we subtract the exponents:

$$(\frac{3}{7})^7 / (\frac{3}{7})^{11} = (\frac{3}{7})^{(7-11)} = (\frac{3}{7})^{-4}$$

To express this in positive exponent, we take the reciprocal of the base:

$$(\frac{3}{7})^{-4} = (\frac{7}{3})^4$$

(ii) $(\frac{2}{7})^{17} / (\frac{2}{7})^{20}$:

$$(\frac{2}{7})^{17} / (\frac{2}{7})^{20} = (\frac{2}{7})^{(17-20)} = (\frac{2}{7})^{-3}$$

Taking the reciprocal of the base to express it in positive exponent:

$$(\frac{2}{7})^{-3} = (\frac{7}{2})^3$$

(iii) $(-\frac{3}{7})^9 / (-\frac{3}{7})^{13}$:

$$(-\frac{3}{7})^9 / (-\frac{3}{7})^{13} = (-\frac{3}{7})^{(9-13)} = (-\frac{3}{7})^{-4}$$

Taking the reciprocal of the base to express it in positive exponent:

$$(-\frac{3}{7})^{-4} = (\frac{7}{-3})^4 = \frac{7^4}{(-3)^4}$$

(iv) $(-\frac{4}{5})^3 / (-\frac{4}{5})^6$:

$$(-\frac{4}{5})^3 / (-\frac{4}{5})^6 = (-\frac{4}{5})^{(3-6)} = (-\frac{4}{5})^{-3}$$

Taking the reciprocal of the base to express it in positive exponent:

$$(-\frac{4}{5})^{-3} = (\frac{5}{-4})^3 = \frac{5^3}{(-4)^3}$$

Question 5

DO YOURSELF

Question 6

1) $19^0=1$

2) $3^0=1$

3) $8^0=1$

4) $(-17)^{18-18}$

$(-17)^0=1$

5) $(4^0-6^0) \times 10^0$

$(1-1) \times 1=0$

6) $(16^0-20^0) \times 10^6 \times 10^{12}$

$(1-1) \times 10^6 \times 10^{12}$

$0 \times 10^{18} = 0$

7) $(1^0-3^0) \times (7^0+2^0)$

$(1-1) \times (1+1)$

$0 \times 2 = 0$

8) $3^0+5^0+7^0$

$1+1+1 = 3$

9) $4^0 \times 5^0 \times 10^0 \times 13^0$

$1 \times 1 \times 1 = 1$

Question 7

To find the product by which $(\frac{1}{4})^{-3}$ should be multiplied to obtain 20, we can set up the equation:

$$x * (1/4)^{-3} = 20$$

To simplify this equation, we can first simplify the negative exponent:

$$(1/4)^{-3} = (4/1)^3 = 4^3/1^3 = 64/1 = 64$$

Now we have the equation:

$$x * 64 = 20$$

To solve for x, we divide both sides of the equation by 64:

$$x = 20/64$$

Simplifying the right side:

$x = 5/16$: $(1/4)^{-3}$ should be multiplied by $5/16$ to obtain a product of 20.

Question 8

To find the value of the expression $(3/7)^{-3} * (-3/7)^{-3}$, we can simplify each term separately and then multiply them together.

$$(3/7)^{-3} = (7/3)^3 \text{ [Taking the reciprocal and changing the sign of the exponent]} \\ = 343/27$$

$$(-3/7)^{-3} = (-7/3)^3 \text{ [Taking the reciprocal and changing the sign of the exponent]} \\ = -343/27$$

Now, we can multiply the two simplified terms together:

$$(3/7)^{-3} * (-3/7)^{-3} = (343/27) * (-343/27)$$

Multiplying the numerators and denominators:

$$(343 * -343) / (27 * 27)$$

$$= -117,649 / 729$$

Question 9

Question 10

Question 11

Question 12

Exercise 3.3

Question 1

(i) $5.08 * 10^{11}$ (ii) $1.36 * 10^{-9}$ (iii) $4.6 * 10^5$ (iv) $3.006839 * 10^{-8}$ (v) $1.25 * 10^{13}$

Question 2

(i) The base number is 6.5 and the power of 10 is 6.

Multiply the base number by 10 raised to the power of 6

Calculate 10^6 : $10^6 = 10,000,000$ (10 multiplied by itself 6 times).

$$6.5 * 10,000,000 = 65,000,000.$$

So, the step-by-step calculations show that $6.5 * 10^6$ equals 65,000,000 in usual form.

(ii)

The base number is 3.02 and the power of 10 is -2.

Calculate 10^{-2} :

$10^{-2} = 1 / (10^2) = 1 / 100 = 0.01$ (since a negative exponent means we take the reciprocal).
 $= 3.02 * 0.01 = 0.0302$.

(iii)

The base number is 2.0053 and the power of 10 is 8.

Multiply the base number by 10 raised to the power of 8: $2.0053 * 10^8 = 200,530,000$.

(iv)

The base number is 5.2 and the power of 10 is -6.

Multiply the base number by 10 raised to the power of -6: $5.2 * 10^{-6} = 0.0000052$.

(v)

The base number is 7.3 and the power of 10 is 8.

Multiply the base number by 10 raised to the power of 8: $7.3 * 10^8 = 730,000,000$.

(vi)

The base number is 6.60013 and the power of 10 is 7.

Multiply the base number by 10 raised to the power of 7: $6.60013 * 10^7 = 66,001,300$.

Question 3

(i) $1.28 * 10^{-5} \text{m}$ (ii) $1.0 * 10^{-6}$ (iii) $4.9 * 10^{-7}$ (iv) $7.0 * 10^{10}$ (v) $1.08323 * 10^{12}$

Question 4

$3.24 * 0.08666 = 0.2807784$

Now, divide the numerator by the denominator

$= 0.2807784 / 5.006$

$= 0.0560883$

Scientific method $= 5.60883 * 10^{-2}$

Question 5

The diameter of a wire on a computer clip is $3 * 10^{-6} \text{m}$.

The exponent -6 shows that you have to move the decimal point six places to the left. Starting with 3.000000, moving the decimal point six places to the left gives us:

0.000003 = answer

Question 6

Question 7

(i) Option B (ii) Option B (iii) Option D (iv) Option D (v) Option A (vi) Option B

CHAPTER 4

Exercise 4.1

Question 1

(i) $10^2 = 100$

and $11^2 = 121$

Now, $121 - 100 = 21$

So, there are $21 - 1 = 20$ numbers lying between the square of the numbers 10 and 11.

(ii) $100^2 = 10,000$ and $101^2 = 10,201$

Now, $10,201 - 10,000 = 201$

$201 - 1 = 200$

There are 200 number lying between the square of 100 and 101.

Question 2

49: The prime factorization of 49 is $7 * 7$. Each prime factor appears an even number of times (two 7's), so 49 is a perfect square.

121: The prime factorization of 121 is $11 * 11$. Each prime factor appears an even number of times (two 11's), so 121 is a perfect square.

729: The prime factorization of 729 is $3 * 3 * 3 * 3 * 3 * 3$. Each prime factor appears an even number of times (six 3's), so 729 is a perfect square.

576: The prime factorization of 576 is $2 * 2 * 2 * 2 * 2 * 2 * 3 * 3$. Each prime factor appears an even number of times (four 2's and two 3's), so 576 is a perfect square.

1225: The prime factorization of 1225 is $5 * 5 * 7 * 7$. Each prime factor appears an even number of times (two 5's and two 7's), so 1225 is a perfect square.

The perfect square numbers from the given list are: 49, 121, 729, 576, and 1225.

Question 3.

55; 217; 3,200; 69; 4,000 are not perfect squares.

Question 4

576 : the square root is 24, which is an even number. So, 576 is the square of an even number.

484: The square root of 484 is 22, which is an even number. Therefore, 484 is the square of an even number.

1,296: The square root of 1,296 is 36, which is an even number. Therefore, 1,296 is the square of an even number.

676: The square root of 676 is 26, which is an even number. Therefore, 676 is the square of an even number.

900: The square root of 900 is 30, which is an even number. Therefore, 900 is the square of an even number.

The perfect squares that are the squares of even numbers are: 484, 1,296, 676, and 900.

Question 5

1: The square of 1 is 1, which ends with 1.

109: The square of 109 is 11,881, which ends with 1.

161: The square of 161 is 25,921, which ends with 1.

Question 6

729: The square root of 729 is 27, which is an odd number. Therefore, 729 is the square of an odd number.

225: The square root of 225 is 15, which is an odd number. Therefore, 225 is the square of an odd number.

121: The square root of 121 is 11, which is an odd number. Therefore, 121 is the square of an odd number.

289: The square root of 289 is 17, which is an odd number. Therefore, 289 is the square of an odd number.

49: The square root of 49 is 7, which is an odd number. Therefore, 49 is the square of an odd number.

1089: The square root of 1089 is 33, which is an odd number. Therefore, 1089 is the square of an odd number.

Question 7

(i) $(\frac{2}{3})^2$:

$$(\frac{2}{3}) * (\frac{2}{3}) = \frac{4}{9}$$

(ii) $(\frac{12}{25})^2$:

$$(\frac{12}{25}) * (\frac{12}{25}) = \frac{144}{625}$$

(iii) $(\frac{101}{220})^2$:

$$(\frac{101}{220}) * (\frac{101}{220}) = \frac{10201}{48400}$$

(iv) $(\frac{19}{24})^2$:

$$(\frac{19}{24}) * (\frac{19}{24}) = \frac{361}{576}$$

(v) 6.25^2 :

$$6.25 * 6.25 = 39.0625$$

Question 8

Between 90^2 and 91^2

Here, $n=90$

$$2 * n = 2 * 90 \text{ or } 180$$

180 non-square numbers lie between 90 and 91.

Between 1000^2 and 1001^2

Here, $n = 1000$

$2 \times n = 2 \times 1000$ or 2000
2000 non-square lie between 1000^2 and 1001^2 .

Question 9

1.(a) Firstly, find the prime factors of 512.

$$512 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

In the above product 'one' two is left without the pair. So, 512 will be multiplied by 2.

(b) First find the prime factors of 1323

$= 3 \times 3 \times 3 \times 7 \times 7$ are the prime factors of 1323 now form pairs of two same numbers which number remains only one is your answer.

=multiply 1323 by 3

(ii) (a) $1575 = 3 \times 3 \times 5 \times 5 \times 7$

7 has no pair so if we divide it by 7 then quotient become a perfect square.

(b)

Prime factorization of 6912 =

$$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 = 2^8 \times 3^3$$

On grouping the prime factors of 6912 we see that 3 is left out.

The prime factor 3 does not occur in pair.

Therefore, we must divide by 3 to obtain a perfect square.

$$6912/3 = 2304$$

$$6912 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$$

$$\sqrt{6912} = 2 \times 2 \times 2 \times 2 \times 3 = 48 \text{ (a perfect square)}$$

Question 10

(i) For the number 1,234, the unit's digit is 4. When we square 4, we get 16, so the unit's digit of 1,234 squared is 6.

(ii) For the number 272, the unit's digit is 2. When we square 2, we get 4, so the unit's digit of 272 squared is 4.

(iii) For the number 52,698, the unit's digit is 8. When we square 8, we get 64, so the unit's digit of 52,698 squared is 4.

(iv) For the number 9,106, the unit's digit is 6. When we square 6, we get 36, so the unit's digit of 9,106 squared is 6.

(v) For the number 3,853, the unit's digit is 3. When we square 3, we get 9, so the unit's digit of 3,853 squared is 9.

(vi) For the number 99,880, the unit's digit is 0. When we square 0, we get 0, so the unit's digit of 99,880 squared is 0.

Question 11

(i)(a) 20^2 (b) 7^2

(ii)(a) $24^2 + 7^2$ (b) $12^2 + 5^2$ (c) $40^2 + 9^2$ (d) $24^2 + 10^2$

(iii)(a) 4,44,889 (b) 4,44,48,889 (c) 4,44,44,88,889

Question 12

(i) $(732)^2 - (731)^2$:

$$(732)^2 - (731)^2 = (732 + 731) * (732 - 731) = 1463 * 1 = 1463$$

(ii) $(34)^2 - (33)^2$:

$$(34)^2 - (33)^2 = (34 + 33) * (34 - 33) = 67 * 1 = 67$$

(iii) $(15)^2 - (14)^2$:

$$(15)^2 - (14)^2 = (15 + 14) * (15 - 14) = 29 * 1 = 29$$

$$(iv) (112)^2 - (111)^2:$$

$$(112)^2 - (111)^2 = (112 + 111) * (112 - 111) = 223 * 1 = 223$$

$$(v) (10002)^2 - (1001)^2:$$

$$(1002)^2 - (1001)^2 = (1002+1001) * (1002-1001) = 2003*1 = 2003$$

$$(vi) (2115)^2 - (2114)^2:$$

$$(2115)^2 - (2114)^2 = (2115 + 2114) * (2115 - 2114) = 4229 * 1 = 4229$$

Question 13

The sum of the first n odd numbers can be found using the formula n^2 .

Using this property

$$(i) 1+3+5+7:$$

$$1+3+5+7 = 4^2 = 16$$

$$(ii) 1+3+5+9+11+13+15:$$

$$1+3+5+9+11+13+15 = 7^2 = 49$$

$$(iii) 1+3+5+9+11+13+15+17:$$

$$1+3+5+9+11+13+15+17 = 8^2 = 64$$

$$(iv) 1+3+5+9+11+13+15+17+19+21+23:$$

$$1+3+5+9+11+13+15+17+19+21+23 = 11^2 = 121$$

Question 14

(i) To find Pythagorean triplets of 24, we can use the formula:

$$a = m^2 - n^2$$

$$b = 2mn$$

$$c = m^2 + n^2$$

let's try $m = 4$ and $n = 2$:

$$a = (4^2) - (2^2) = 16 - 4 = 12$$

$$b = 2 * 4 * 2 = 16$$

$$c = (4^2) + (2^2) = 16 + 4 = 20$$

Pythagorean triplets of 24 are 12, 16, and 20.

(ii)

$$a = m^2 - n^2$$

$$b = 2mn$$

$$c = m^2 + n^2$$

let's set 99 as the value of c and try to find values of m and n that satisfy the equation $m^2 + n^2 = 99$.

One possible solution is $m = 10$ and $n = 1$:

$$a = (10^2) - (1^2) = 100 - 1 = 99$$

$$b = 2 * 10 * 1 = 20$$

$$c = (10^2) + (1^2) = 100 + 1 = 101$$

Pythagorean triplet of 99 is 99, 20, and 101.

(iii)

Find values of m and n that satisfy the equation $m^2 + n^2 = 82$.

$m = 9$ and $n = 1$ satisfy the equation:

$$a = (9^2) - (1^2) = 81 - 1 = 80$$

$$b = 2 * 9 * 1 = 18$$

$$c = (9^2) + (1^2) = 81 + 1 = 82$$

Pythagorean triplets of 82 are 80, 18, and 82.

(iv) We can use the formula:

$$a = 2m$$

$$b = m^2 - 1$$

$$c = m^2 + 1$$

Let's calculate the values for $m = 7$:

$$a = 2 * 7 = 14$$

$$b = 7^2 - 1 = 49 - 1 = 48$$

$c = 7^2 + 1 = 49 + 1 = 50$
Pythagorean triplets are 14, 48, and 50.

Question 15

(i) Let's understand with the help of :

$$11^2 = 121$$

$$111^2 = 12321$$

$$1111^2 = 1234321$$

$$\text{Now, } 333^2/12321 = (333/111)^2 = (3)^2 = 9$$

(ii) Let's understand with

$$11111^2 = 123454321$$

$$55,555^2/123454321 = (55,555/11111)^2 = (5)^2 = 25$$

Question 16

(i) $12^2 = 12 * 12 = 144$

(ii) $25^2 = 25 * 25 = 625$

(iii) $37^2 = 37 * 37 = 1369$

(iv) $43^2 = 43 * 43 = 1849$

(v) $54^2 = 54 * 54 = 2916$

(vi) $98^2 = 98 * 98 = 9604$

Question 17

(i) LCM of 8, 9 and 10 = $2 \times 2 \times 2 \times 3 \times 3 \times 5 = 360$

Prime factors of 360 = $(2 \times 2) \times 2 \times (3 \times 3) \times 5$

Here, prime factors 2 and 5 are unpaired.

Multiply by 2×5 , ie. 10

Therefore, required number = $360 \times 10 = 3600$

(ii) LCM of 6, 9 and 15 = $2 \times 3 \times 3 \times 3 \times 5$

LCM is = $2 \times 3 \times 3 \times 5 = 90$ (to find the LCM we will take the highest number of times whichever prime is repeated and multiply with other primes.

We have 2 only one time, 3 is multiplied two times so we take and 5 is also there one time.)

Prime factorisation of 90 = $2 \times 3 \times 3 \times 5$

To find the smallest number that is a square and is divisible by 90 we will form a number by multiplying factors to the prime factorization of 90.

$2 \times 3 \times 3 \times 5$ a square we need each number to be multiplied to itself. i.e. each prime factor should be in square.

We can write the prime factors in the form of their powers as

$$2 \times 3 \times 3 \times 5 = 2^1 \times 3^2 \times 5^1$$

$$2^1 \times 2 \times 3^2 \times 5^1 \times 5 = 2^2 \times 3^2 \times 5^2$$

$$= 4 \times 9 \times 25 = 900$$

Question 18

The sum of the first n odd natural numbers is given by the formula: n^2 .

(i) For 36:

find the value of n such that $n^2 = 36$. In this case, $n = 6$.

36 can be expressed as the sum of the first 6 odd natural numbers: $1 + 3 + 5 + 7 + 9 + 11 = 36$.

(ii) For 16:

find the value of n such that $n^2 = 16$. In this case, $n = 4$.

16 can be expressed as the sum of the first 4 odd natural numbers: $1 + 3 + 5 + 7 = 16$.

(iii) For 81:

find the value of n such that $n^2 = 81$. In this case, $n = 9$.

81 can be expressed as the sum of the first 9 odd natural numbers: $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 = 81$.

(iv) For 25:

find the value of n such that $n^2 = 25$. In this case, $n = 5$. 25 can be expressed as the sum of the first 5 odd natural numbers: $1 + 3 + 5 + 7 + 9 = 25$.

(v) For 49:

find the value of n such that $n^2 = 49$. In this case, $n = 7$.

49 can be expressed as the sum of the first 7 odd natural numbers: $1 + 3 + 5 + 7 + 9 + 11 + 13 = 49$.

(vi) For 64:

find the value of n such that $n^2 = 64$. In this case, there is no value of n that satisfies this equation, as 64 is not a perfect square. Therefore, it cannot be expressed as the sum of a specific number of odd natural numbers.

Exercise 4.2

Question 1

(i) $225 = 3 \times 3 \times 5 \times 5 = \sqrt{225} = 3 \times 5 = 15$.

(ii) $729 = 3 \times 3 \times 3 \times 3 \times 3 = 3 \times 3 \times 3 = 27$

(iii) $6561 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$ and hence $6561 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3 \times 3 \times 3 = 81$

(iv) $41616 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 17 \times 17 = 2 \times 2 \times 3 \times 17 = 204$

(v) $2025 = 2025 = 5 \times 5 \times 3 \times 3 \times 3 \times 3 \therefore = 5 \times 3 \times 3 = 45$

(vi) $5929 =$ the square root of 5929 is $5929 = 7 \times 7 \times 11 \times 11$

$$5929 = 7 \times 7 \times 11 \times 11$$

$$5929 = 11 \times 7 = 77$$

(vii) $8464 =$ Factors = $2 \times 2 \times 2 \times 2 \times 23 \times 23$, which equals $4^2 \times 23^2$. Square root of 8464 is 92.

(viii) $10,000 =$ Factors = $2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5 = 2 \times 2 \times 5 \times 5$

$$= 100$$

(ix) $24,336 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 13 \times 13 = 2 \times 2 \times 3 \times 13 = 156$

(x) $11,025 =$ factors obtained of $11025 = 3 \times 3 \times 5 \times 5 \times 7 \times 7$

$$(3 \times 3) \times (5 \times 5) \times (7 \times 7)$$

Square root of 11025 = $\sqrt{11025} = \sqrt{(3 \times 3) \times (5 \times 5) \times (7 \times 7)}$

$$= \sqrt{3^2 \times 5^2 \times 7^2} = 3 \times 5 \times 7 = 105$$

Question 2

(i) $\sqrt{64/169}$:

Step 1: Simplify the fraction: $64/169$

Step 2: Take the square root of the numerator and the denominator separately:

$$\sqrt{64}/\sqrt{169}$$

Step 3: Simplify the square roots:

$$8/13$$

(ii) $\sqrt{961/25}$:

Step 1: Simplify the fraction: $961/25$

Step 2: Take the square root of the numerator and the denominator separately:

$$\sqrt{961}/\sqrt{25}$$

Step 3: Simplify the square roots:

$$31/5$$

(iii) $\sqrt{676/625}$:

Step 1: Simplify the fraction: $676/625$

Step 2: Take the square root of the numerator and the denominator separately:

$$\sqrt{676}/\sqrt{625}$$

Step 3: Simplify the square roots:

$$26/25.$$

(iv) $\sqrt{31.36}$:

Step 1: Approximate the square root:

$$\sqrt{31.36} \approx 5.6$$

(v) Do yourself

(vi) $\sqrt{0.0225}$:

Step 1: Simplify the decimal:

$$\sqrt{0.0225}$$

Step 2: Take the square root:

$$\sqrt{0.0225} = 0.15$$

(vii) $\sqrt{0.000049}$:

Step 1: Simplify the decimal:

$$\sqrt{0.000049}$$

Step 2: Take the square root:

$$\sqrt{0.000049} = 0.007$$

Question 3

Let's assume the number of rows in the garden is x , and the number of trees in a row is also x .

Total number of trees in the garden is 1,024.

$$x * x = 1,024$$

To find the value of x , we can take the square root of both sides of the equation:

$$\sqrt{(x * x)} = \sqrt{1,024}$$

$$x = \sqrt{1,024}$$

Calculating the square root of 1,024 gives us $x = 32$.

32 trees in a row.

Question 4

$$9126 = 2 \times 3 \times 3 \times 3 \times 13 \times 13$$

As 2 and 3 are left as unpaired, therefore 6 is the least number should be multiplied to get a perfect square.

$$9126 \times 6 = 54756$$

$$\text{Also, } \sqrt{54756} = 234$$

Question 5

Given number is 3528

Using Prime Factorization, 3528 can be expressed as:

$$3528 = (2 \times 2) \times 2 \times (3 \times 3) \times (7 \times 7)$$

Since 2 is left unpaired, 3528 is not a perfect square.

To make 3528 a perfect square, it should be multiplied by 2.

Hence, the smallest number by which 3528 must be multiplied so that the product becomes a perfect square is 2.

Question 6

Smallest/ least number divisible by 6,9,15 and 20 is it's LCM

i.e.

$$\text{LCM} = 2 \times 2 \times 3 \times 3 \times 5 = 180$$

On resolving 180 into prime factors 180.

$$= 2 \times 2 \times 3 \times 3 \times 5$$

Therefore, there is no factor to form pair of 5 so to make it a perfect square so we multiply 180 with 5 to get 900.

Hence least square number divisible by 6,9,15 and 20 is 900.

Question 7

3528 –

$1152 = 2 \times (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (3 \times 3)$, one 2 is left unpaired

Divide 1152 by 2, we get the perfect square and square root of the resulting number $1152/2 = 576$, will be $2 \times 2 \times 2 \times 3 = 24$.

$$7776 = 2 * 2 * 2 * 2 * 3 * 3 * 3 * 3 * 3$$

$$= 2 * 2 * 3 * 3 \sqrt{2 * 3}$$

$$= 4 * 9 \sqrt{6}$$

$$= 36 \sqrt{6}$$

So, 6 is the smallest number by which 7776 is divided to get a perfect square.

Question 8

(i) $4, 5, 8 = \text{LCM of } 4, 5 \text{ and } 8 = 2 \times 2 \times 2 \times 5 = 40 =$ Now to make it a perfect square, the number 2 and 5

should be multiplied with 40.

$40 \times 2 \times 5 = 400$, The least square number which is exactly divisible by 4,5,8 is 400.

(ii) 16,15 and 20 = LCM of 16, 15 and 20 = $2 \times 2 \times 2 \times 3 \times 5 = 240$. 3 and 5 exist without a pair.

Now, to make it a perfect square, the number 3 and 5 should be multiplied with 240.

$$240 \times 3 \times 5 = 3600$$

The least square number which is exactly divisible by 16,15, 20 is 3600

(iii) 16,18 and 45 = LCM of 16,18,45 = $2 \times 2 \times 2 \times 3 \times 3 \times 5 = 720$. Pair of 5 is not completed, so to make it a proper square the number should be multiplied with 720.

$720 \times 5 = 3600$. The least square number which is exactly divisible by 16,18 and 45 is 3600

Question 9

Area of square = (side)²

Substitute the given area into this formula and solve for the side:

$$31,684 = (\text{side})^2$$

Taking the square root of both sides, we get:

$$\sqrt{31,684} = \text{side}$$

Simplify the square root

178 = side, the side of the square field is 178 meters.

Question 10

(i)

$$\sqrt{225} = 15, \text{ as } 15 \times 15 = 225$$

$$\sqrt{676} = 26, \text{ as } 26 \times 26 = 676$$

$$\text{So, } \sqrt{225} \times \sqrt{676} = 15 \times 26 = 390.$$

(ii) To simplify the given expressions, we can use the properties of square roots:

(ii) $\sqrt{625} \times \sqrt{1296}$:

$$\sqrt{625} = 25$$

$$\sqrt{1296} = \sqrt{(36 \times 36)} = \sqrt{36} \times \sqrt{36} = 6 \times 6 = 36$$

$$\text{So, } \sqrt{625} \times \sqrt{1296} = 25 \times 36 = 900$$

(iii) $\sqrt{36} \times \sqrt{81}$:

$$\sqrt{36} = 6$$

$$\sqrt{81} = 9$$

$$\text{So, } \sqrt{36} \times \sqrt{81} = 6 \times 9 = 54$$

To simplify the given expressions, we can start by simplifying the square roots individually and then apply the division operation:

$$\text{(iv) } \sqrt{0.3481} - \sqrt{0.2025} / \sqrt{0.3481} + \sqrt{0.2025}:$$

$$\sqrt{0.3481} = 0.59 \text{ (approx.)}$$

$$\sqrt{0.2025} = 0.45 \text{ (approx.)}$$

So, the expression becomes:

$$(0.59 - 0.45) / (0.59 + 0.45) = 0.14 / 1.04 \approx 0.1346$$

(v) $\sqrt{60.84} - \sqrt{5.76} / \sqrt{60.84} + \sqrt{5.76}$:

$$\sqrt{60.84} = 7.8 \text{ (approx.)}$$

$$\sqrt{5.76} = 2.4 \text{ (approx.)}$$

So, the expression becomes:

$$(7.8 - 2.4) / (7.8 + 2.4) = 5.4 / 10.2 = 0.5294$$

(vi) $\sqrt{0.2116} - \sqrt{0.1764} / \sqrt{0.2116} + \sqrt{0.1764}$:

$$\sqrt{0.2116} = 0.46 \text{ (approx.)}$$

$$\sqrt{0.1764} = 0.42 \text{ (approx.)}$$

So, the expression becomes:

$$(0.46 - 0.42) / (0.46 + 0.42) = 0.04 / 0.88 \approx 0.0455$$

Exercise 4.3

Question 1

On paper (send on WhatsApp)

Question 2

$$\text{(i) } \sqrt{6249} = 79.05$$

Find the next smaller perfect square number:

perfect square = $79^2 = 6241$

Find the root of the perfect square:

$$\sqrt{6249} = 79$$

Find the number it needs to subtract:

$$6249 - 6241 = 8$$

(ii) Nearest perfect square that is smaller than 1,19,766 is $346^2 = 1,19,716$.

$$\text{Subtract } 1,19,716 \text{ from } 1,19,766 = 50.$$

Therefore, 50 must be subtracted from 1,19,766 to make it a perfect square.

(iii) The nearest perfect square that is smaller than 1,989 is $44^2 = 1,936$.

Subtract 1,936 from 1,989 = 53. Therefore, 53 must be subtracted from 1,989 to make it a perfect square.

(iv) For 1,525: The nearest perfect square that is smaller than 1,525 is $39^2 = 1,521$.

Subtract 1,521 from 1,525 = 4. Therefore, 4 must be subtracted from 1,525 to make it a perfect square.

$$(v) \sqrt{273682} = 523$$

so 523^2 is the largest perfect square below 273682.

This means that the smallest number that can be subtracted from 273682 to make a perfect square is

$$273682 - 523^2 = 273682 - 273529 = 153$$

Question 3

$$(i) 2124 < 4515600$$

$$2125 > 4515600$$

$$4515625 > 4515600$$

4515625 is the perfect square nearest to 4515600

$$\text{Next} = 4515625 - 4515600 = 25$$

It is the number to be added to 4515600.

25 will be added.

(ii) The nearest perfect square that is larger than 6,708 is $82^2 = 6,724$.

Subtract 6,708 from 6,724 = 16. Therefore, 16 must be added to 6,708 to make it a perfect square.

(iii)

(iv) The greatest square number nearest to the number 7912 is 7921. So the required number to be added is:

$$7912 + x = 7921$$

$$x = 7921 - 7912$$

$$x = 9.$$

So 9 must be added to the number 7912 to make the sum a perfect square.

Question 4

To find the least 4-digit perfect square, find the smallest perfect square greater than or equal to 1000.

The square root of 1000 is approx = 31.62

The smallest perfect square greater than or equal to 1000 is $32^2 = 1024$.

So, the least 4-digit perfect square is 1024, and its square root is 32.

Question 5

To find the greatest 4-digit perfect square find the largest perfect square less than or equal to 9999.

The square root of 9999 is approx = 99.995

So the largest perfect square less than or equal to 9999 is $99^2 = 9801$.

The greatest 4-digit perfect square is 9801, and its square root is 99.

To find the greatest 5-digit perfect square, find the largest perfect square less than or equal to 99999.

The square root of 99999 is approx = 316.227, so the largest perfect square less than or equal to 99999 is $316^2 = 99856$.

The greatest 5-digit perfect square is 99856, and its square root is 316.

Question 6

First calculate the perimeter of the square field using the given area.

The area of a square is given by the formula: $\text{Area} = \text{side}^2$.

Area of the square field is $720,801 \text{ m}^2$, we can find the length of one side of the square as follows:

$$720,801 = \text{side}^2$$

Taking the square root of both sides:

$$\text{side} = \sqrt{720,801} \approx 849.69 \text{ m}$$

Field is a square, all sides have the same length. Therefore, the perimeter of the square field is:
Perimeter = 4 * side = 4 * 849.69 ≈ 3,398.76 m

Now calculate the time it takes for the man to cycle along the boundary of the field.
The speed of the man is = 18 km/hr, which can be converted to meters per minute =
Speed = 18 km/hr = (18 * 1000) m / (60 * 60) sec ≈ 5 m/s
To find the time, divide the perimeter of the field by the speed of the man:
Time = Perimeter / Speed = 3,398.76 / 5 = 679.75 seconds
Therefore, it will take approximately 679.75 seconds
= 679.75 seconds / 60 = 11.33 minutes

Question 7

By prime factorisation

$$4410 = 2 \times 3 \times 3 \times 5 \times 7 \times 7$$

2 and 5 are unpaired

$$2 \times 5 = 10.$$

4410 must be multiplied by 10 to make it a perfect square.

$$\text{Thus, } 4410 \times 10 = 44100$$

$$44100 = 2 \times 2 \times 3 \times 3 \times 5 \times 5 \times 7 \times 7$$

$$\sqrt{44100} = 210$$

Question 8

Find the square root of the total number of students (1525).

The square root of 1525 is approximately 39.05.

Since we are arranging the students in a square, the number of students in each row (or column) will be the whole number part of the square root, which is 39.

To find the number of students left out, subtract the square of the number of students in each row from the total number of students:

$$1525 - 39^2 = 1525 - 1521 = 4$$

The number of students in each row is 39, and 4 students are left out.

Question 9

(i) 121:

The square root of 121 is 11. Here, the ones digit is 1, and the tens digit is 1.

(ii) 625:

The square root of 625 is 25. Here, the ones digit is 5, and the tens digit is 2.

(iii) 841:

The square root of 841 is 29. Here, the ones digit is 9, and the tens digit is 2.

(iv) 676:

The square root of 676 is 26. Here, the ones digit is 6, and the tens digit is 2.

Question 10

(i) Perimeter of the square is 40 cm, it means that each side of the square is $40 \text{ cm} / 4 = 10 \text{ cm}$.

To find the length of the diagonal of the square, we can use the Pythagorean theorem.

In this case, the diagonal of the square forms a right triangle with two sides of equal length (10 cm each). Let's call the diagonal "d".

Using the Pythagorean theorem:

$$d^2 = 10^2 + 10^2$$

$$d^2 = 100 + 100$$

$$d^2 = 200$$

$d \approx \sqrt{200} \approx 14.14 \text{ cm}$, length of the diagonal of the square is approximately 14.14 cm.

Let's assume the length of the rectangle is "L" cm. The breadth of the rectangle is 4 cm less than its length, so the breadth would be "L - 4" cm.

$$\text{Perimeter} = 2 * (\text{Length} + \text{Breadth})$$

The perimeter of the rectangle is 40 cm

$$2 * (L + L - 4) = 40$$

$$2 * (2L - 4) = 40$$

$$4L - 8 = 40$$

$$4L = 48$$

$$L = 48 / 4$$

L = 12, length of the rectangle is 12 cm.

Breadth = Length - 4 = 12 - 4 = 8 cm

Question 12

The missing digit is 5. The number is = 11025.

11025 is the square of 105.

Question 13

Cost of ploughing at rate of Rs. 10 is Rs.123210

Let the area of the square field be 'X' m sq.

SO,

$$x * 10 = 123210$$

$$x = 123210 / 10$$

$$x = 12321$$

Area of square field = x = 12321 m sq.

$$\text{Area} = (\text{side})^2$$

$$12321 = \text{side} * \text{side} = \sqrt{12321} = \text{side}$$

$$111 = \text{side}$$

Each side of square field = 111 m

Perimeter of square field = 4 * side

$$= 4 * 111 = 444 \text{ m}$$

If the cost of fencing the square field per 1 m = Rs.7

Then, the cost of fencing the square field of perimeter 444

$$\text{m} = 444 * 7 = \text{Rs.}3108$$

Question 14

Let number of students went for outing be n

Let the each student contributed = Rs. N

Total amount collected = Rs. 16,129

$$N * N = 16,129$$

$$N^2 = 16129$$

$$N^2 = (127)^2$$

$$N = 127$$

Question 15

LCM of 5776

$$= 2 * 2 * 2 * 2 * 19 * 19$$

$$= 2 * 2 * 19 = 76$$

Smallest no. is = 76

Exercise 4.4

Question 1 – send on WhatsApp

Question 2 – send on WhatsApp

Question 3 – send on WhatsApp

Question 4

To find the length of one side of the square field, we need to determine the square root of its area.

Given that the area of the square field is 1 m², we can take the square root of 1 to find the length of one side.

$\sqrt{1} = 1$, length of one side of the field is 1 meter.

Question 5

Given that the area of the square paper is 331.24 cm^2 , we can find the length of one side by taking the square root of the area.

$$\sqrt{331.24} \approx 18.19 \text{ cm (rounded to two decimal places)}$$

Square has 4 equal sides, the length of the boundary to be drawn is four times the length of one side.

$$4 * 18.19 \text{ cm} \approx 72.76 \text{ cm}$$

length of the boundary = 72.76 cm.

Question 6

Let's denote the decimal fraction as "x".

$$x * x = 51.84$$

To solve this equation, we need to find the square root of 51.84:

$$\sqrt{51.84} \approx 7.2$$

Therefore, the decimal fraction "x" is approximately 7.2.

Question 7

Let's denote the decimal fraction as "x".

$$x * x = 61.7796$$

To solve this equation, we need to find the square root of 61.7796:

$$\sqrt{61.7796} \approx 7.8612$$

Therefore, the decimal fraction "x" is approximately 7.8612.

Question 8.

(i) For the number 144:

$$\sqrt{144} = 12$$

The square root of 144 is 12, which has two digits.

(ii) For the number 4,489:

$$\sqrt{4489} \approx 66.96$$

The square root of 4,489 is approximately 66.96, which has two digits.

(iii) For the number 27,225:

$$\sqrt{27225} = 165$$

The square root of 27,225 is 165, which has three digits.

Question 9

(i) $\sqrt{97} \approx 9.85$

The nearest whole number to 9.85 is 10.

(ii) $\sqrt{520} \approx 22.8$

The nearest whole number to 22.8 is 23.

(iii) $\sqrt{1100} \approx 33.17$

The nearest whole number to 33.17 is 33.

(iv) $\sqrt{6800} \approx 82.46$

The nearest whole number to 82.46 is 82.

Question 10

In a right triangle XYZ, if ZY is the right angle, we can apply the Pythagorean theorem to find the length of the hypotenuse XZ.

Given that XY = 6 cm and YZ = 8 cm, we can calculate XZ as follows:

$$XZ^2 = XY^2 + YZ^2$$

$$XZ^2 = 6^2 + 8^2$$

$$XZ^2 = 36 + 64$$

$$XZ^2 = 100$$

Taking the square root of both sides, we find:

$$XZ = \sqrt{100}$$

$$XZ = 10 \text{ cm}$$

Therefore, the length of XZ in the right triangle XYZ is 10 cm.

(ii) In a right triangle XYZ, if ZY is the right angle, we can apply the Pythagorean theorem to find the length of the other two sides.

Given that XZ = 13 cm and YZ = 5 cm, we can calculate XY as follows:

$$XY^2 = XZ^2 - YZ^2$$

$$XY^2 = 13^2 - 5^2$$

$$XY^2 = 169 - 25$$

$$XY^2 = 144$$

Taking the square root of both sides, we find:

$$XY = \sqrt{144}$$

$$XY = 12 \text{ cm}$$

Therefore, the length of XY in the right triangle XYZ is 12 cm.

Exercise 5.1

Question 1

(i) 1:

$$1 * 1 * 1 = 1$$

(ii) 25:

$$25 * 25 * 25 = 15,625$$

(iii) 2.7:

$$2.7 * 2.7 * 2.7 = 19.683$$

(iv) 50:

$$50 * 50 * 50 = 125,000$$

(v) 3.8:

$$3.8 * 3.8 * 3.8 = 54.872$$

(vi) $-\frac{11}{6}$:

$$\left(-\frac{11}{6}\right) * \left(-\frac{11}{6}\right) * \left(-\frac{11}{6}\right) = 6.162$$

(vii) $\frac{4}{5}$:

$$\left(\frac{4}{5}\right) * \left(\frac{4}{5}\right) * \left(\frac{4}{5}\right) = 0.512$$

(viii) $\frac{9}{17}$:

$$\left(\frac{9}{17}\right) * \left(\frac{9}{17}\right) * \left(\frac{9}{17}\right) = 0.148$$

(ix) $\frac{13}{6}$:

$$\left(\frac{13}{6}\right) * \left(\frac{13}{6}\right) * \left(\frac{13}{6}\right) = 10.171$$

Question 2

343, 64,000, 13,824, 1,25,000

Question 3

(i) $15625 = 5 \times 5 \times 5 \times 5 \times 5$

Since 5 occurs in triplets

15625 is a perfect cube.

$$\text{Cube root of } 15625 = 5 \times 5 = 25$$

(ii) $13824 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

Since 2 & 3 occur in triplets

13824 is a perfect cube.

$$\text{Cube root of } 13824 = 2 \times 2 \times 2 \times 3$$

$$= 4 \times 6 = 24$$

(iii) $512 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

Since 2 occurs in triplets

: 512 is a perfect cube.

$$\text{Cube root of } 512 = 2 \times 2 \times 2 = 8$$

(iv) $91125 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5$

: 91125 is a perfect cube.

$$\text{Cube root of } 91125 = 3 \times 3 \times 5$$

$$= 9 \times 5 = 45$$

Question 4

$$1372 = 2 \times 2 \times 7 \times 7 \times 7$$

Step 2: Find the least number

The prime factors of 1372, 7 is in the group of 3 i.e. it makes a cube but 2 is not in a group of 3 i.e. it is not making a cube.

2 is the smallest number by which 1372 must be multiplied so that the product becomes a perfect cube.

Check by this :

$$\begin{aligned} &1372 \times \text{The least number} \\ &= 1372 \times 2 \\ &= 2744 \end{aligned}$$

Question 5

$$392 = 2 \times 2 \times 2 \times 7 \times 7$$

Since 7 does not occur in triplets,

392 is not a perfect cube. So, we multiply by 7 to make triplet.

Question 6

$$\text{Factors} - 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3$$

So now by multiplying 2 and 3 once we can obtain a perfect cube.

$$2304 \times 2 \times 3 = 13824, \text{ so the cube root of } 13824 \text{ is } 24$$

6 should be multiplied to 2304 to make a perfect cube root.

Question 7

$$15552 = 2^2 \times 2^2 \times 2^2 \times 2^2 \times 3^3 \times 3^3 \times 3^3$$

15552 must be divided by 3 so the quotient is a perfect square.

$$15552/3 = 5184$$

Question 8

$$13,824; 216; 1,728; 5,832$$

Question 9

$$15,625 \text{ (i); } 1331 \text{ (vi)}$$

Question 10

$$-2,197; -3,375; -8000$$

Question 11

3 is an odd natural number and its cube is 27 which is also an odd natural number. (ii) 5 is also an odd natural number and its cube is 125 which is also an odd natural number.

Question 12

(i) F (ii) F (iii) T (iv) T (v) T (vi) F (vii) F

Question 13

(i) 36:

Using the alternative method:

$$36^3 = (36^2) \times 36 = (36 \times 36) \times 36 = 1296 \times 36 = 46,656.$$

(ii) 42:

Using the alternative method:

$$42^3 = (42^2) \times 42 = (42 \times 42) \times 42 = 1764 \times 42 = 74,088.$$

(iii) 79:

Using the alternative method:

$$79^3 = (79^2) \times 79 = (79 \times 79) \times 79 = 6241 \times 79 = 493,039.$$

(iv) 84:

Using the alternative method:

$$84^3 = (84^2) \times 84 = (84 \times 84) \times 84 = 7056 \times 84 = 592,704.$$

(v) 105:

Using the alternative method:

$$105^3 = (105^2) \times 105 = (105 \times 105) \times 105 = 11025 \times 105 = 1,157,625.$$

Question 14

(i) 73 can be written as $49 \times 7 = 343$
 keeping 49 as the mean number.
 Numbers will be 43,45,47,49,51,53,55 sum of which will give 343

(ii) 12^3
 $n=12$
 $n-1=12-1=11$
 $n(n-1)=12 \times 11=132$
 $12^3=133+135+137+139+141+143+145+147+149+151+153+155$

(iii) 28^3
 $N=28$
 $n-1=28-1=27$
 $n(n-1)=28 \times 27=756$
 Numbers = 757+759+.....811

Question 15

Use the formula $n^3 - (n-1)^3 = 1 + n(n-1) \times 3$. Let's calculate the values:

(i) $8^3 - 7^3$:
 Using the formula, we have:
 $8^3 - 7^3 = 1 + 8(8-1) \times 3 = 1 + 8(7) \times 3 = 1 + 56 \times 3 = 1 + 168 = 169$.

(ii) $15^3 - 14^3$:
 Applying the formula, we get:
 $15^3 - 14^3 = 1 + 15(15-1) \times 3 = 1 + 15(14) \times 3 = 1 + 210 \times 3 = 1 + 630 = 631$.

(iii) $27^3 - 26^3$:
 Using the formula, we find:
 $27^3 - 26^3 = 1 + 27(27-1) \times 3 = 1 + 27(26) \times 3 = 1 + 702 \times 3 = 1 + 2106 = 2107$.

Question 16

The cube root of 9261 is the number that, when multiplied by itself twice, gives 9261.

$\sqrt[3]{9261} = x$
 Cubing both sides:
 $(\sqrt[3]{9261})^3 = x^3$
 $9261 = x^3$

Therefore, 9261 is a perfect cube since it can be expressed as the cube of some number.

To find the number whose cube is 9261, we can take the cube root of 9261:
 $\sqrt[3]{9261} \approx 21$

Question 17

(i) T (ii) T (iii) T (iv) F (v) T

Exercise 5.2

Question 1

1. Cube root of 125:
 $125 - 5^3 = 125 - 125 = 0$
 Therefore, the cube root of 125 is 5.

2. Cube root of 64:
 Let's start with an initial guess of 4. We perform successive subtractions:
 $64 - 4^3 = 64 - 64 = 0$
 Hence, the cube root of 64 is 4.

3. Cube root of 216:
 Starting with an initial guess of 6, we perform the subtractions:
 $216 - 6^3 = 216 - 216 = 0$
 Thus, the cube root of 216 is 6.

4. Cube root of 512:
 We can begin with an initial guess of 8. By the subtractions-
 $512 - 8^3 = 512 - 512 = 0$

Question 2

(i) 1331:

Prime factorization of 1331: $1331 = 11 \times 11 \times 11$

Therefore, the cube root of 1331 is $\sqrt[3]{1331} = 11$.

(ii) 27000:

Prime factorization of 27000: $27000 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5$

Therefore, the cube root of 27000 is $\sqrt[3]{27000} = 2 \times 3 \times 5 = 30$.

(iii) 27:

Prime factorization of 27: $27 = 3 \times 3 \times 3$

Therefore, the cube root of 27 is $\sqrt[3]{27} = 3$.

(iv) Prime factorization of 15,625:

$15,625 = 5 \times 5 \times 5 \times 5 \times 5$

$15,625 = (5 \times 5 \times 5) \times (5 \times 5)$

$\sqrt[3]{(5 \times 5 \times 5) \times (5 \times 5)} = 5 \times 5 = 25$

(v) $17576 = 2^3 \times 13^3 = 17576 = (2 \times 13)^3$

$17576 = 26^3$

$\sqrt[3]{17576} = 26$

Therefore, the cube root of 17576 is 26

(vi) $110592 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

Since 2 & 3 occur in triplets, 110592 is a perfect cube.

Cube root of 110592 = $2 \times 2 \times 2 \times 3 = 16 \times 3 = 48$

(vii) First factorize the number in the term of prime factors ..

$-85,184 = 2^3 \times 2^3 \times 2^3 \times 11 \times 11 \times 11$

Take cube root

By making triples as one when we take cube root

Cube root of $-85,184 = 2 \times 2 \times 11 = -44$

(viii) $-19683 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$

$= 33 \times 33 \times 33$

$319683 = 33 \times 33 \times 33$

$= 3 \times 3 \times 3$

$= -27$

(ix) $614125 = 5 \times 5 \times 5 \times 17 \times 17 \times 17$

$= 53 \times 173$

Then, cube root of 614125 is:

$= \sqrt[3]{5^3 \times 17^3} = 5 \times 17 = 85$.

(x) do yourself

Question 3

(i) Cube root of 1860867 is 123. Therefore last digit is 3

(ii) The cube root of 74088 is 42. Unit digit = 2

(iii) Cube root of 13824 = 24. Unit digit = 4

(iv) Cube root of 857375 = 95. Unit digit = 5

(v) Cube root of 8000 = 20. Unit digit = 0

Question 4

(i) The units digit of 103823 is 3.

If $n^3 = 103823$, then the units digit of n must be 7.

Let us split 103823 as 103 and 823.

$4^3 = 64 < 103 < 125 = 5^3$.

$40^3 = 64000 < 103823 < 125000 = 50^3$.

Hence n must lie between 40 and 50. Since the units digit of n is 7, the only such number is 47.

(ii) The factors of 15625 are $= 5 \times 5 \times 5 \times 5 \times 5 = (25 \times$

$25 \times 25)$ the cube root of 15625 is 25.

(iii) $23 \times 23 \times 23 =$ Cube root of 12167 = 23

(iv) $3 \times 3 \times 3 \times (11 \times 11 \times 11) = 3^3 \times 11^3$

Cube root of 35937 is $= \sqrt[3]{3^3 \times 11^3} = 3 \times 11 = 33$

(v) Cube root of 2700 = 32700

$\sqrt[3]{27000} = \sqrt[3]{(30) \times (30) \times (30)} = 30$

Question 5

1. Cube root of $-64/1331$:

The cube root of $-64/1331$ can be calculated as follows:

Cube root of $-64/1331 = -4/11$

2. Cube root of $125/1728$:

Cube root of $125/1728 = 5/12$

3. Cube root of $343/216$:

Cube root of $343/216 = 7/6$

4. Cube root of $3375/512$:

Cube root of $3375/512 = 15/8$

5. Cube root of $2^6 * 3^6 * 5^3 =$ Cube root of $(2^6) *$ Cube root of $(3^6) *$ Cube root of (5^3)
 $64 * 729 * 125$

Cube root of $64 = 4$

Cube root of $729 = 9$

Cube root of $125 = 5$

$4 * 9 * 5 = 180$

6. Cube root of 32.768 :

Cube root of $32.768 = 3.2$

7. Cube root of $11^3 * 7^3 * 5^3$:

Cube root of $11^3 * 7^3 * 5^3 = 11 * 7 * 5 = 385$

8. Cube root of 1.331 :

Cube root of $1.331 \approx 1.104$

9. $(-6)^3 * (-3)^3 = (-6 * -6 * -6) * (-3 * -3 * -3)$
 $= (-216) * (-27)$

Cube root of $(-216) * (-27) =$ Cube root of $(-216) *$ Cube root of (-27)
 $= -6 * -3 = 18$

10. Express the given number as a fraction with a perfect cube denominator:

$0.003375 = 3375/1,000,000$

Step 2: Simplify the fraction by cancelling common factors:

$3375/1,000,000 = 27/8,000$

Cube root of $27 = 3$

Cube root of $8,000 = 20$

Cube root of $3375/1,000,000 = 3/20$

Question 6

(i) Cube root of $27 * 216$:

Cube root of $27 = 3$

Cube root of $216 = 6$

Therefore, $\sqrt[3]{27 * 216} = 3 * 6 = 18$.

(ii) Cube root of $1331 * 1728$:

Cube root of $1331 = 11$

Cube root of $1728 = 12$

Therefore, $\sqrt[3]{1331 * 1728} = 11 * 12 = 132$.

(iii) Cube root of $5^3 * 6^3$:

Cube root of $5^3 = 5$

Cube root of $6^3 = 6$

Therefore, $\sqrt[3]{5^3 * 6^3} = 5 * 6 = 30$.

(iv) Cube root of $64 * 125$:

Cube root of $64 = 4$

Cube root of $125 = 5$

Therefore, $\sqrt[3]{64 * 125} = 4 * 5 = 20$.

(v) Cube root of $3375 * -512$:

Cube root of $3375 = 15$

Cube root of $-512 = -8$

Therefore, $\sqrt[3]{3375 * -512} = 15 * -8 = -120$.

Question 7

(i) To find the missing value, we can use the property of cube roots that states:

$$\sqrt[3]{a/b} = \sqrt[3]{a} / \sqrt[3]{b}$$

Using this property, we can rewrite the given expression as:

$$\sqrt[3]{38/3} = \sqrt[3]{38} / \sqrt[3]{3} ; \text{ Therefore, the missing value in the blank is } 38.$$

(ii)-15

(iii)(20/3)³

(iv)20

Question 8

$$(i) \sqrt[3]{27} * 216 = \sqrt[3]{3^3} * 216$$

Using the properties of exponents and radicals, we can rewrite 27 as 3³:

$$\sqrt[3]{27} * 216 = \sqrt[3]{3^3} * 216$$

Next, simplify the cube root of 3³:

$$\sqrt[3]{27} * 216 = \sqrt[3]{3^3} * 216 = \sqrt[3]{3^3} * 6^3$$

Now, let's simplify the right side of the equation:

$$\sqrt[3]{27} * \sqrt[3]{216} = \sqrt[3]{3^3} * \sqrt[3]{6^3}$$

Since both sides have the same factor of $\sqrt[3]{3^3}$, we can cancel it out:

$$\sqrt[3]{27} * \sqrt[3]{216} = \sqrt[3]{3^3} * \sqrt[3]{6^3} = \sqrt[3]{3^3 * 6^3}$$

To prove the equation, we need to show that:

$$\sqrt[3]{3^3 * 6^3} = \sqrt[3]{3^3} * 6^3$$

Now, let's simplify both sides of the equation further:

$$\sqrt[3]{3^3 * 6^3} = \sqrt[3]{3^3} * 6^3$$

Since the cube root and cube exponent are inverse operations, we can rewrite the equation as:

$$3 * 6^3 = \sqrt[3]{3^3} * 6^3$$

simplify both sides:

$$3 * 6^3 = \sqrt[3]{3^3} * 6^3$$

$$216 = \sqrt[3]{3^3} * 6^3$$

Since both sides of the equation are equal to 216, we have shown that: $\sqrt[3]{27} * 216 = \sqrt[3]{27} * \sqrt[3]{216}$

(ii)

$$\sqrt[3]{-64} / \sqrt[3]{512}$$

We can rewrite -64 as -4³ and 512 as 8³:

$$\sqrt[3]{-4^3} / \sqrt[3]{8^3}$$

Using the properties $-4 / 8 = -1/2$

Now simplify the right side of the equation:

$$\sqrt[3]{-64} / 512$$

Since 512 is a cube of 8, simplify this expression as: $\sqrt[3]{-64} / 8^3$

Using the properties of exponents and radicals, we can simplify this expression further: $-4 / 8 = -1/2$

$$-1/2 = -1/2$$

These two fractions are equal, so the equation: $\sqrt[3]{-64} / \sqrt[3]{512} = \sqrt[3]{-64} / 512$

Question 9 (with the help of the given table in the chapter)

(i)2.080 (ii)2.410 (iii) 2.924 (iv) 3.362 (v)4.344 (vi)3.302 (vii)18.283 (viii) 20.035 (ix)10.132 (x)4.412 (xi) 7.140

(xii) 20.258

Question 10

$$(2x)^3 + (3x)^3 + (4x)^3 = 38,957$$

Simplifying further:

$$8x^3 + 27x^3 + 64x^3 = 38,957$$

Combining like terms:

$$99x^3 = 38,957$$

Now, let's solve for x by dividing both sides by 99:

$$x^3 = 38957 / 99$$

$$x^3 = 393$$

To find the value of x, we need to calculate the cube root of 393.

The cube root of 393 is approximately 7.

Now, we can find the three numbers:

First number: $2x = 2 * 7 = 14$

Second number: $3x = 3 * 7 = 21$

Third number: $4x = 4 * 7 = 28$

Therefore, the three numbers are 14, 21, and 28.

Question 11

Volume of a cube = side^3

Let's denote the side of the cube as "s". We can set up the equation:

$$s^3 = 13.824$$

To find the side length, we need to take the cube root of both sides of the equation:

$$\sqrt[3]{(s^3)} = \sqrt[3]{13.824}$$

Simplifying further:

$$s = \sqrt[3]{13.824}$$

The cube root of 13.824 is approximately 2.4.

The side length of the cube is approximately 2.4 meters.

Question 12

Let's denote the three numbers in the ratio 1:2:3 as x, 2x, and 3x, where x is a common factor.

The sum of their cubes is 62,208. Therefore, we can write the equation:

$$x^3 + (2x)^3 + (3x)^3 = 62,208$$

Simplifying further: $x^3 + 8x^3 + 27x^3 = 62,208$

Combining like terms: $36x^3 = 62,208$

Now, let's solve for x by dividing both sides by 36:

$$x^3 = 62,208 / 36$$

$$x^3 = 1,728$$

To find the value of x, we need to calculate the cube root of 1,728.

The cube root of 1,728 is 12.

Now, we can find the three numbers:

First number: $x = 12$

Second number: $2x = 2 * 12 = 24$

Third number: $3x = 3 * 12 = 36$

Question 13

$$(i) 64 \times 729 = \sqrt[3]{64 \times 729} = \sqrt[3]{4 \times 4 \times 4 \times 9 \times 9 \times 9}$$

$$= 4 \times 9 = 36$$

$$(ii) \sqrt[3]{1331/1000}$$

$$\sqrt[3]{1331/31000}$$

cube root of 1331=11

$$1000=10$$

cube root of 1331/1000=11/10

(iii) Cube root of 0.085184 = 0.44

(iv) Cube root of 3375 = 15 and cube root of 1372 = 11.112

$$15/11 \text{ approx} = 1.36$$

(v) Cube root of $\sqrt[3]{17576} = 26$

Question 14

Use the formula $V = s^3$, where V represents the volume and s represents the length of each side (edge) of the cube.

In this case, the length of each side (edge) of the cube is given as 4.3 cm.

Substituting this value into the formula, we have:

$$V = (4.3 \text{ cm})^3$$

To calculate the volume, we need to cube the length of the side:

$$V = 4.3 \text{ cm} * 4.3 \text{ cm} * 4.3 \text{ cm}$$

$$V = 79.507 \text{ cm}^3$$

Therefore, the volume of the cube, with each side measuring 4.3 cm, is 79.507 cubic cm.

Question 15

To find the length of a cube, given its volume, we can use the formula $V = s^3$, where V represents the volume and s represents the length of each side (edge) of the cube.

In this case, the volume of the cube is given as 820.584 cubic meters.

We need to solve for s . Taking the cube root of both sides of the equation, we have:

$$\sqrt[3]{820.584} = s$$

Now, let's calculate the cube root of 820.584.

The cube root of 820.584 is approximately 9.4.

Therefore, the length of the cube is approximately 9.4 meters.

Question 16

(i) 682:

The cube root of 682 lies between 8 and 9 because $8^3 = 512$ (nearest smaller perfect cube) and $9^3 = 729$ (nearest larger perfect cube). Let's take the smaller value, 8, as an estimation.

To make a perfect cube, we need to subtract the cube of 8 ($8^3 = 512$) from 682:

$$682 - 512 = 170$$

So, the smallest number that must be subtracted from 682 to make a perfect cube is 170.

(ii) The cube root of 730 lies between 8 and 9 because $8^3 = 512$ (nearest smaller perfect cube) and $9^3 = 729$ (nearest larger perfect cube).

To make a perfect cube, we need to subtract the cube of 9 ($9^3 = 729$) from 730:

$$730 - 729 = 1$$

So, the smallest number that must be subtracted from 730 to make a perfect cube is 1.

Question 17

Prime factorising 231525, we get,

$$\begin{aligned} 231525 &= 3 \times 3 \times 3 \times 5 \times 5 \times 7 \times 7 \times 7 \\ &= 3^3 \times 5^2 \times 7^3. \end{aligned}$$

We know that a perfect cube number has its factor with an exponent as multiples of 3.

Here, exponent of 3's is 3, exponent of 5's is 2 and exponent of 7's is 3. So we need to multiply another 5 to the factorization to make 2,31,525 a perfect cube.

Hence, the smallest number by which 2,31,525 must be multiplied to obtain a perfect cube is 5.

Question 18

$$6912 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$$

$$= 2^7 \times 3^3$$

$$= 12^2$$

But there is two numbers which is ungrouped $2 \times 2 = 4$

So, 4 is the smallest no. which must be divided 6912 so that the quotient obtained will be a perfect cube.

The quotient is perfect cube of 12.

Question 19

It should be 6 as

216 is cube root of 6

$$5^3 = 125$$

$$7^3 = 343$$

$$6^3 = 216$$

CHAPTER 6

Exercise 6.1

Question 1

(i) $10^7 + 3$ (ii) $100^3 + 10^0 + 2$ (iii) $100^1 + 20^2 + 9$ (iv) $100^2 + 10^0 + 1$

Question 2

(i) 76 (ii) 328 (iii) $100(p+q) + 2$

Question 3

(i) Let's assume the original number is represented by " $10x + y$," where x and y are the digits of the number. The sum of the digits ($x + y$) is equal to 9, and the number obtained by interchanging the digits ($10y + x$) is 9 more than the original number.

From the first condition, we have:

$$x + y = 9 \quad \text{---(1)}$$

From the second condition, we have:

$$10y + x = 10x + y + 9$$

Simplifying the equation further:

$$9y - 9x = 9 \quad \text{---(2)}$$

Now, we have a system of two equations with two variables (Equations 1 and 2). Let's solve them simultaneously to find the values of x and y .

From Equation 1, we can rewrite it as:

$$x = 9 - y$$

Substituting this value of x into Equation 2:

$$9y - 9(9 - y) = 9$$

$$9y - 81 + 9y = 9$$

$$18y - 81 = 9$$

$$18y = 90$$

$$y = 90 / 18$$

$$y = 5$$

Substituting the value of y back into Equation 1:

$$x + 5 = 9$$

$$x = 9 - 5$$

$x = 4$ Therefore, the original number is $10x + y = 10(4) + 5 = 40 + 5 = 45$. Original number is 45.

(ii) Let's assume the original number is represented by " $10x + y$," where x and y are the digits of the number. According to the given information, the sum of the digits ($x + y$) is equal to 7, and the number obtained by interchanging the digits ($10y + x$) is 27 more than the original number.

From the first condition, we have:

$$x + y = 7 \quad \text{---(1)}$$

From the second condition, we have:

$$10y + x = 10x + y + 27$$

Simplifying the equation further:

$$9y - 9x = 27 \quad \text{---(2)}$$

Now, we have a system of two equations with two variables (Equations 1 and 2). Let's solve them simultaneously to find the values of x and y .

From Equation 1, we can rewrite it as:

$$x = 7 - y$$

Substituting this value of x into Equation 2:

$$9y - 9(7 - y) = 27$$

$$9y - 63 + 9y = 27$$

$$18y - 63 = 27$$

$$18y = 90$$

$$y = 90 / 18$$

$$y = 5$$

Substituting the value of y back into Equation 1:

$$x + 5 = 7$$

$$x = 7 - 5$$

$$x = 2$$

Therefore, the original number is $10x + y = 10(2) + 5 = 20 + 5 = 25$. The original number is 25.

(iii)

According to the given information, the sum of the digits ($x + y$) is equal to 8, and the number obtained by interchanging the digits ($10y + x$) is 36 more than the original number.

From the first condition, we have:

$$x + y = 8 \quad \text{---(1)}$$

From the second condition, we have:

$$10y + x = 10x + y + 36$$

Simplifying the equation further:

$$9y - 9x = 36 \quad \text{---(2)}$$

Now, we have a system of two equations with two variables (Equations 1 and 2). Let's solve them simultaneously to find the values of x and y .

From Equation 1, we can rewrite it as:

$$x = 8 - y$$

Substituting this value of x into Equation 2:

$$9y - 9(8 - y) = 36$$

$$9y - 72 + 9y = 36$$

$$18y - 72 = 36$$

$$18y = 108$$

$$y = 108 / 18$$

$$y = 6$$

Substituting the value of y back into Equation 1:

$$x + 6 = 8$$

$$x = 8 - 6$$

$$x = 2$$

Therefore, the original number is $10x + y = 10(2) + 6 = 20 + 6 = 26$. So, the original number is 26.

Question 4

Let's assume the two-digit number is represented by " $10x + y$," where x and y are the tens and units digits, respectively.

According to the given information, the sum of the digits ($x + y$) is equal to 9, and the number is 6 times the units digit.

From the first condition, we have:

$$x + y = 9 \quad \text{---(1)}$$

From the second condition, we have:

$$10x + y = 6y$$

Simplifying the equation further:

$$10x = 5y$$

Dividing both sides by 5, we get:

$$2x = y$$

Now, we have a system of two equations with two variables (Equations 1 and 2). Let's solve them simultaneously to find the values of x and y .

From Equation 2, we can rewrite it as:

$$y = 2x$$

Substituting this value of y into Equation 1:

$$x + 2x = 9$$

$$3x = 9$$

$$x = 9 / 3$$

$$x = 3$$

Substituting the value of x back into Equation 2:

$$y = 2(3)$$

$$y = 6$$

Therefore, the number is $10x + y = 10(3) + 6 = 30 + 6 = 36$.

Question 5

Let's assume the original number is represented by " $10x + y$," where x and y are the tens and units digits, respectively.

According to the given information, the difference between the original number and the number obtained by interchanging the digits is 18.

From this:

$$(10x + y) - (10y + x) = 18$$

$$9x - 9y = 18$$

Dividing both sides by 9, we get:

$$x - y = 2 \quad \text{----(1)}$$

The ratio between the digits is 5:3, which can be expressed as:

$$x/y = 5/3$$

Cross-multiplying, we have:

$$3x = 5y$$

Dividing both sides by 3, we get:

$$x = (5/3)y \quad \text{----(2)}$$

Now, we have a system of two equations with two variables (Equations 1 and 2). Let's solve them simultaneously to find the values of x and y.

Substituting the value of x from Equation 2 into Equation 1:

$$(5/3)y - y = 2$$

$$(5y - 3y)/3 = 2$$

$$2y/3 = 2$$

Multiplying both sides by 3/2, we get:

$$y = 3$$

Substituting the value of y back into Equation 2:

$$x = (5/3)(3)$$

$$x = 5$$

Therefore, the original number is $10x + y = 10(5) + 3 = 50 + 3 = 53$. So, the original number is 53.

Question 6

Let's assume the two-digit number is represented by " $10x + y$," where x and y are the tens and units digits, respectively.

According to the given information, the sum of the digits ($x + y$) is 10, and the digit in the tens place (x) is 4 times the digit in the units place (y).

From the first condition

$$x + y = 10 \quad \text{----(1)}$$

From the second condition,

$$x = 4y \quad \text{----(2)}$$

Substituting the value of x from Equation 2 into Equation 1:

$$4y + y = 10$$

$$5y = 10$$

$$y = 10 / 5$$

$$y = 2$$

Substituting the value of y back into Equation 2:

$$x = 4(2)$$

$$x = 8$$

Therefore, the two-digit number is $10x + y = 10(8) + 2 = 80 + 2 = 82$. So, the two-digit number is 82.

Question 7

Let's assume the two-digit number is represented by " $10x + y$," where x and y are the tens and units digits, respectively.

According to the given information, the number is 8 times the sum of its digits, and when 45 is subtracted from it, the digits are reversed.

From the first condition,

$$10x + y = 8(x + y)$$

$$10x + y = 8x + 8y$$

Rearranging terms

$$10x - 8x = 8y - y$$

$$2x = 7y \quad \text{----(1)}$$

From the second condition

$$10x + y - 45 = 10y + x$$

Rearranging terms

$$10x - x = 10y - y + 45$$

$$9x = 9y + 45$$

Dividing both sides by 9

$$x = y + 5 \text{ ----(2)}$$

Now, we have a system of two equations with two variables (Equations 1 and 2). Let's solve them simultaneously to find the values of x and y.

Substituting the value of x from Equation 2 into Equation 1:

$$2(y + 5) = 7y$$

$$2y + 10 = 7y$$

$$10 = 7y - 2y$$

$$10 = 5y$$

$$y = 10 / 5$$

$$y = 2$$

Substituting the value of y back into Equation 2:

$$x = 2 + 5$$

$$x = 7$$

Therefore, the two-digit number is $10x + y = 10(7) + 2 = 70 + 2 = 72$. So, the number is 72.

Question 8

Let's assume the two-digit number is represented by " $10x + y$," where x and y are the tens and units digits, respectively.

According to the given information, the sum of the digits ($x + y$) is 13, and the difference between the number and the number formed by reversing the digits is 27.

From the first condition, we have:

$$x + y = 13 \text{ ----(1)}$$

From the second condition, we have:

$$(10x + y) - (10y + x) = 27$$

Simplifying the equation further:

$$10x + y - 10y - x = 27$$

$$9x - 9y = 27$$

$$x - y = 3 \text{ ----(2)}$$

Now, we have a system of two equations with two variables (Equations 1 and 2). Let's solve them simultaneously to find the values of x and y.

We can solve the system of equations by subtracting Equation 2 from Equation 1:

$$(x + y) - (x - y) = 13 - 3$$

$$2y = 10$$

$$y = 10 / 2$$

$$y = 5$$

Substituting the value of y back into Equation 1:

$$x + 5 = 13$$

$$x = 13 - 5$$

$$x = 8$$

Therefore, the two-digit number is $10x + y = 10(8) + 5 = 80 + 5 = 85$. So, the number is 85.

Exercise 6.2

Question 1

The numbers that are divisible by 2 are:

(i) 212 (iii) 36 (iv) 50 (vii) 412

Question 2

39, 48, 15, 363

Question 3

45, 185, 310, 4040

Question 4

63, 135, 594, 4869

Question 5

70, 3840, 740, 280, 9850

Question 6

(i) The number obtained by reversing the digits of 469 is 964.

Now, let's calculate the difference:

$$469 - 964 = -495$$

The difference is -495.

To determine if -495 is divisible by 99, we can check if -495 divided by 99 gives us an integer result.

$$-495 \div 99 = -5$$

Since -495 divided by 99 gives us an integer result (-5), the difference is divisible by 99.

Therefore, the difference between 469 and the number obtained by reversing its digits is divisible by 99.

(ii) 739 : The number obtained by reversing the digits of 739 is 937.

$$739 - 937 = -198 . \text{ The difference is } -198.$$

To determine if -198 is divisible by 99, check if -198 divided by 99 gives us an integer result.

$$-198 \div 99 = -2$$

Since -198 divided by 99 gives us an integer result (-2), the difference is divisible by 99.

(iii) The number obtained by reversing the digits of 901 is 109.

$$\text{The difference: } 901 - 109 = 792.$$

To determine if 792 is divisible by 99, we can check if 792 divided by 99 gives us an integer result.

$$792 \div 99 = 8$$

Since 792 divided by 99 gives us an integer result (8), the difference is divisible by 99.

Question 7

Interchanging the digits from units place to hundreds place one by one, we get the following numbers:

623

362

Calculate the sum of these numbers: $632 + 623 + 362 = 1617$

To determine if 1617 is divisible by 37, check if 1617 divided by 37 gives us an integer result.

$$1617 \div 37 = 43$$

Since 1617 divided by 37 gives us an integer result (43), the sum of the numbers obtained by interchanging the digits is divisible by 37.

(ii) Interchanging the digits from units place to hundreds place one by one, we get the following numbers:

739

397

calculate the sum of these numbers:

$$937 + 739 + 397 = 2073$$

Divide by 37 gives us an integer result.

$$2073 \div 37 = 56$$

Since 2073 divided by 37 gives us an integer result (56), the sum of the numbers obtained by interchanging the digits is divisible by 37.

(iii) Interchanging the digits from units place to hundreds place one by one, we get the following numbers:

714

147

Now, let's calculate the sum of these numbers:

$$417 + 714 + 147 = 1278$$

To determine if 1278 is divisible by 37, we can check if 1278 divided by 37 gives us an integer result.

$$1278 \div 37 = 34.594\dots$$

Since 1278 divided by 37 does not give us an integer result, the sum of the numbers obtained by interchanging the digits is not divisible by 37.

Question 8

(i) The number will be 8115 = divisible by 3 .

(ii) The number will be 52821 = divisible by 3.

(iii) The number will be 130746 = divisible by 3.

(iv) The number will be 52314 = divisible by 3.

Question 9

(i)24435 (ii)348237 (iii) 7636302 = all divisible by 9

Question 10

1530; 19890; 4,44,780

Question 11

Let x be the digit in units' place and y be the digit in hundreds' place.

Then, since the digit in tens' place is 0, the number will be represented by $100y + x$.

If the digits are reversed, the number so formed will be represented by $100x + y$.

$$100x + y - (100y + x) = 495$$

$$\text{or } 100x + y - 100y - x = 495$$

$$\text{or } 99x - 99y = 495$$

$$\text{or } x - y = 5 \dots\dots\dots (1)$$

Again, since the sum of the other digits is 11, and the middle one is 0,

$$x + y = 11 \dots\dots\dots (2)$$

From (1) and (2), we get $x=8, y=3$

The number is 308.

Question 12

(i)84,316 and 684572 (ii) 70,806 and 657828

CHAPTER 7

Exercise 7.1

Question 1

(i)7=7, $x=1$, $-x^2=-1$ (ii) $0.2ab=0.2$, $-0.4a=-0.4$, $0.7b=0.7$ (iii) $a/3=1/3$, $b/3=1/3$, $-ab=-1$ (iv) $2m^2n^2=2$, $-4m^2n^2p^2=-4$

Question 2

(i)binomial (ii) trinomial (iii) do not fit (iv) monomial (v) trinomial (vi) binomial

Question 3

(i)2 (ii) 2 (iii) 4 (iv) 4

Question 4 – do yourself

Question 5

(i) Subtracting $-13a^2b$ from $5a^2b$:

$$5a^2b - (-13a^2b)$$

$$= 5a^2b + 13a^2b$$

$$= (5 + 13)a^2b$$

$$= 18a^2b$$

(ii) Subtracting $-3x$ from $-6x$:

$$-6x - (-3x)$$

$$= -6x + 3x$$

$$= -3x$$

(iii) Subtracting $2x^2 + 3y + 4$ from $14x^2 - 6y - 5$:

$$(14x^2 - 6y - 5) - (2x^2 + 3y + 4)$$

$$= 14x^2 - 6y - 5 - 2x^2 - 3y - 4$$

$$= (14x^2 - 2x^2) + (-6y - 3y) + (-5 - 4)$$

$$= 12x^2 - 9y - 9$$

(iv) Subtracting $3pq - 4q^2 - 7p^2$ from $p^2 + 3q^2 - 4pq$:

$$(p^2 + 3q^2 - 4pq) - (3pq - 4q^2 - 7p^2)$$

$$= p^2 + 3q^2 - 4pq - 3pq + 4q^2 + 7p^2$$

$$= (p^2 - 3pq + 7p^2) + (3q^2 - 4q^2)$$

$$= 8p^2 - 7pq + q^2$$

(v) Subtracting $7x^3 + y^3 + 2z^3$ from $12x^3 - 8y^3 + z^3 + 8$:

$$(12x^3 - 8y^3 + z^3 + 8) - (7x^3 + y^3 + 2z^3)$$

$$= 12x^3 - 8y^3 + z^3 + 8 - 7x^3 - y^3 - 2z^3$$

$$= (12x^3 - 7x^3) + (-8y^3 - y^3) + (z^3 - 2z^3) + 8$$

$$= 5x^3 - 9y^3 - z^3 + 8$$

(vi) Subtracting $-x^2y^2 + z^2$ from $5x^2y^2 - 3z^2$:

$$(5x^2y^2 - 3z^2) - (-x^2y^2 + z^2)$$

$$= 5x^2y^2 - 3z^2 + x^2y^2 - z^2$$

$$= (5x^2y^2 + x^2y^2) + (-3z^2 - z^2)$$

$$= 6x^2y^2 - 4z^2$$

Question 6

(i) $4x + 2x - 5x = 6x - 5x = x$

(ii) $p^2 + 5pq + 6p^2 - 4pq = 7p^2 + pq$

(iii) $-12xy + 9xy - 3xy = -6xy$

(iv) $15m^2 + 6m - 7 + 7m + 7 - 2m^2 + 5 - 5m + 3m^2 = 16m^2 + 8m - 5$

(v) $4x^3 + 3xy + 3 + 2x^3 - 6xy + 11 = 6x^3 - 3xy + 14$

Question 7

(i) $4p^2 - 4q + 6p^2 - (5p^2 + 2q)$

Simplifying the expression inside the parentheses:

$$= 4p^2 - 4q + 6p^2 - 5p^2 - 2q$$

Combining like terms:

$$= (4p^2 + 6p^2 - 5p^2) + (-4q - 2q)$$

$$= 5p^2 - 6q$$

(ii) $9x - 4y + 2x + 3y$

Combining like terms:

$$= (9x + 2x) + (-4y + 3y)$$

$$= 11x - y$$

(iii) $16x^2 + 2z^2 - 5 + z^2 - 2x^2 + 6$

Combining like terms:

$$= (16x^2 - 2x^2) + (2z^2 + z^2) + (-5 + 6)$$
$$= 14x^2 + 3z^2 + 1$$

(iv) $11a^2b - 9a^2 + 3ab^2 + 3b^2 + a^2 - 4a^2b$

Combining like terms: $(11a^2b - 4a^2b) + (-9a^2 + a^2) + (3ab^2) + (3b^2)$

$$7a^2b - 8a^2 + 3ab^2 + 3b^2$$

So, the simplified expression is $7a^2b - 8a^2 + 3ab^2 + 3b^2$.

Exercise 7.2

Question 1

(i) $6xy * -3x^2y^2$

$$(6 * -3) * (x * x^2) * (y * y^2) = -18x^3y^3$$

(ii) $7x^2 * -5y^3$

Multiply the coefficients and combine the variables:

$$(7 * -5) * (x^2 * y^3) = -35x^2y^3$$

(iii) $4xy * 6y^2$

Multiply the coefficients and combine the variables:

$$(4 * 6) * (x * y * y^2) = 24xy^3$$

(iv) $(-2/5) * a^2 * b^2 * c * (5/3) * a * b^2 * c$

Multiply the coefficients and combine the variables:

$$(-2/5 * 5/3) * (a^2 * a) * (b^2 * b^2) * (c * c) = (-2/5) * (5/3) * a^3 * b^4 * c^2 = -2/3 a^3 b^4 c^2$$

(v) $(14/27) * pq * (4/7p^2)$

Multiply the coefficients and combine the variables:

$$(14/27 * 4/7) * (p * p) * q = (56/189) * p^2 * q = 8/27 p^2 q$$

(vi) $(-9/11) * x^3y * (-3/7) * x^2y$

Multiply the coefficients and combine the variables:

$$(-9/11 * -3/7) * (x^3 * x^2) * (y * y) = (27/77) * x^5 * y^2$$

Question 2

(i) $5xy * (-3x^2) * 8xy^3$

Combine the coefficients and variables:

$$(5 * -3 * 8) * (x * x * x^2) * (y * y^3) = -120x^4y^4$$

(ii) $ab * bc * ca$

Combine the variables:

$$(a * b * c) * (b * c) * (c * a) = a^2b^2c^2$$

(iii) $-12q^2q * 3pq^2 * 0$

Any multiplication involving 0 will result in 0, so the expression becomes: 0

(iv) $(-2/7) p^2 q^2 * (7/8) pq^2 * (3/7) p^2 q$

Combining the coefficients and variables:

$$((-2/7) * (7/8) * (3/7)) * (p^2 * p^2 * p) * (q^2 * q^2 * q) = (-6/56) * p^5 * q^5 = (-3/28) p^5 q^5$$

(v) $(-3/15) x^2y * (-15/8) y^2z * (-1/5) z^2x$

Combine the coefficients and variables:

$$(-3/15 * -15/8 * -1/5) * (x^2 * y * z^2) * (y * y^2 * z) = 1/8 x^2y^4z^3$$

Question 3 – do yourself

Question 4

$$12xy * -1/3 x^2y^2$$

$$= -4x^3y^3$$

Verifying – let $x = 1$ and $y = -1$

$$\text{LHS} = 12xy * -1/3 x^2 y^2 = 12 * -1 * -1/3 * 1 * 1 = 4$$

$$\text{RHS} = -4x^3y^3$$

$$= -4(1)^3 (-1)^3$$

$$= 4$$

hence, LHS = RHS

Question 5

$$3xy * -1/9 x^2y^2z^2 * -8xy$$

$$= +8/3 x^4 y^4 z^2$$

Verifying = $x = -2, y = 2, z = -3$

$$\text{LHS} = 3(-2)(2) * -1/9 (-2)^2 (2)^2 (-3)^2 * -8 (-2)(2)$$

$$= -12 * -16 * 32 = 6144$$

$$\text{RHS} = 8/3 (-2)^4 (2)^4 (-3)^2 = 8/3 * 16 * 16 * 9$$

$$= 6144$$

LHS = RHS, proved

Exercise 7.3

Question 1

(i) To multiply $(5x)$ by $(7x + 5)$, we use the distributive property:

$$(5x) * (7x + 5) = 5x * 7x + 5x * 5$$

To simplify further, we multiply each term:

$$= 35x^2 + 25x$$

Therefore, the product of $(5x)$ and $(7x + 5)$ is $35x^2 + 25x$.

(ii) To multiply $(7a)$ by $(6a - 6)$, we again use the distributive property:

$$(7a) * (6a - 6) = 7a * 6a - 7a * 6$$

$$= 42a^2 - 42a$$

So, the product of $(7a)$ and $(6a - 6)$ is $42a^2 - 42a$.

(iii) To multiply $2pq$ by $(3ab - 9y)$, we apply the distributive property:

$$2pq * (3ab - 9y) = 2pq * 3ab - 2pq * 9y$$

$$= 6pqa * b - 18pqy$$

The simplified product is $6pqa * b - 18pqy$.

Question 2

(i) To multiply $(x^2 - 6y)$ and $(2x^2 - 3y)$, apply the distributive property:

$$(x^2 - 6y) * (2x^2 - 3y) = x^2 * 2x^2 + x^2 * (-3y) - 6y * 2x^2 - 6y * (-3y)$$

Simplifying each term, we get:

$$= 2x^4 - 3xy - 12xy^2 + 18y^2$$

Therefore, the product of $(x^2 - 6y)$ and $(2x^2 - 3y)$ is $2x^4 - 3xy - 12xy^2 + 18y^2$.

(ii) To multiply $(3y + 8)$ and $(5y + 1)$, we once again use the distributive property:

$$(3y + 8) * (5y + 1) = 3y * 5y + 3y * 1 + 8 * 5y + 8 * 1$$

Simplifying each term, we have:

$$= 15y^2 + 3y + 40y + 8$$

Combining like terms, we get:

$$= 15y^2 + 43y + 8$$

So, the product of $(3y + 8)$ and $(5y + 1)$ is $15y^2 + 43y + 8$.

(iii) To multiply $(xy + 1/xy)$ by $(x + 1/x)$, we apply the distributive property:

$$(xy + 1/xy) * (x + 1/x) = xy * x + xy * (1/x) + (1/xy) * x + (1/xy) * (1/x)$$

Simplifying each term, we get:

$$= x^2y + y + x + 1/(xy)$$

Therefore, the product of $(xy + 1/xy)$ and $(x + 1/x)$ is $x^2y + y + x + 1/(xy)$.

(iv) To multiply $(1/2ab^2 - 3b)$ and $(7ab^2 + 4b)$, we apply the distributive property:

$$(1/2ab^2 - 3b) * (7ab^2 + 4b) = (1/2ab^2) * (7ab^2) + (1/2ab^2) * (4b) + (-3b) * (7ab^2) + (-3b) * (4b)$$

Simplifying each term, we have:

$$= (7/2)a^2b^4 + 2/2ab^3 - 21ab^3 - 12b^2$$

Combining like terms, we get:

$$= (7/2)a^2b^4 - 19/2ab^3 - 12b^2$$

So, the product of $(1/2ab^2 - 3b)$ and $(7ab^2 + 4b)$ is $(7/2)a^2b^4 - 19/2ab^3 - 12b^2$.

$$(v) (3x^2 + 1/2x) * (6x^2 + 5/3x) = 3x^2 * 6x^2 + 3x^2 * (5/3x) + (1/2x) * 6x^2 + (1/2x) * (5/3x)$$

Simplifying each term, we get: $= 18x^4 + (15/3)x^3 + (6/2)x^3 + (5/6)x^2$

Combining like terms, we have:

$$= 18x^4 + 5x^3 + 3x^3 + (5/6)x^2$$

$$= 18x^4 + 8x^3 + (5/6)x^2$$

So, the product of $(3x^2 + 1/2x)$ and $(6x^2 + 5/3x)$ is $18x^4 + 8x^3 + (5/6)x^2$.

Question 4

$$(i)(2x + 3) * (x^2 - 3x + 7) = (2x) * (x^2 - 3x + 7) + 3 * (x^2 - 3x + 7)$$

Multiplying each term, we get:

$$= 2x^3 - 6x^2 + 14x + 3x^2 - 9x + 21$$

Combining like terms, = $2x^3 - 3x^2 + 5x + 21$

So, the product of $(2x + 3)$ and $(x^2 - 3x + 7)$ is $2x^3 - 3x^2 + 5x + 21$.

(ii) To multiply $(2a + b)$ and $(3a^2 + 5ab + 4b^2 - 5)$, we again apply the distributive property:

$$(2a + b) * (3a^2 + 5ab + 4b^2 - 5) = (2a) * (3a^2 + 5ab + 4b^2 - 5) + b * (3a^2 + 5ab + 4b^2 - 5)$$

Multiplying each term:

$$= 6a^3 + 10a^2b + 8ab^2 - 10a + 3a^2b + 5ab^2 + 4b^3 - 5b$$

Combining like terms, we have: = $6a^3 + 13a^2b + 13ab^2 - 10a + 4b^3 - 5b$

So, the product of $(2a + b)$ and $(3a^2 + 5ab + 4b^2 - 5)$ is $6a^3 + 13a^2b + 13ab^2 - 10a + 4b^3 - 5b$.

$$(iii) (4z + 5y + 2) * (x^2 - xy + y + 1) = (4z) * (x^2 - xy + y + 1) + (5y) * (x^2 - xy + y + 1) + 2 * (x^2 - xy + y + 1)$$

Multiplying each term, we get:

$$= 4zx^2 - 4zxy + 4zy + 4z + 5yx^2 - 5xy^2 + 5yy + 5y + 2x^2 - 2xy + 2y + 2$$

Combining like terms, we have:

$$= 4zx^2 + (5yx^2 - 4zxy) + (4zy - 5xy^2 - 2xy) + (5yy + 5y + 2x^2 + 2y + 4z + 2)$$

$$= 4zx^2 + 5yx^2 - 4zxy + 4zy - 5xy^2 - 2xy + 5yy + 5y + 2x^2 + 2y + 4z + 2$$

Simplifying further, = $4zx^2 + 5yx^2 - 4zxy + 4zy - 5xy^2 - 2xy + 5y^2 + 5y + 2x^2 + 2y + 4z + 2$

Therefore, the product of $(4z + 5y + 2)$ and $(x^2 - xy + y + 1)$ is $4zx^2 + 5yx^2 - 4zxy + 4zy - 5xy^2 - 2xy + 5y^2 + 5y + 2x^2 + 2y + 4z + 2$.

(iv) To multiply $(x^2 + x + 1)$ and $(8x^3 - 6x^2 + 6x - 1)$, we can apply the distributive property:

$$(x^2 + x + 1) * (8x^3 - 6x^2 + 6x - 1) = (x^2) * (8x^3 - 6x^2 + 6x - 1) + (x) * (8x^3 - 6x^2 + 6x - 1) + (1) * (8x^3 - 6x^2 + 6x - 1)$$

Multiplying each term:

$$= 8x^5 - 6x^4 + 6x^3 - x^2 + 8x^4 - 6x^3 + 6x^2 - x + 8x^3 - 6x^2 + 6x - 1$$

Combining like terms: = $8x^5 + 2x^4 + 8x^3 - x^2 - x - 1$

Therefore, the product of $(x^2 + x + 1)$ and $(8x^3 - 6x^2 + 6x - 1)$ is $8x^5 + 2x^4 + 8x^3 - x^2 - x - 1$.

$$(v) (5x^2y + 3x + 3) * (6x^4 + 7x^3y + y^2 + 3)$$

$$= 5x^2y * 6x^4 + 5x^2y * 7x^3y + 5x^2y * y^2 + 5x^2y * 3 + 3x * 6x^4 + 3x * 7x^3y + 3x * y^2 + 3x * 3 + 3 * 6x^4 + 3 * 7x^3y + 3 * y^2 + 3 * 3$$

Multiplying each term:

$$= 30x^6y + 35x^5y^2 + 5x^2y^3 + 15x^2y + 18x^5 + 21x^4y + 3x^2y^2 + 9x^2 + 18x^4 + 21x^3y + 3y^2 + 9x^2 + 18x^4 + 21x^3y + 3y^2 + 9$$

Combining like terms, = $30x^6y + 35x^5y^2 + 5x^2y^3 + 15x^2y + 18x^5 + 42x^4y + 6x^2y^2 + 27x^2 + 21x^3y + 6y^2 + 9$

Therefore, the product of $(5x^2y + 3x + 3)$ and $(6x^4 + 7x^3y + y^2 + 3)$ is $30x^6y + 35x^5y^2 + 5x^2y^3 + 15x^2y + 18x^5 + 42x^4y + 6x^2y^2 + 27x^2 + 21x^3y + 6y^2 + 9$.

Question 5

$$(i)(x^2 + 2x - 7) * (3x^2 - 4x + 3) = x^2 * (3x^2 - 4x + 3) + 2x * (3x^2 - 4x + 3) - 7 * (3x^2 - 4x + 3)$$

Multiplying each term,:

$$= 3x^4 - 4x^3 + 3x^2 + 6x^3 - 8x^2 + 6x - 21x^2 + 28x - 21$$

Combining like terms, we have:

$$= 3x^4 + 2x^3 - 20x^2 + 34x - 21$$

Therefore, the product of $(x^2 + 2x - 7)$ and $(3x^2 - 4x + 3)$ is $3x^4 + 2x^3 - 20x^2 + 34x - 21$.

$$(ii) (a + 2b + 3) * (a - 3b + 7) = a * (a - 3b + 7) + 2b * (a - 3b + 7) + 3 * (a - 3b + 7)$$

Multiplying each term, we get:

$$= a^2 - 3ab + 7a + 2ab - 6b^2 + 14b + 3a - 9b + 21$$

Combining like terms, we have:

$$= a^2 - ab + 10a - 15b + 21$$

Therefore, the product of $(a + 2b + 3)$ and $(a - 3b + 7)$ is $a^2 - ab + 10a - 15b + 21$.

$$(iii) (x^2 + xy - y^2) * (6x^2 + 5y - 2) = x^2 * (6x^2 + 5y - 2) + xy * (6x^2 + 5y - 2) - y^2 * (6x^2 + 5y - 2)$$

Multiplying each term

$$= 6x^4 + 5xy^2 - 2x^2 + 6x^3y + 5xy^2 - 2xy - 6x^2y^2 - 5y^3 + 2y^2$$

Combining like terms:= $6x^4 + 6x^3y - 2x^2 - 6x^2y^2 + 10xy^2 - 5y^3 + 2y^2$

Therefore, the product of $(x^2 + xy - y^2)$ and $(6x^2 + 5y - 2)$ is $6x^4 + 6x^3y - 2x^2 - 6x^2y^2 + 10xy^2 - 5y^3 + 2y^2$.

$$(iv) (2m^2 + 5m + 3) * (m^2 + 3m + 7) = 2m^2 * (m^2 + 3m + 7) + 5m * (m^2 + 3m + 7) + 3 * (m^2 + 3m + 7)$$

Multiplying each term: $= 2m^4 + 6m^3 + 14m^2 + 5m^3 + 15m^2 + 35m + 3m^2 + 9m + 21$

Combining like terms: $= 2m^4 + 11m^3 + 32m^2 + 44m + 21$

Therefore, the product of $(2m^2 + 5m + 3)$ and $(m^2 + 3m + 7)$ is $2m^4 + 11m^3 + 32m^2 + 44m + 21$.

(v) $(\frac{1}{2}x + y + \frac{1}{3}) * (\frac{2}{3}x^2 + \frac{1}{2}x - 3) = (\frac{1}{2}x) * (\frac{2}{3}x^2 + \frac{1}{2}x - 3) + y * (\frac{2}{3}x^2 + \frac{1}{2}x - 3) + (\frac{1}{3}) * (\frac{2}{3}x^2 + \frac{1}{2}x - 3)$

Multiplying each term: $= (\frac{1}{3}x^3 + \frac{1}{4}x^2 - 1x) + (\frac{2}{3}xy + \frac{1}{2}y - 3y) + (\frac{2}{9}x^2 + \frac{1}{6}x - 1)$

Combining like terms: $= \frac{1}{3}x^3 + \frac{1}{4}x^2 - 1x + \frac{2}{3}xy + \frac{1}{2}y - 3y + \frac{2}{9}x^2 + \frac{1}{6}x - 1$

Simplifying the fractions: $= \frac{1}{3}x^3 + \frac{1}{4}x^2 - 1x + \frac{2}{3}xy + \frac{1}{2}y - 3y + \frac{2}{9}x^2 + \frac{1}{6}x - 1$

Therefore, the product of $(\frac{1}{2}x + y + \frac{1}{3})$ and $(\frac{2}{3}x^2 + \frac{1}{2}x - 3)$ is $\frac{1}{3}x^3 + \frac{1}{4}x^2 - 1x + \frac{2}{3}xy + \frac{1}{2}y - 3y + \frac{2}{9}x^2 + \frac{1}{6}x - 1$.

(vi) $(x^2y - x - 1) * (4x^2y - x + 5) = (x^2y) * (4x^2y - x + 5) - x * (4x^2y - x + 5) - 1 * (4x^2y - x + 5)$

Multiplying each term: $= 4x^4y^2 - x^3y + 5x^2y - 4x^3y + x^2 - 5x - 4xy + x - 5$

Combining like terms: $= 4x^4y^2 - 4x^3y + 5x^2y - 4xy + x^2 - 4x - 5$

Therefore, the product of $(x^2y - x - 1)$ and $(4x^2y - x + 5)$ is $4x^4y^2 - 4x^3y + 5x^2y - 4xy + x^2 - 4x - 5$.

Question 6

(i) Simplifying $(p-1)(5p+3q-7) - (p+4)(q+3-2p)$:

$= (5p^2 + 3pq - 7p - 5p + 3q - 7) - (pq + 3p - 2p^2 + 4q + 12 - 8p)$

$= 5p^2 + 3pq - 7p - 5p + 3q - 7 - pq - 3p + 2p^2 - 4q - 12 + 8p$

$= 5p^2 + 2p^2 + 3pq - pq - 7p - 5p + 8p - 3p + 3q - 4q - 7 - 12$

$= 7p^2 + 2pq + 2q - 14$

(ii) Simplifying $(5x+2)(2x^2-3x+5) - 7x(3x-5y)$:

$= (10x^3 - 15x^2 + 25x + 4x^2 - 6x + 10) - (21x^2 - 35xy)$

$= 10x^3 - 15x^2 + 4x^2 - 21x^2 + 25x - 6x + 10 - 35xy$

$= 10x^3 - 32x^2 + 19x - 35xy + 10$

(iii) Simplifying $(2^a - a + 1)(a-3) - (a^2 - 6a + 3)(2a + 2)$:

Expanding the products, we get:

$= (2^a * a - 3 * 2^a - a^2 + 3a + a - 3) - (2a^3 + 2a^2 - 12a^2 - 12a + 3a^2 - 18a + 3)$

$= 2^a * a - 6^a - a^2 + 3a + a - 3 - 2a^3 - 2a^2 + 12a^2 + 12a - 3a^2 + 18a - 3$

$= -2a^3 + 2^a * a - a^2 + 12a^2 - 6^a + a + 3$

(iv) Simplifying $(y+3)(y+5) + (y-5)(y-7)$:

Expanding the products, we get:

$= (y^2 + 5y + 3y + 15) + (y^2 - 7y - 5y + 35)$

$= y^2 + 5y + 3y + 15 + y^2 - 7y - 5y + 35$

$= 2y^2 - 4y + 50$

Question 7

(i) $(2x^2 + 2x^2 + xy^2)$:

Plugging in $x = 2$ and $y = -1$:

$2(2)^2 + 2(2)^2 + (2)(-1)^2$

$= 2(4) + 2(4) + 2$

$= 8 + 8 + 2$

$= 18$

(ii) $(x + 2y) * (5x^2 + xy)$:

Plugging in $x = 2$ and $y = -1$:

$(2 + 2(-1))(5(2)^2 + (2)(-1))$

$= (2 - 2)(5(4) - 2)$

$= 0(20 - 2)$

$= 0(18)$

$= 0$

(iii) $(6x^2 - 15y^2) * (\frac{1}{3})(6x^2 + 15y^2)$:

Plugging in $x = 2$ and $y = -1$:

$(6(2)^2 - 15(-1)^2)(\frac{1}{3})(6(2)^2 + 15(-1)^2)$

$= (6(4) - 15)(\frac{1}{3})(6(4) + 15)$

$= (24 - 15)(\frac{1}{3})(24 + 15)$

$= (9)(\frac{1}{3})(39)$

$= 3(39)$

$$= 117$$

Question 8

$$\text{Perimeter of the triangle} = 17a + 11b + 13c$$

$$\text{First side} = 6a + 3b - 4c$$

$$\text{Second side} = 7a + 8b + 3c$$

$$\text{Third side} = \text{Perimeter} - (\text{First side} + \text{Second side})$$

$$\text{Perimeter} = 17a + 11b + 13c$$

$$\text{First side} = 6a + 3b - 4c$$

$$\text{Second side} = 7a + 8b + 3c$$

$$\text{Third side} = (17a + 11b + 13c) - ((6a + 3b - 4c) + (7a + 8b + 3c))$$

$$= 17a + 11b + 13c - (6a + 3b - 4c + 7a + 8b + 3c)$$

$$= 17a + 11b + 13c - 6a - 3b + 4c - 7a - 8b - 3c$$

$$= (17a - 6a - 7a) + (11b - 3b - 8b) + (13c + 4c - 3c)$$

$$= 4a + 0b + 14c$$

$$= 4a + 14c : \text{Therefore, the third side of the triangle is } 4a + 14c$$

Question 9

$$[(18a+13b+15c) + (16a-20b + 11c)] - [(18a+12b-10c) + (9a+13b-15c)]$$

$$= [34a-7b+26c] - [27a + 25b- 25c]$$

$$= 7a - 32b + 51c$$

Question 10

Given:

$$X = 5x + 16y - 15z$$

$$Y = 12x - 13y + 12z$$

$$Z = 8x - 6y + 21z$$

(a) $X + Y + Z$:

Substituting the values of X, Y, and Z into $X + Y + Z$, we have:

$$X + Y + Z = (5x + 16y - 15z) + (12x - 13y + 12z) + (8x - 6y + 21z)$$

$$= 5x + 16y - 15z + 12x - 13y + 12z + 8x - 6y + 21z$$

$$= (5x + 12x + 8x) + (16y - 13y - 6y) + (-15z + 12z + 21z)$$

$$= 25x - 3y + 18z$$

Therefore, $X + Y + Z = 25x - 3y + 18z$.

(b) $X - Y - Z$:

Substituting the values of X, Y, and Z into $X - Y - Z$, we have:

$$X - Y - Z = (5x + 16y - 15z) - (12x - 13y + 12z) - (8x - 6y + 21z)$$

$$= 5x + 16y - 15z - 12x + 13y - 12z - 8x + 6y - 21z$$

$$= (5x - 12x - 8x) + (16y + 13y + 6y) + (-15z - 12z - 21z)$$

$$= -15x + 35y - 48z$$

Therefore, $X - Y - Z = -15x + 35y - 48z$.

(c) $X + Y - Z$:

Substituting the values of X, Y, and Z into $X + Y - Z$, we have:

$$X + Y - Z = (5x + 16y - 15z) + (12x - 13y + 12z) - (8x - 6y + 21z)$$

$$= 5x + 16y - 15z + 12x - 13y + 12z - 8x + 6y - 21z$$

$$= (5x + 12x - 8x) + (16y - 13y + 6y) + (-15z + 12z - 21z)$$

$$= 9x + 9y - 24z$$

Therefore, $X + Y - Z = 9x + 9y - 24z$.

(d) Given:

$$X = 5x + 16y - 15z$$

$$Y = 12x - 13y + 12z$$

$$Z = 8x - 6y + 21z$$

$2X + 3Y + Z$:

Substituting the values of X, Y, and Z into $2X + 3Y + Z$, we have:

$$2X + 3Y + Z = 2(5x + 16y - 15z) + 3(12x - 13y + 12z) + (8x - 6y + 21z)$$

$$= 10x + 32y - 30z + 36x - 39y + 36z + 8x - 6y + 21z$$

$$= (10x + 36x + 8x) + (32y - 39y - 6y) + (-30z + 36z + 21z)$$

$$= 54x - 13y + 27z : \text{Therefore, } 2X + 3Y + Z = 54x - 13y + 27z.$$

Exercise 7.4

Question 1

(i) $(4x + 4y)^2$:

Expanding using the formula $(a + b)^2 = a^2 + 2ab + b^2$:

$$(4x + 4y)^2 = (4x)^2 + 2(4x)(4y) + (4y)^2 \\ = 16x^2 + 32xy + 16y^2$$

(ii) $(3a + b)^2$:

Expanding using the formula $(a + b)^2 = a^2 + 2ab + b^2$:

$$(3a + b)^2 = (3a)^2 + 2(3a)(b) + (b)^2 \\ = 9a^2 + 6ab + b^2$$

(iii) $(2p - 3q)^2$:

Expanding using the formula $(a - b)^2 = a^2 - 2ab + b^2$:

$$(2p - 3q)^2 = (2p)^2 - 2(2p)(3q) + (3q)^2 \\ = 4p^2 - 12pq + 9q^2$$

(iv) $(5x + 12)^2$:

Expanding using the formula $(a + b)^2 = a^2 + 2ab + b^2$:

$$(5x + 12)^2 = (5x)^2 + 2(5x)(12) + (12)^2 \\ = 25x^2 + 120x + 144$$

(v) $(2x^2 + 3y)^2$:

Expanding using the formula $(a + b)^2 = a^2 + 2ab + b^2$:

$$(2x^2 + 3y)^2 = (2x^2)^2 + 2(2x^2)(3y) + (3y)^2 \\ = 4x^4 + 12x^2y + 9y^2$$

(vi) $(\frac{2}{5}x - 4)^2$:

Expanding using the formula $(a - b)^2 = a^2 - 2ab + b^2$:

$$(\frac{2}{5}x - 4)^2 = (\frac{2}{5}x)^2 - 2(\frac{2}{5}x)(4) + (4)^2 \\ = \frac{4}{25}x^2 - \frac{16}{5}x + 16$$

(vii) $(\frac{9}{4}x - 3y)^2$:

Expanding using the formula $(a - b)^2 = a^2 - 2ab + b^2$:

$$(\frac{9}{4}x - 3y)^2 = (\frac{9}{4}x)^2 - 2(\frac{9}{4}x)(3y) + (3y)^2 \\ = \frac{81}{16}x^2 - \frac{54}{4}xy + 9y^2 \\ = \frac{81}{16}x^2 - \frac{27}{2}xy + 9y^2$$

(viii) $(\frac{1}{7}x + \frac{1}{2}y)^2$:

Expanding using the formula $(a + b)^2 = a^2 + 2ab + b^2$:

$$(\frac{1}{7}x + \frac{1}{2}y)^2 = (\frac{1}{7}x)^2 + 2(\frac{1}{7}x)(\frac{1}{2}y) + (\frac{1}{2}y)^2 \\ = \frac{1}{49}x^2 + \frac{2}{14}xy + \frac{1}{4}y^2$$

Question 2

(i) $(3 + 5b)^2$:

$$(3 + 5b)(3 + 5b) = 9 + 15b + 15b + 25b^2 = 9 + 30b + 25b^2$$

Therefore, the square of $(3 + 5b)$ is $9 + 30b + 25b^2$.

(ii) $(x + 5)^2$:

$$(x + 5)(x + 5) = x^2 + 5x + 5x + 25 = x^2 + 10x + 25$$

Therefore, the square of $(x + 5)$ is $x^2 + 10x + 25$.

(iii) $(p + \frac{1}{2}q)^2$:

$$(p + \frac{1}{2}q)(p + \frac{1}{2}q) = p^2 + (\frac{1}{2}pq) + (\frac{1}{2}pq) + (\frac{1}{4}q^2) = p^2 + pq + pq + (\frac{1}{4}q^2) = p^2 + 2pq + (\frac{1}{4}q^2)$$

Therefore, the square of $(p + \frac{1}{2}q)$ is $p^2 + 2pq + (\frac{1}{4}q^2)$.

(iv) $(1 - \frac{3}{5}x)^2$:

$$(1 - \frac{3}{5}x)(1 - \frac{3}{5}x) = 1 - \frac{3}{5}x - \frac{3}{5}x + (\frac{9}{25}x^2) = 1 - (\frac{6}{5}x) + (\frac{9}{25}x^2)$$

Therefore, the square of $(1 - \frac{3}{5}x)$ is $1 - (\frac{6}{5}x) + (\frac{9}{25}x^2)$.

(v) $(4a - 6b)^2$:

$$(4a - 6b)(4a - 6b) = 16a^2 - 24ab - 24ab + 36b^2 = 16a^2 - 48ab + 36b^2$$

Therefore, the square of $(4a - 6b)$ is $16a^2 - 48ab + 36b^2$.

(vi) $(\frac{a}{3} - \frac{3}{a})^2$:

$$(\frac{a}{3} - \frac{3}{a})(\frac{a}{3} - \frac{3}{a}) = (\frac{a^2}{9}) - (\frac{9}{3})\frac{a}{a} + \frac{9}{a^2} = (\frac{a^2}{9}) - 3\frac{a^2}{a^2} + \frac{9}{a^2} = (\frac{a^2}{9}) - 3 + \frac{9}{a^2}$$

Therefore, the square of $(\frac{a}{3} - \frac{3}{a})$ is $(\frac{a^2}{9}) - 3 + \frac{9}{a^2}$.

Question 3

(i) $(7x + y)(7x - y)$:

Using the formula $a^2 - b^2 = (a + b)(a - b)$:

$$(7x + y)(7x - y) = (7x)^2 - (y)^2 = 49x^2 - y^2$$

Therefore, the product of $(7x + y)(7x - y)$ is $49x^2 - y^2$.

(ii) $(7x + 9y)(7x - 9y)$:

Using the formula $a^2 - b^2 = (a + b)(a - b)$:

$$(7x + 9y)(7x - 9y) = (7x)^2 - (9y)^2 = 49x^2 - 81y^2$$

Therefore, the product of $(7x + 9y)(7x - 9y)$ is $49x^2 - 81y^2$.

(iii) $(3a + 5y)(3a - 5y)$:

Using the formula $a^2 - b^2 = (a + b)(a - b)$:

$$(3a + 5y)(3a - 5y) = (3a)^2 - (5y)^2 = 9a^2 - 25y^2$$

Therefore, the product of $(3a + 5y)(3a - 5y)$ is $9a^2 - 25y^2$.

(iv) $(6 - 1/5x)(6 + 1/5x)$:

Using the formula $a^2 - b^2 = (a + b)(a - b)$:

$$(6 - 1/5x)(6 + 1/5x) = (6)^2 - (1/5x)^2 = 36 - 1/25x^2$$

Therefore, the product of $(6 - 1/5x)(6 + 1/5x)$ is $36 - 1/25x^2$.

(v) $(3/5x + 4)(3/5x - 4)$:

Using the formula $a^2 - b^2 = (a + b)(a - b)$:

$$(3/5x + 4)(3/5x - 4) = (3/5x)^2 - (4)^2 = 9/25x^2 - 16$$

Therefore, the product of $(3/5x + 4)(3/5x - 4)$ is $9/25x^2 - 16$.

Question 4

(i) $(67)^2$:

To square a two-digit number, we can use the identity $(a + b)^2 = a^2 + 2ab + b^2$:

$$(67)^2 = (60 + 7)^2 = 60^2 + 2(60)(7) + 7^2 = 3600 + 840 + 49 = 4489$$

Therefore, $(67)^2 = 4489$.

(ii) $(102)^2$:

Using the same identity:

$$(102)^2 = (100 + 2)^2 = 100^2 + 2(100)(2) + 2^2 = 10000 + 400 + 4 = 10404$$

Therefore, $(102)^2 = 10404$.

(iii) $(496)^2$:

Using the same identity: $(496)^2 = (500 - 4)^2 = 500^2 - 2(500)(4) + 4^2 = 250000 - 4000 + 16 = 246016$

Therefore, $(496)^2 = 246016$.

(iv) $(997)^2$:

Using the same identity:

$$(997)^2 = (1000 - 3)^2 = 1000^2 - 2(1000)(3) + 3^2 = 1000000 - 6000 + 9 = 994009$$

Therefore, $(997)^2 = 994009$.

(v) $52 * 48$:

To multiply two-digit numbers, we can use the identity $(a + b)(a - b) = a^2 - b^2$: $52 * 48 = (50 + 2)(50 - 2) = 50^2 - 2^2 = 2500 - 4 = 2496$

Therefore, $52 * 48 = 2496$.

(vi) $10.3 * 9.7$:

To multiply decimal numbers, we can multiply them as whole numbers and adjust the decimal point:

$$10.3 * 9.7 = 103 * 97 = 10000 + 300 + 70 + 21 = 10391$$

Therefore, $10.3 * 9.7 = 99.91$

(vii) $106 * 94$:

Using the same multiplication technique:

$$106 * 94 = 10000 + 600 + 60 + 24 = 10084$$

Therefore, $106 * 94 = 9964$

Question 5

Given that $a - 1/a = 4$, we can find the value of $(a - 1/a)^2$ and $a^2 + 1/a^2$.

To find $(a - 1/a)^2$, we square the expression:

$$\begin{aligned}(a - 1/a)^2 &= (a^2 - 2(a)(1/a) + (1/a)^2) \\ &= (a^2 - 2 + (1/a)^2)\end{aligned}$$

$$= a^2 - 2 + 1/a^2$$

Since $a - 1/a = 4$, we can substitute the value of $(a - 1/a)$ into the expression:

$$(a - 1/a)^2 = (4)^2 \\ = 16$$

Therefore, $(a - 1/a)^2$ is equal to 16.

To find $a^2 + 1/a^2$, we square the equation $a - 1/a = 4$:

$$(a - 1/a)^2 = 4^2 \\ a^2 - 2 + 1/a^2 = 16$$

Adding 2 to both sides of the equation:

$$a^2 + 1/a^2 = 16 + 2 \\ a^2 + 1/a^2 = 18$$

Therefore, $a^2 + 1/a^2$ is equal to 18.

Question 6

Given that $x + 1/x = 3$, we can find the value of $(x^2 + 1/x^2)$ and $x^4 + 1/x^4$.

To find $(x^2 + 1/x^2)$, we square the equation $x + 1/x = 3$:

$$(x + 1/x)^2 = 3^2 \\ x^2 + 2 + 1/x^2 = 9$$

Subtracting 2 from both sides of the equation:

$$x^2 + 1/x^2 = 9 - 2 \\ x^2 + 1/x^2 = 7$$

Therefore, $(x^2 + 1/x^2)$ is equal to 7.

To find $x^4 + 1/x^4$, we can square the equation $x^2 + 1/x^2 = 7$:

$$(x^2 + 1/x^2)^2 = 7^2 \\ x^4 + 2 + 1/x^4 = 49$$

Subtracting 2 from both sides of the equation:

$$x^4 + 1/x^4 = 49 - 2 \\ x^4 + 1/x^4 = 47$$

Therefore, $x^4 + 1/x^4$ is equal to 47.

Question 7

(i) $6a = 29^2 - 23^2$:

To find the value of 'a', we can simply evaluate the right-hand side of the equation:

$$6a = 841 - 529 \\ 6a = 312$$

Dividing both sides of the equation by 6:

$$a = 312/6$$

$a = 52$ Therefore, the value of 'a' is 52.

(ii) $48a = 25^2 - 23^2$:

$$48a = 625 - 529 \\ 48a = 96$$

Dividing both sides of the equation by 48:

$$a = 96/48 \\ a = 2$$

Therefore, the value of 'a' is 2.

(iii) $38^2 - 32^2 = 4a$:

To find the value of 'a', we can evaluate the left-hand side of the equation:

$$1444 - 1024 = 4a \\ 420 = 4a$$

Dividing both sides of the equation by 4:

$$a = 420/4$$

$a = 105$:Therefore, the value of 'a' is 105.

Question 8

(i) $1/9x^2 + 6xy + 81y^2$, when $x = -1$ and $y = 1$:

Substituting $x = -1$ and $y = 1$ into the expression:

$$\begin{aligned}
& 1/9(-1)^2 + 6(-1)(1) + 81(1)^2 \\
& = 1/9 + (-6) + 81 \\
& = 1/9 - 6 + 81 \\
& = 1/9 + 9 \\
& = 10/9
\end{aligned}$$

Therefore, the value of $1/9x^2 + 6xy + 81y^2$, when $x = -1$ and $y = 1$, is $10/9$.

(ii) $49x^2 + 70x + 25$, when $x = 1$:

Substituting $x = 1$ into the expression:

$$\begin{aligned}
& 49(1)^2 + 70(1) + 25 \\
& = 49 + 70 + 25 \\
& = 144
\end{aligned}$$

Therefore, the value of $49x^2 + 70x + 25$, when $x = 1$, is 144.

(iii) $16x^2 - 16/3xy + 4/9y^2$, when $x = 1/3$ and $y = 1/2$:

Substituting $x = 1/3$ and $y = 1/2$ into the expression:

$$\begin{aligned}
& 16(1/3)^2 - 16/3(1/3)(1/2) + 4/9(1/2)^2 \\
& = 16(1/9) - 16/3(1/6) + 4/9(1/4) \\
& = 16/9 - 16/18 + 4/36 \\
& = 16/9 - 8/9 + 1/9 \\
& = (16 - 8 + 1)/9 \\
& = 9/9 \\
& = 1
\end{aligned}$$

Therefore, the value of $16x^2 - 16/3xy + 4/9y^2$, when $x = 1/3$ and $y = 1/2$, is 1.

Question 9

(i) $(a^2 - b^2)/(a - b)$:

We can factor the numerator using the difference of squares formula ($a^2 - b^2 = (a + b)(a - b)$):

$$(a^2 - b^2)/(a - b) = [(a + b)(a - b)]/(a - b)$$

The $(a - b)$ terms in the numerator and denominator cancel out, leaving us with:

$$(a + b)$$

Therefore, $(a^2 - b^2)/(a - b)$ simplifies to $(a + b)$.

(ii) $[(a + b)^2 - (a - b)^2]/(2a)$:

Expanding the squares in the numerator using the identity ($a^2 - b^2 = (a + b)(a - b)$):

$$\begin{aligned}
& [(a + b)^2 - (a - b)^2]/(2a) = [(a + b + a - b)(a + b - a + b)]/(2a) \\
& = [2a(2b)]/(2a) \\
& = 2b
\end{aligned}$$

Therefore, $[(a + b)^2 - (a - b)^2]/(2a)$ simplifies to $2b$.

(iii) $(3.5 * 3.5 - 2 * 3.5 * 0.5 + 0.5 * 0.5)/(3.5 * 3.5 + 2 * 3.5 * 0.5 + 0.5 * 0.5)$:

Expanding and simplifying each term:

$$\begin{aligned}
& (12.25 - 3.5 + 0.25)/(12.25 + 3.5 + 0.25) \\
& = 9/(16.25) \\
& = 9/16.25
\end{aligned}$$

Therefore, $(3.5 * 3.5 - 2 * 3.5 * 0.5 + 0.5 * 0.5)/(3.5 * 3.5 + 2 * 3.5 * 0.5 + 0.5 * 0.5)$ simplifies to $9/16.25$.

(iv) $(36^2 - 35^2)/71$:

Applying the difference of squares formula ($a^2 - b^2 = (a + b)(a - b)$):

$$\begin{aligned}
& (36^2 - 35^2)/71 = [(36 + 35)(36 - 35)]/71 \\
& = (71 * 1)/71 \\
& = 1
\end{aligned}$$

Therefore, $(36^2 - 35^2)/71$ simplifies to 1.

Question 10

(i) $(x + 2y)(x - 2y)(x^2 + 4y^2)$:

To simplify this product, we can use the formula for the difference of squares and the formula for the square of a binomial:

$$\begin{aligned}
(x + 2y)(x - 2y)(x^2 + 4y^2) & = (x^2 - (2y)^2)(x^2 + 4y^2) \\
& = (x^2 - 4y^2)(x^2 + 4y^2) \\
& = x^4 - (4y^2)^2 \\
& = x^4 - 16y^4
\end{aligned}$$

Therefore, $(x + 2y)(x - 2y)(x^2 + 4y^2)$ simplifies to $x^4 - 16y^4$.

(ii) $(x + y)(x - y)(x^2 + y^2)$:

Using the same approach as above, we can simplify the product:

$$\begin{aligned}(x + y)(x - y)(x^2 + y^2) &= (x^2 - y^2)(x^2 + y^2) \\ &= x^4 - y^4\end{aligned}$$

Therefore, $(x + y)(x - y)(x^2 + y^2)$ simplifies to $x^4 - y^4$.

(iii) $(16x^2 + 25y^2)(4x - 5y)(4x + 5y)$:

To simplify this product, we can use the formula for the square of a binomial:

$$\begin{aligned}(16x^2 + 25y^2)(4x - 5y)(4x + 5y) &= (16x^2 + 25y^2)(16x^2 - (5y)^2) \\ &= (16x^2 + 25y^2)(16x^2 - 25y^2) \\ &= (16x^2)^2 - (25y^2)^2 \\ &= 256x^4 - 625y^4\end{aligned}$$

Therefore, $(16x^2 + 25y^2)(4x - 5y)(4x + 5y)$ simplifies to $256x^4 - 625y^4$.

(iv) $(1/9a^2 + 9b^2)(1/3a + 3b)(1/3a - 3b)$:

To simplify this product, we can use the formula for the difference of squares:

$$\begin{aligned}(1/9a^2 + 9b^2)(1/3a + 3b)(1/3a - 3b) &= ((1/3a)^2 - (3b)^2)((1/3a)^2 - (3b)^2) \\ &= (1/9a^2 - 9b^2)(1/9a^2 - 9b^2) \\ &= (1/9a^2)^2 - (9b^2)^2 \\ &= 1/81a^4 - 81b^4\end{aligned}$$

Therefore, $(1/9a^2 + 9b^2)(1/3a + 3b)(1/3a - 3b)$ simplifies to $1/81a^4 - 81b^4$.

Exercise 7.5

Question 1

(i) $(-90a^2b) \div (5ab)$:

We can cancel out the common factors of "a" and "b" in the numerator and denominator:

$$\begin{aligned}(-90a^2b) \div (5ab) &= -90a^2b / 5ab \\ &= (-90/5)(a^2/a)(b/b) \\ &= -18a^{(2-1)} \\ &= -18a\end{aligned}$$

Therefore, $(-90a^2b) \div (5ab)$ simplifies to $-18a$.

(ii) $(4a^2b) \div (ab)$:

We can cancel out the common factor of "ab" in the numerator and denominator:

$$\begin{aligned}(4a^2b) \div (ab) &= 4a^2b / ab \\ &= (4/1)(a^2/a)(b/b) \\ &= 4a^{(2-1)} \\ &= 4a\end{aligned}$$

Therefore, $(4a^2b) \div (ab)$ simplifies to $4a$.

(iii) $(-144x^3y^2z) \div (12xy)$:

We can cancel out the common factors of "x" and "y" in the numerator and denominator:

$$\begin{aligned}(-144x^3y^2z) \div (12xy) &= -144x^3y^2z / 12xy \\ &= (-144/12)(x^3/x)(y^2/y)(z/z) \\ &= -12x^{(3-1)}y^{(2-1)} \\ &= -12x^2y\end{aligned}$$

Therefore, $(-144x^3y^2z) \div (12xy)$ simplifies to $-12x^2y$.

(iv) $(35x^2y^3z^4) \div (5xyz^2)$:

We can cancel out the common factors of "x", "y", and "z" in the numerator and denominator:

$$\begin{aligned}(35x^2y^3z^4) \div (5xyz^2) &= 35x^2y^3z^4 / 5xyz^2 \\ &= (35/5)(x^2/x)(y^3/y)(z^4/z^2) \\ &= 7x^{(2-1)}y^{(3-1)}z^{(4-2)} \\ &= 7xy^2z^2\end{aligned}$$

Therefore, $(35x^2y^3z^4) \div (5xyz^2)$ simplifies to $7xy^2z^2$.

(v) $(125m^6n^3p^2) \div (-5mnp^2)$:

We can cancel out the common factors of "m", "n", and "p" in the numerator and denominator:

$$\begin{aligned}(125m^6n^3p^2) \div (-5mnp^2) &= 125m^6n^3p^2 / (-5mnp^2) \\ &= (-125/5)(m^6/m)(n^3/n)(p^2/p^2) \\ &= -25m^{(6-1)}n^{(3-1)} \\ &= -25m^5n^2\end{aligned}$$

Therefore, $(125m^6n^3p^2) \div (-5mnp^2)$ simplifies to $-25m^5n^2$.

(vi) $(-160a^4b^2c^2) \div (-20a^2b^2c)$:

We can cancel out the common factors of "a", "b", and "c" in the numerator and denominator:

$$\begin{aligned}(-160a^4b^2c^2) \div (-20a^2b^2c) &= (-160a^4b^2c^2) / (-20a^2b^2c) \\ &= (-160/-20)(a^4/a^2)(b^2/b^2)(c^2/c) \\ &= 8a^{(4-2)}c^{(2-1)} \\ &= 8a^2c\end{aligned}$$

Therefore, $(-160a^4b^2c^2) \div (-20a^2b^2c)$ simplifies to $8a^2c$.

Question 2

(i) $(9x^2 + 18x^2 + 45x) \div (9x)$:

We can simplify this expression by factoring out the common factor of 9x:

$$\begin{aligned}(9x^2 + 18x^2 + 45x) \div (9x) &= (9x^2 + 18x^2 + 45x) / (9x) \\ &= (9x(x + 2x + 5)) / (9x) \\ &= (9x(3x + 5)) / (9x) \\ &= 3x + 5\end{aligned}$$

Therefore, $(9x^2 + 18x^2 + 45x) \div (9x)$ simplifies to $3x + 5$.

(ii) $(21x^2y^3 - 48xy^2 + 36x^3y^3) \div (3xy)$:

We can simplify this expression by factoring out the common factor of 3xy:

$$\begin{aligned}(21x^2y^3 - 48xy^2 + 36x^3y^3) \div (3xy) &= (3xy(7x^2y^2 - 16y + 12x^2y^2)) / (3xy) \\ &= 7x^2y^2 - 16y + 12x^2y^2\end{aligned}$$

Therefore, $(21x^2y^3 - 48xy^2 + 36x^3y^3) \div (3xy)$ simplifies to $7x^2y^2 - 16y + 12x^2y^2$.

(iii) $(20a^2 - 15a^3b^2 + 20a^4) \div (-5a)$:

We can simplify this expression by factoring out the common factor of -5a:

$$\begin{aligned}(20a^2 - 15a^3b^2 + 20a^4) \div (-5a) &= (-5a(4 - 3ab^2 - 4a^3)) / (-5a) \\ &= 4 - 3ab^2 - 4a^3\end{aligned}$$

Therefore, $(20a^2 - 15a^3b^2 + 20a^4) \div (-5a)$ simplifies to $4 - 3ab^2 - 4a^3$.

(iv) $(4x^4y^4 - 8x^3y^3 - x^2y^2) \div (1/2xy)$:

We can simplify this expression by multiplying by the reciprocal of $1/2xy$, which is $2xy$:

$$\begin{aligned}(4x^4y^4 - 8x^3y^3 - x^2y^2) \div (1/2xy) &= (4x^4y^4 - 8x^3y^3 - x^2y^2) * (2xy) \\ &= 8x^5y^5 - 16x^4y^4 - 2x^3y^3\end{aligned}$$

Therefore, $(4x^4y^4 - 8x^3y^3 - x^2y^2) \div (1/2xy)$ simplifies to $8x^5y^5 - 16x^4y^4 - 2x^3y^3$.

(v) $(56x^2y^2 - 32x^4y + 48x^2y) \div (-8x^2y)$:

We can simplify this expression by dividing each term by $-8x^2y$:

$$\begin{aligned}(56x^2y^2 - 32x^4y + 48x^2y) \div (-8x^2y) &= (56x^2y^2) / (-8x^2y) - (32x^4y) / (-8x^2y) + (48x^2y) / (-8x^2y) \\ &= -7y - (-4x^2) + (-6) \\ &= -7y + 4x^2 - 6\end{aligned}$$

Therefore, $(56x^2y^2 - 32x^4y + 48x^2y) \div (-8x^2y)$ simplifies to $-7y + 4x^2 - 6$.

(vi) $(18m^5n^3p^3 - 63m^2np + 27m^2n^2p^2) \div (9m^2np)$:

We can simplify this expression by dividing each term by $9m^2np$:

$$\begin{aligned}(18m^5n^3p^3 - 63m^2np + 27m^2n^2p^2) \div (9m^2np) &= (18m^5n^3p^3) / (9m^2np) - (63m^2np) / (9m^2np) \\ &+ (27m^2n^2p^2) / (9m^2np) \\ &= 2m^3n^2p^2 - 7 + 3n\end{aligned}$$

Therefore, $(18m^5n^3p^3 - 63m^2np + 27m^2n^2p^2) \div (9m^2np)$ simplifies to $2m^3n^2p^2 - 7 + 3n$.

Question 3

Do yourself (same as above 2)

Question 4

To find the quotient and remainder of the division of the polynomial $(8y^3 - 6y^2 + 10y + 15)$ by $(4y + 1)$, use polynomial long division.

$$4y + 1 \overline{) 8y^3 - 6y^2 + 10y + 15}$$

Divide the highest degree term of the dividend by the highest degree term of the divisor, which is $(8y^3 / 4y) = 2y^2$. Then multiply this result by the divisor $(4y + 1)$ and subtract it from the dividend:

$$\begin{array}{r}
 2y^2 \\
 \hline
 4y + 1 \mid 8y^3 - 6y^2 + 10y + 15 \\
 - (8y^3 + 2y^2) \\
 \hline
 - 8y^2 + 10y + 15
 \end{array}$$

Now bring down the next term, which is $-8y^2$:

$$\begin{array}{r}
 2y^2 - 8y^2 \\
 \hline
 4y + 1 \mid 8y^3 - 6y^2 + 10y + 15 \\
 - (8y^3 + 2y^2) \\
 \hline
 - 8y^2 + 10y + 15 \\
 - (- 8y^2 - 2y) \\
 \hline
 12y + 15
 \end{array}$$

Divide the highest degree term of the new dividend $(-8y^2)$ by the highest degree term of the divisor $(4y)$, which gives us $-2y$. Now, multiply this result by the divisor $(4y + 1)$ and subtract it from the new dividend:

$$\begin{array}{r}
 2y^2 - 8y^2 - 2y \\
 \hline
 4y + 1 \mid 8y^3 - 6y^2 + 10y + 15 \\
 - (8y^3 + 2y^2) \\
 \hline
 - 8y^2 + 10y + 15 \\
 - (- 8y^2 - 2y) \\
 \hline
 12y + 15 \\
 - (12y + 3) \\
 \hline
 12
 \end{array}$$

Now, you have reached a constant term, which means we cannot divide further. The constant term 12 is the remainder of the division.

Therefore, the quotient is $2y^2 - 2y + 3$, and the remainder is 12.

(ii)

$$\begin{array}{r}
 a - 1 \mid 4a^3 + a - 5
 \end{array}$$

First divide the highest degree term of the dividend by the highest degree term of the divisor, which is $(4a^3 / a) = 4a^2$. We then multiply this result by the divisor $(a - 1)$ and subtract it from the dividend:

$$\begin{array}{r}
 4a^2 \\
 \hline
 a - 1 \mid 4a^3 + a - 5 \\
 - (4a^3 - 4a^2) \\
 \hline
 5a^2 + a - 5
 \end{array}$$

Now bring down the next term, which is $5a^2$:

$$\begin{array}{r}
 4a^2 + 5a^2 \\
 \hline
 a - 1 \mid 4a^3 + a - 5 \\
 - (4a^3 - 4a^2) \\
 \hline
 5a^2 + a - 5 \\
 - (5a^2 - 5a) \\
 \hline
 6a - 5
 \end{array}$$

Now divide the highest degree term of the new dividend ($5a^2$) by the highest degree term of the divisor (a), which gives us $5a$. Then, multiply this result by the divisor ($a - 1$) and subtract it from the new dividend:

$$\begin{array}{r}
 4a^2 + 5a^2 + 5a \\
 \hline
 a - 1 \mid 4a^3 + a - 5 \\
 - (4a^3 - 4a^2) \\
 \hline
 5a^2 + a - 5 \\
 - (5a^2 - 5a) \\
 \hline
 6a - 5 \\
 - (6a - 6) \\
 \hline
 1
 \end{array}$$

At this point, we have reached a constant term, which means we cannot divide further. The constant term 1 is the remainder of the division.

Therefore, the quotient is $4a^2 + 5a + 6$, and the remainder is 1.

(iii)

$$\begin{array}{r}
 3x^2 - 7x + 14 \\
 \hline
 x^2 - 2x \mid 3x^4 - 3x^3 - 4x^2 - 4x + 0
 \end{array}$$

start by dividing the highest degree term of the dividend, which is $3x^4$, by the highest degree term of the divisor, which is x^2 . The result is $3x^2$. We write this above the line.

$$\begin{array}{r}
 3x^2 \\
 \hline
 x^2 - 2x \mid 3x^4 - 3x^3 - 4x^2 - 4x + 0
 \end{array}$$

Next, multiply the divisor, ($x^2 - 2x$), by the result obtained in step 1, which is $3x^2$. We subtract this product from the dividend.

$$\begin{array}{r}
 3x^2 \\
 \hline
 x^2 - 2x \mid 3x^4 - 3x^3 - 4x^2 - 4x + 0 \\
 - (3x^4 - 6x^3) \\
 \hline
 3x^3 - 4x^2 - 4x
 \end{array}$$

Now bring down the next term of the dividend, which is $-4x$.

$$\begin{array}{r}
 3x^2 - 7x \\
 \hline
 x^2 - 2x \mid 3x^4 - 3x^3 - 4x^2 - 4x + 0 \\
 - (3x^4 - 6x^3) \\
 \hline
 3x^3 - 4x^2 - 4x \\
 - (3x^3 - 6x^2)
 \end{array}$$

$$\text{-----}$$

$$2x^2 - 4x$$

Now divide the highest degree term of the new dividend, which is $2x^2$, by the highest degree term of the divisor, which is x^2 . The result is $2x$. We write this above the line.

$$\begin{array}{r}
 3x^2 - 7x + 2x \\
 \text{-----} \\
 x^2 - 2x \mid 3x^4 - 3x^3 - 4x^2 - 4x + 0 \\
 - (3x^4 - 6x^3) \\
 \text{-----} \\
 3x^3 - 4x^2 - 4x \\
 - (3x^3 - 6x^2) \\
 \text{-----} \\
 2x^2 - 4x \\
 - (2x^2 - 4x) \\
 \text{-----} \\
 0
 \end{array}$$

Since the degree of the new dividend ($2x^2 - 4x$) is less than the degree of the divisor ($x^2 - 2x$), we have reached the end.

The quotient is $3x^2 - 7x + 2$, and the remainder is 0.

Therefore, the quotient is $3x^2 - 7x + 2$, and the remainder is 0.

(iv) Do yourself (same as above 3 solved)

CHAPTER 8

Exercise 8.1

(i) 1, 2, 3, 6, x, 2x, 3x, 6x, x^2 , $3x^2$, $6x^2$

(ii) 1, 2, 4, 8, x, 2x, 4x, 8x, y, 2y, 4y, 8y, xy, 2xy, 4xy, 8xy, x^2 , $2x^2$, $4x^2$, $8x^2$, x^2y , $2x^2y$, $4x^2y$, $8x^2y$ (iii) 1, 13, p, 13p, q, 13q, pq, 13pq

(iv) 1, 5, x, 5x, y, 5y, y^2 , $5y^2$, xy, 5xy, xy^2 , $5xy^2$

Question 2

(i) Common factors = 1, 3, x, 3x (ii) 1, 2, n, 2n (iii) 1, 3, 5, 15, a, 3a, 5a, 15a

(iv) 1, 2, 3, 4, 6, 12, x, 2x, 3x, 4x, 6x, 12x, y, 2y, 3y, 4y, 6y, 12y, xy, 2xy, 3xy, 4xy, 6xy, 12xy

Question 3

(i) $3x^2 + 9$:

The expression $3x^2 + 9$ can be factorized by taking out the common factor, which is 3: $3(x^2 + 3)$.

(ii) $30x - 25y$:

The expression $30x - 25y = 5(6x - 5y)$

(iii) $42x^2y^2 - 36y$:

The expression $42x^2y^2 - 36y$ can be factorized by taking out the common factor, which is 6y: $6y(7x^2y - 6)$.

(iv) $5x^3 + 10x^2y$:

The expression $5x^3 + 10x^2y$ can be factorized by taking out the common factor, which is $5x^2$: $5x^2(x + 2y)$.

(v)

$54m^2 - 18mn - 27n^2 = 9(6m^2 - 2mn - 3n^2)$

Now, let's focus on the quadratic trinomial within the parentheses: $6m^2 - 2mn - 3n^2$.

The first term, $6m^2$, can be factored as $2m \cdot 3m$.

Applying this, we can rewrite the expression as:

$9(2m \cdot 3m - 2mn - 3n^2)$

$9(2m \cdot 3m - 2m \cdot n - 3n^2)$

Finally, the factorization becomes:

$9(2m(3m - n) - 3n^2)$

Therefore, the factorization of $54m^2 - 18mn - 27n^2$ is:

$9(2m(3m - n) - 3n^2)$.

(vi) $5a^2 + 5a + 15ab + 10b$

Step 1: Group the terms:

$(5a^2 + 5a) + (15ab + 10b)$

Step 2: Factor out the common factors from each group:

$$5a(a + 1) + 5b(3a + 2)$$

Step 3: Simplify the expression:

$$5a(a + 1) + 5b(3a + 2)$$

So, the factorization of $5a^2 + 5a + 15ab + 10b$ is:

$$5a(a + 1) + 5b(3a + 2).$$

Question 4

(i) $2x(x+y) + 4y(x+y)$

$$= (x+y)(2x+4y)$$

$$= 2(x+y)(x+2y)$$

(ii) $a^2+2ab+a^2b$

Assuming the expression was meant to be " a^2 " instead of " a^b " as there is no commonly used notation " a^b " without a specific exponent value, we can factorize the expression as follows:

$$= (a^2 + 2ab) + (a + 2)$$

$$= a(a + 2b) + 1(a + 2)$$

$$= (a+1)(a+2b+2)$$

(iii) $x(4x+12y) - 3(2x+6y)$

$$= 4x^2 + 12xy - 6x - 18y$$

$$= 2x(2x+6y) - 6(2x+6y)$$

$$= (2x-6)(2x+6y)$$

$$= 2(x-3)(2x+6y)$$

(iv) $6(x+2y)^3 - 8(x+2y)^2 + 4(x+2y)$

$$= (x+2y)(6(x+2y)^2 - 8(x+2y) + 4)$$

$$= 2(x+2y)(3(x+2y)^2 - 4(x+2y) + 2)$$

(v) $2x(a-b)^3 + 3y(a-b)^2 - 5(a-b)$

$$= (a-b)(2x(a-b)^2 + 3y(a-b) - 5)$$

$$= (a-b)(2x(a^2 + b^2 - 2ab) + 3y(a-b) - 5)$$

$$= (a-b)(2xa^2 + 2xb^2 - 4xab + 3ya - 3yb - 5)$$

(vi) $5a(2b-3c)^2 + 2a(2b-3c)$

$$= (2b-3c)(5a(2b-3c) + 2a)$$

$$= (2b-3c)(10ab-15ac+2a)$$

Question 5

(i) $ab - xy + ya - xb$

Rearranging the terms:

$$= ab - xb + ya - xy$$

$$= b(a - x) + y(a - x)$$

$$= (b + y)(a - x)$$

(ii) $x^2 + yz + xy + xz$

Grouping the terms:

$$= (x^2 + xy) + (yz + xz)$$

$$= x(x + y) + z(y + x)$$

$$= x(x + y) + z(x + y)$$

$$= (x + z)(x + y)$$

(iii) $8 - 4x - 2x^2 + x^3$

Rearranging the terms:

$$= x^3 - 2x^2 - 4x + 8$$

Grouping the terms:

$$= (x^3 - 2x^2) - (4x - 8)$$

$$= x^2(x - 2) - 4(x - 2)$$

$$= (x^2 - 4)(x - 2)$$

$$= (x + 2)(x - 2)(x - 2)$$

$$= (x + 2)(x - 2)^2$$

(iv) $xz^2 + xt^2 + yz^2 + yt^2$

Grouping the terms:

$$= (xz^2 + yz^2) + (xt^2 + yt^2)$$

$$= z^2(x + y) + t^2(x + y)$$

$$= (z^2 + t^2)(x + y)$$

(v) $1 + x + 8y + 8xy$

Rearranging the terms:

$$= x + 8xy + 1 + 8y$$

Grouping the terms:

$$= (x + 8xy) + (1 + 8y)$$

$$= x(1 + 8y) + 1(1 + 8y)$$

$$= (x + 1)(1 + 8y)$$

(vi) $5 - 2a - 6ab + 15b$

Rearranging the terms:

$$= -2a - 6ab + 15b + 5$$

Grouping the terms:

$$= (-2a - 6ab) + (15b + 5)$$

$$= -2a(1 + 3b) + 5(3b + 1)$$

$$= (-2a + 5)(1 + 3b)$$

(vii), (viii), (ix), (x) parts do yourself, same as above.

Exercise 8.2

Question 1

(i) $x^2 - 16z^2$

This is a difference of squares. It can be factorized as:

$$(x + 4z)(x - 4z)$$

(ii) $a^2 - (x+2)^2$

This is a difference of squares. It can be factorized as:

$$(a + x + 2)(a - x - 2)$$

(iii) $81(a - b)^2 - 36(a + b)^2$

$$81(a - b)^2 - 36(a + b)^2$$

We can factor out the common factor of 9:

$$= 9 * 9(a - b)^2 - 9 * 4(a + b)^2$$

$$= 9[(a - b)^2 - 4(a + b)^2]$$

Now, we can recognize that $(a - b)^2 - 4(a + b)^2$ is a difference of squares:

$$= 9[(a - b - 2(a + b))(a - b + 2(a + b))]$$

$$= 9[(a - b - 2a - 2b)(a - b + 2a + 2b)]$$

$$= 9[(-a - 3b)(3a + b)]$$

Therefore, the factorization of $81(a - b)^2 - 36(a + b)^2$ is: $9(-a - 3b)(3a + b)$

(iv) $x^8 - 81$

This is a difference of squares. It can be factorized as:

$$(x^4 + 9)(x^4 - 9)$$

$$= (x^4 + 9)(x^2 + 3)(x^2 - 3)$$

$$= (x^4 + 9)(x^2 + 3)(x^2 - 3)$$

(v) $a^2 + 2ab + b^2 - z^2$

This is a perfect square trinomial. It can be factorized as:

$$(a + b)^2 - z^2$$

$$= (a + b + z)(a + b - z)$$

(vi) $x^8 - y^8$

This is a difference of squares. It can be factorized as:

$$(x^4 + y^4)(x^4 - y^4)$$

$$= (x^4 + y^4)(x^2 + y^2)(x^2 - y^2)$$

$$= (x^4 + y^4)(x^2 + y^2)(x + y)(x - y)$$

(vii) $x^2/36 - 4$

This expression can be simplified as:

$$\begin{aligned} & (x^2/36) - (4 * 36/36) \\ & = (x^2 - 144)/36 \\ & = [(x + 12)(x - 12)]/36 \end{aligned}$$

(viii) $x^2/4 - 16z^2$

This expression can be simplified as:

$$\begin{aligned} & (x^2/4) - (16z^2 * 4/4) \\ & = (x^2 - 64z^2)/4 \\ & = [(x + 8z)(x - 8z)]/4 \end{aligned}$$

(ix) $x^2/9 - 16$

This expression can be simplified as:

$$\begin{aligned} & (x^2/9) - (16 * 9/9) \\ & = (x^2 - 144)/9 \\ & = [(x + 12)(x - 12)]/9 \end{aligned}$$

Question 2

(i) $4a^2 - 4a + 1$

This expression is a perfect square trinomial and can be factorized as:

$$(2a - 1)^2$$

(ii) $25a^2 + 30ab + 9b^2$

This expression is a perfect square trinomial and can be factorized as:

$$(5a + 3b)^2$$

(iii) $16x^2 - 40x + 25$

This expression is a perfect square trinomial and can be factorized as:

$$(4x - 5)^2$$

(iv) $16a^2b^2 - 8ab^2 + b^2$

This expression is a perfect square trinomial and can be factorized as:

$$(4ab - b)^2$$

(v) $9a^2 - 6a + 1$

This expression is a perfect square trinomial and can be factorized as:

$$(3a - 1)^2$$

(vi), vii, viii, ix part do yourself (same as above)

Exercise 8.3

(i) $4x^2 + 8x + 3$

This expression can be factorized as:

$$(2x + 1)(2x + 3)$$

(ii) $a^2 + 9a + 20$

This expression can be factorized as:

$$(a + 4)(a + 5)$$

(iii) $x^2 + 9x + 18$

This expression can be factorized as:

$$(x + 3)(x + 6)$$

(iv) $3x^2 - 15x + 18$

This expression can be factorized by factoring out the common factor:

$$3(x^2 - 5x + 6)$$

Now, factorize the quadratic expression:

$$3(x - 2)(x - 3)$$

(v) $a^2 - 24a + 128$

This expression can be factorized as:

$$(a - 8)(a - 16)$$

Let's factorize each of the given expressions:

(vi) $x^2 - 40x + 279$

Do yourself

(vii) $x^2 - 2x - 24$

This expression can be factorized as:

$$(x - 6)(x + 4)$$

(viii) $x^2 - 21x + 54$

This expression can be factorized as:

$$(x - 3)(x - 18)$$

(ix) $z^2 - z - 2$

This expression can be factorized as:

$$(z - 2)(z + 1)$$

(x) $m^2 - 4m - 12$

This expression can be factorized as:

$$(m - 6)(m + 2)$$

(xi) $-x^2 + 3x + 18$

This expression can be factorized as:

$$-(x - 6)(x + 3)$$

(xii) $a^2 - 5a - 176$

This expression can be factorized as:

$$(a - 16)(a + 11)$$

(xiii) $3x^2 + 5x + 2$

This expression can be factorized as:

$$(3x + 2)(x + 1)$$

(xiv) $3x^2 + 15x - 72$

This expression can be factorized as:

$$(x + 8)(3x - 9)$$

(xv) $4x^2 - 19x + 15$

This expression can be factorized as:

$$(4x - 3)(x - 5)$$

(xvi) $3m^2 + 14m + 8$

This expression can be factorized as:

$$(3m + 2)(m + 4)$$

(xvii) $m^2 + 3m - 4$

This expression can be factorized as:

$$(m + 4)(m - 1)$$

(xviii) $2x^2 + x - 6$

This expression can be factorized as:

$$(2x - 3)(x + 2)$$

19,20,21,22,23,24 parts – do yourself , same as above

CHAPTER 9

Exercise 9.1

(i) $5x + 7 = 2x - 8$

$$5x - 2x = -8 - 7$$

$$3x = -15$$

$$x = -15/3$$

$$x = -5$$

Therefore, the solution to the equation is $x = -5$.

(ii) $8x + 3 = 27$

$$8x = 27 - 3$$

$$8x = 24$$

$$x = 24/8$$

$$x = 3$$

Therefore, the solution to the equation is $x = 3$.

(iii) $90/8 + x = 32$

$$x = 32 - 90/8$$

$$x = 256/8 - 90/8$$

$$x = 166/8$$

$$x = 83/4$$

Therefore, the solution to the equation is $x = 83/4$.

$$(iv) \frac{2}{3}x + 1 = \frac{7}{3}$$

$$\frac{2}{3}x = \frac{7}{3} - 1$$

$$\frac{2}{3}x = \frac{7}{3} - \frac{3}{3}$$

$$\frac{2}{3}x = \frac{4}{3}$$

$$x = \frac{4}{3} * \frac{3}{2}$$

$$x = 2$$

Therefore, the solution to the equation is $x = 2$.

$$(v) 3x + \frac{2}{3} = 2x + 1$$

$$3x - 2x = 1 - \frac{2}{3}$$

$$x = \frac{3}{3} - \frac{2}{3}$$

$$x = \frac{1}{3}$$

Therefore, the solution to the equation is $x = \frac{1}{3}$.

Let's solve each of the given equations:

$$(vi) 8x - \frac{3}{3}x = 2$$

$$(vii) 5x - \frac{8}{5} = 2x$$

To solve this equation, let's first simplify the expression on the left-hand side:

$$5x - \frac{8}{5} = 2x$$

To eliminate the fraction, multiply through by the common denominator, which is 5:

$$25x - 8 = 10x$$

Now, rearrange the equation to isolate the variable x :

$$25x - 10x = 8$$

$$15x = 8$$

$$x = \frac{8}{15}$$

Therefore, the solution to the equation is $x = \frac{8}{15}$.

$$(viii) \frac{x}{5} - \frac{5}{2} = 8$$

$$\frac{x}{5} - \frac{5}{2} = 8$$

To eliminate the fractions, we can find a common denominator, which is 10:

$$\frac{2x}{10} - \frac{25}{10} = 8$$

Now, let's simplify the equation:

$$\frac{2x - 25}{10} = 8$$

To isolate the variable x , we can multiply through by 10:

$$2x - 25 = 80$$

Now, let's solve for x :

$$2x = 80 + 25$$

$$2x = 105$$

$x = \frac{105}{2}$ Therefore, the solution to the equation is $x = \frac{105}{2}$.

$$(ix) \frac{3x - 5}{2x + 15} = \frac{8}{9}$$

To solve this equation, let's first cross-multiply:

$$9(3x - 5) = 8(2x + 15)$$

simplify the equation:

$$27x - 45 = 16x + 120$$

To isolate the variable x , let's move the terms involving x to one side and the constants to the other side:

$$27x - 16x = 120 + 45$$

Combining like terms:

$$11x = 165$$

$$x = \frac{165}{11}$$

$x = 15$ Therefore, the solution to the equation is $x = 15$.

$$(x) \frac{1}{2x + 1} = \frac{1}{3x + 1}$$

Cross-multiplying:

$$(2x + 1) = (3x + 1)$$

$$2x = 3x$$

$$2x - 3x = 0$$

$$-x = 0$$

$$x = 0$$

$$(xi) (7x)/(2x - 5) = 14/5$$

Cross-multiplying:

$$5(7x) = 14(2x - 5)$$

$$35x = 28x - 70$$

$$35x - 28x = -70$$

$$7x = -70$$

$$x = -10$$

$$(xii) (x - 5)/(6) = (x - 6)/(3)$$

Cross-multiplying:

$$3(x - 5) = 6(x - 6)$$

$$3x - 15 = 6x - 36$$

$$3x - 6x = -36 + 15$$

$$-3x = -21$$

$$x = 7$$

$$(xiii) (3x/5) - (x/4) = 1/8$$

To simplify the equation, we need to find a common denominator:

$$(12x/20) - (5x/20) = 1/8$$

$$(12x - 5x)/20 = 1/8$$

$$7x/20 = 1/8$$

Cross-multiplying:

$$8(7x) = 20(1)$$

$$56x = 20$$

$$x = 20/56 \text{ (or simplified: } x = 5/14)$$

$$(xiv) 2 + (5/3)y = (26/3)y - 1$$

To simplify the equation, let's get rid of the fractions by multiplying everything by 3:

$$6 + 5y = 26y - 3$$

$$5y - 26y = -3 - 6$$

$$-21y = -9$$

$$y = (-9)/(-21) \text{ (or simplified: } y = 3/7)$$

$$(xv) (x + 5)/(3x - 7) = 2/7$$

Cross-multiplying:

$$7(x + 5) = 2(3x - 7)$$

$$7x + 35 = 6x - 14$$

$$7x - 6x = -14 - 35$$

$$x = -49$$

$$(xvi) (3/2)b - 5 = 2/(b + 3)$$

To simplify the equation, let's find a common denominator:

$$(3/2)b - 5 = 2(b + 3)/(b + 3)$$

$$(3/2)b - 5 = 2(b + 3)/(b + 3)$$

$$(3/2)b - 5 = 2$$

$$(3/2)b = 7$$

$$b = 7(2/3) \text{ (or simplified: } b = 14/3)$$

$$(xvii)$$

$$2(b + 3) * [(3/2)b - 5] = 2(b + 3) * [2/(b + 3)]$$

$$3(b + 3) - 10(b + 3) = 2$$

Step 2: Distribute and simplify:

$$3b + 9 - 10b - 30 = 2$$

$$-7b - 21 = 2$$

$$-7b - 21 + 21 = 2 + 21$$

$$-7b = 23$$

$$-7b / -7 = 23 / -7$$

$$b = -23/7$$

Therefore, the solution to the equation $(3/2)b - 5 = 2/(b + 3)$ is $b = -23/7$.

(xviii)

$$a * (0.21) + (0.7a) = a * (0.56)$$

$$0.21a + 0.7a = 0.56a$$

$$0.91a = 0.56a$$

$$0.91a - 0.56a = 0$$

$$0.35a = 0$$

$$(0.35a) / 0.35 = 0 / 0.35$$

$$a = 0$$

(xi)

(xx) To solve the equation $(0.3x - 5)/(1.5x + 11) = -3/5$, let's follow these steps:

$$(0.3x - 5)(5) = (-3)(1.5x + 11)$$

$$1.5x - 25 = -4.5x - 33$$

$$1.5x + 4.5x = -33 + 25$$

$$6x = -8$$

$$x = -8/6$$

$$x = -4/3$$

21.

The common denominator is $(6x + 7)(2x + 3)$. Multiply the numerator of the first fraction by $(2x + 3)$, and the numerator of the second fraction by $(6x + 7)$:

$$[(3x + 4)(2x + 3)] / [(6x + 7)(2x + 3)] - [(x + 1)(6x + 7)] / [(2x + 3)(6x + 7)] = 0$$

$$(6x^2 + 9x + 8x + 12) / [(6x + 7)(2x + 3)] - (6x^2 + 7x + 6) / [(2x + 3)(6x + 7)] = 0$$

$$(6x^2 + 17x + 12 - 6x^2 - 7x - 6) / [(6x + 7)(2x + 3)] = 0$$

$$(10x + 6) / [(6x + 7)(2x + 3)] = 0$$

$$10x + 6 = 0$$

$$10x = -6$$

$$x = -6/10$$

$$x = -3/5$$

22.

$$9(x - 1) - 20(x - 4) = (96/5)(x - 6) + 5$$

$$9x - 9 - 20x + 80 = (96/5)x - 576/5 + 5$$

Combining like terms:

$$-11x + 71 = (96/5)x - 115 + 5$$

$$-11x + 71 = (96/5)x - 110$$

Multiplying both sides by 5 to eliminate the fraction:

$$-55x + 355 = 96x - 550$$

$$-55x - 96x = -550 - 355$$

$$-151x = -905$$

$$x = -905 / -151$$

$$x = 6$$

$$23. 1.4 * 2 - 1.4 * x = 0.5 * 2x - 0.5 * 4$$

$$2.8 - 1.4x = x - 2$$

$$-1.4x - x = -2 - 2.8$$

$$-2.4x = -4.8$$

$$x = -4.8 / -2.4$$

$$x = 2$$

$$24. (x + 4/3) + (2x - 3/35) = (5x - 32/4) - (x + 9/28)$$

$$(x + 4/3) + (2x - 3/35) = (5x - 8) - (x + 9/28)$$

$$x + 4/3 + 2x - 3/35 = 5x - 8 - x - 9/28$$

$$(35x + 140)/105 + (6x - 9)/105 = (525x - 840)/105 - (105x + 27)/105$$

$$(35x + 140 + 6x - 9)/105 = (525x - 840 - 105x - 27)/105$$

$$(41x + 131)/105 = (420x - 867)/105$$

$$105(41x + 131) = 105(420x - 867)$$

$$41x + 131 = 420x - 867$$

$$41x - 420x = -867 - 131$$

$$-379x = -998$$

$$x = -998 / -379$$

$$x = 11.62$$

25.

$$-0.11x + 0.11 = 0.101 - 0.2x$$

$$-0.11x + 0.2x = 0.101 - 0.11$$

$$(0.2 - 0.11)x = 0.101 - 0.11$$

$$0.09x = -0.009$$

$$x = -0.009 / 0.09$$

$$x = -0.1$$

26 and 27th do yourself- same as above .

CHAPTER 10

Exercise 10.1

(i) To express $5 \frac{1}{4}$ as a percentage:

First, convert the mixed number to an improper fraction: $5 \frac{1}{4} = (4 \cdot 5 + 1)/4 = 21/4$.

Then, convert the fraction to a decimal: $21/4 \approx 5.25$.

Finally, multiply the decimal by 100 to convert it to a percentage: $5.25 \cdot 100 = 525\%$.

Therefore, $5 \frac{1}{4}$ is equal to 525% as a percentage.

(ii) To express $12 \frac{1}{2}$ as a fraction: First, convert the mixed number to an improper fraction: $12 \frac{1}{2} = (2 \cdot 12 + 1)/2 = 25/2$.

Then, divide the fraction by 100 to convert it to a decimal: $25/2 / 100 = 25/200 = 1/8$.

Therefore, $12 \frac{1}{2}$ is equal to $1/8$ as a fraction.

(iii) To express 0.78 as a percent:

Multiply the decimal by 100 to convert it to a percentage: $0.78 \cdot 100 = 78\%$.

Therefore, 0.78 is equal to 78% as a percent.

(iv) To express 200% as a decimal:

Divide the percentage by 100 to convert it to a decimal: $200\% / 100 = 2$.

Therefore, 200% is equal to 2 as a decimal.

(v) To express 70% as a ratio:

The percentage 70% can be written as $70/100$ or 7:10 as a ratio.

(vi) To express 18:6 as a percent:

To convert a ratio to a percentage, divide the first number by the sum of both numbers, and then multiply by 100.

$$\text{Percentage} = (18 / (18 + 6)) \cdot 100 = (18 / 24) \cdot 100 = 75\%$$

Therefore, 18:6 is equal to 75% as a percent.

Question 2

(i) To evaluate 20% of 60 litres:

$$20\% \text{ of } 60 \text{ litres} = (20/100) \cdot 60 = 0.2 \cdot 60 = 12 \text{ litres.}$$

(ii) To evaluate 40% of 300 kg:

$$40\% \text{ of } 300 \text{ kg} = (40/100) \cdot 300 = 0.4 \cdot 300 = 120 \text{ kg.}$$

(iii) To evaluate $12 \frac{1}{2}\%$ of 480 ml:

$$12 \frac{1}{2}\% \text{ of } 480 \text{ ml} = (12.5/100) \cdot 480 = 0.125 \cdot 480 = 60 \text{ ml.}$$

(iv) To evaluate 30% of 200 m:

$$30\% \text{ of } 200 \text{ m} = (30/100) \cdot 200 = 0.3 \cdot 200 = 60 \text{ m.}$$

Question 3

(I) $1/2\%$ of $x = 0.5/100 \cdot x = x/200$

According to the given equation, $x/200 = 16$.

To solve for x , we can multiply both sides of the equation by 200:

$$x = 16 \cdot 200$$

$$x = 3200$$

(II) 50% of $x = 50/100 \cdot x = x/2$

According to the given equation, $x/2 = 35$.

To solve for x , we can multiply both sides of the equation by 2:

$$x = 35 \cdot 2$$

$$x = \text{Rs. } 70$$

(III) To find the value of x if 60% of x is 300:

$$60\% \text{ of } x = 60/100 * x = 3x/5$$

According to the given equation, $3x/5 = 300$.

To solve for x , we can multiply both sides of the equation by $5/3$:

$$(5/3) * (3x/5) = (5/3) * 300$$

$$x = 500$$

Question 4

(i) To find what percent 300 ml is of 3 litres:

First, convert 3 litres to millilitres: 3 litres = 3000 ml.

$$(300 \text{ ml} / 3000 \text{ ml}) * 100 = 10\%$$

(ii) To find what percent 6 is of 3:

Calculate the percentage:

$$(6 / 3) * 100 = 200\%$$

(iii) To find what percent 20 is of 40:

Calculate the percentage:

$$(20 / 40) * 100 = 50\%$$

(iv) To find what percent Rs. 7.50 is of Rs. 50:

Calculate the percentage:

$$(7.50 / 50) * 100 = 15\%$$

Question 5

(i) If 65% of a number is 260, then we can set up the equation as follows:

$$65\% \text{ of } x = 260$$

To find the number, we need to solve for x . We can start by converting the percentage to a decimal:

$$65\% = 65/100 = 0.65$$

$$0.65x = 260$$

To solve for x , divide both sides of the equation by 0.65:

$$x = 260 / 0.65$$

$$x = 400$$

Therefore, the number is 400.

(ii) To increase 320 by 30%:

$$30\% \text{ of } 320 = 30/100 * 320 = 0.30 * 320 = 96$$

To find the increased value, add the calculated amount to the original number:

$$320 + 96 = 416$$

Therefore, increasing 320 by 30% results in 416.

(iii) To decrease Rs. 120 by 12 1/2%:

$$12 \frac{1}{2}\% \text{ of } 120 = (12.5/100) * 120 = 0.125 * 120 = 15$$

To find the decreased value, subtract the calculated amount from the original value:

$$120 - 15 = 105$$

Therefore, decreasing Rs. 120 by 12 1/2% results in Rs. 105.

Question 6

$$26\% \text{ of } x = 65$$

To solve for x , we need to isolate x . Convert the percentage to a decimal: $26\% = 26/100 = 0.26$

Now rewrite the equation:

$$0.26x = 65$$

To solve for x , divide both sides of the equation by 0.26:

$$x = 65 / 0.26$$

$$x \approx 250$$

Therefore, the number is approximately 250.

Question 7

Let's assume that the glass contains a total of 100 units of juice (you can assume any convenient amount).

According to the given ratio, the orange juice to pineapple juice ratio is 2:3. This means that for every 2 units of orange juice, there are 3 units of pineapple juice.

Therefore, in the 100 units of mixed juice, calculate the quantities of orange and pineapple juice as follows:

$$\text{Orange juice: } (2/5) * 100 = 40 \text{ units}$$

Pineapple juice: $(3/5) * 100 = 60$ units

To find the percentage of each juice, we divide the quantity of each juice by the total quantity (100 units) and multiply by 100:

Percentage of orange juice: $(40/100) * 100 = 40\%$

Percentage of pineapple juice: $(60/100) * 100 = 60\%$

Therefore, the mixed juice contains 40% orange juice and 60% pineapple juice.

Question 8

50% of $x = 250$

To solve for x , we need to isolate x . First, let's convert the percentage to a decimal:

$50\% = 50/100 = 0.50$

$0.50x = 250$

To solve for x , divide both sides of the equation by 0.50:

$x = 250 / 0.50$

$x = 500$

Question 9

To calculate the percentage increase in size, we need to find the difference between the new and old sizes, and then express that difference as a percentage of the original size.

The original size of the bag was 5 kg, and the new size is 7 kg.

The increase in size is: $7 \text{ kg} - 5 \text{ kg} = 2 \text{ kg}$

To calculate the percentage increase, we divide the increase by the original size and multiply by 100:

$(2 \text{ kg} / 5 \text{ kg}) * 100 = 0.4 * 100 = 40\%$

Therefore, the bag has increased in size by 40%.

Question 10

The original length of the rectangle is 20 cm, and the original width is 15 cm.

The original area of the rectangle is:

$20 \text{ cm} * 15 \text{ cm} = 300 \text{ cm}^2$

Now, let's calculate the new dimensions after increasing each side by 20%.

The increased length would be:

$20 \text{ cm} + (20\% \text{ of } 20 \text{ cm}) = 20 \text{ cm} + (0.2 * 20 \text{ cm}) = 20 \text{ cm} + 4 \text{ cm} = 24 \text{ cm}$

The increased width would be:

$15 \text{ cm} + (20\% \text{ of } 15 \text{ cm}) = 15 \text{ cm} + (0.2 * 15 \text{ cm}) = 15 \text{ cm} + 3 \text{ cm} = 18 \text{ cm}$

The new area of the rectangle is:

$24 \text{ cm} * 18 \text{ cm} = 432 \text{ cm}^2$

To find the percentage increase in the area, we calculate the difference between the new area and the original area, divide it by the original area, and multiply by 100:

Percentage increase = $((\text{New area} - \text{Original area}) / \text{Original area}) * 100$

$= ((432 \text{ cm}^2 - 300 \text{ cm}^2) / 300 \text{ cm}^2) * 100$

$= (132 \text{ cm}^2 / 300 \text{ cm}^2) * 100$

$= 0.44 * 100$

$= 44\%$

Therefore, the area of the rectangle has increased by 44%.

Question 11

Let's assume Kiran's salary is x .

Rani's salary is then 10% more than Kiran's salary, which can be expressed as $1.10x$.

The difference in their salaries is Rani's salary minus Kiran's salary:

$1.10x - x = 0.10x$

To find the percentage difference, we divide the difference by Rani's salary and multiply by 100:

Percentage difference = $(0.10x / 1.10x) * 100 = (0.10 / 1.10) * 100 \approx 9.09\%$

Therefore, Kiran's income is approximately 9.09% less than Rani's income.

Question 12

If the cost of a bus ticket from Delhi to Haridwar has risen by 20% to Rs. 240, we can find the original price of the ticket by calculating the percentage decrease.

Let's assume the original price of the ticket is y .

If the price has risen by 20%, the increased price is 120% of the original price, which can be expressed as $1.20y$.
 $1.20y = \text{Rs. } 240$

To find the original price, we divide both sides of the equation by 1.20:

$$y = \text{Rs. } 240 / 1.20$$

$$y = \text{Rs. } 200$$

Therefore, the original price of the ticket was Rs. 200.

Question 13

Let's assume Rosy's initial consumption of onions is x units and the initial price per unit is y .

After the increase of 30%, the new price per unit will be 1.3 times the initial price, which can be calculated as $1.3y$.

To keep Rosy's expenditure on onions the same, the total cost should remain constant. The total cost is the product of consumption and price:

$$\text{Initial total cost} = x * y$$

$$\text{New total cost} = x * (1.3y)$$

Since the total cost should remain the same, we have:

$$x * y = x * (1.3y)$$

Dividing both sides of the equation by x , we get:

$$y = 1.3y$$

$$\text{Percentage reduction} = ((\text{Initial consumption} - \text{New consumption}) / \text{Initial consumption}) * 100$$

The initial consumption is x units, and the new consumption is $0.7x$ units (30% reduction).

Substituting the values, we have:

$$\text{Percentage reduction} = ((x - 0.7x) / x) * 100$$

$$= (0.3x / x) * 100$$

$$= 0.3 * 100$$

$$= 30\%$$

Therefore, Rosy should reduce her consumption of onions by 30% to ensure her expenditure on onions does not increase.

Question 14

Let V be the total number of valid votes cast in the election.

Ram Prakash gets 36% of the valid votes, which means Birendra Mohan gets $100\% - 36\% = 64\%$ of the valid votes.

Given that Ram Prakash is defeated by 700 votes, we can set up the equation:

$$36\% \text{ of } V - 64\% \text{ of } V = 700$$

$$0.36V - 0.64V = 700$$

$$-0.28V = 700$$

Dividing both sides of the equation by -0.28 :

$$V = 700 / -0.28$$

$$V \approx -2500$$

Question 15

(i) To find the population of the village a year ago, we need to calculate the decrease in population due to the annual increase of 6%.

Let P be the population of the village a year ago.

Given that the present population is 17490, which is $100\% + 6\% = 106\%$ of the population a year ago.

$$P + (6/100)P = 17490$$

$$(106/100)P = 17490$$

$$P = (17490 * 100) / 106$$

$$P \approx 16500$$

Therefore, the population of the village a year ago was approximately 16500.

Exercise 10.2

Question 1

$$(i) \text{ Cost Price (CP)} = \text{Rs. } 850$$

$$\text{Selling Price (SP)} = \text{Rs. } 918$$

$$\text{Profit} = \text{SP} - \text{CP}$$

$$\text{Profit} = 918 - 850 = \text{Rs. } 68$$

$$\text{Gain percent} = (\text{Profit} / \text{CP}) * 100$$

$$\text{Gain percent} = (68 / 850) * 100$$

$$\text{Gain percent} \approx 8\%$$

Therefore, Komal's gain percent is approximately 8%.

Question 2

$$\text{Cost Price (CP)} = \text{Rs. } 6250 + \text{Rs. } 375 = \text{Rs. } 6625$$

$$\text{Selling Price (SP)} = \text{Rs. } 6890$$

$$\text{Profit/Loss} = \text{SP} - \text{CP}$$

$$\text{Profit/Loss} = 6890 - 6625 = \text{Rs. } 265$$

$$\text{Profit percent} = (\text{Profit} / \text{CP}) * 100$$

$$\text{Profit percent} = (265 / 6625) * 100$$

$$\text{Profit percent} \approx 4\%$$

Therefore, Ram's gain percent is approximately 4%.

Question 3

$$\text{C.P. of 16 articles} = \text{S.P. of 12 articles (given)}$$

$$\text{Let SP of 1 article} = \text{Rs. } X$$

$$\text{then, SP of 12 articles} = 12 \times \text{Rs. } X$$

$$\text{C.P. of 16 articles} = \text{S.P. of 12 articles}$$

$$\text{CP of 16 articles} = 12 \times \text{Rs. } X$$

$$\text{SP of 16 articles} = 16 \times \text{Rs. } X$$

$$\text{SP} > \text{CP}$$

$$\text{Profit} = \text{SP} - \text{CP}$$

$$16x - 12x = 4x$$

$$\text{Profit \%} = \text{Profit} / \text{C} \times 100$$

$$= 12x / 4x \times 100 = 300\%$$

Question 4

To find the selling price of the toaster, we need to calculate the 10% gain on the cost price.

$$\text{Gain} = 10\% \text{ of Cost Price} = (10/100) * 510 = \text{Rs. } 51$$

$$\text{Selling Price} = \text{Cost Price} + \text{Gain} = 510 + 51 = \text{Rs. } 561$$

Therefore, the selling price of the toaster is Rs. 561.

Question 5. To find Suhana's loss percentage, we need to calculate the difference between the cost price and the selling price, and then determine the loss percentage.

$$\text{Loss} = \text{Cost Price} - \text{Selling Price} = 4500 - 4230 = \text{Rs. } 270$$

$$\text{Loss Percentage} = (\text{Loss} / \text{Cost Price}) * 100 = (270 / 4500) * 100 \approx 6\%$$

Therefore, Suhana incurred a loss of approximately 6%.

Question 6

$$\text{Let selling price of 20 pens} = \text{Rs. } 20$$

$$\text{Now Gain} = \text{Rs. } 4$$

$$\text{Cost Price} = 20 - 4 = 16$$

$$\text{Hence Gain percent} = 4/16 \times 100 = 25\%$$

Question 7

Let's assume the cost price of the refrigerator is 'C'.

$$\text{Loss Percentage} = (\text{Loss} / \text{Cost Price}) * 100$$

$$10 = (\text{Loss} / C) * 100$$

$$\text{Loss} = 10\% \text{ of } C = (10/100) * C = 0.1C$$

The selling price after a 10% loss is:

$$\text{Selling Price} = \text{Cost Price} - \text{Loss} = C - 0.1C = 0.9C$$

Now, Monika wants to gain 10%, so the selling price should be 110% of the cost price.

$$110\% \text{ of } C = 0.9C$$

Dividing both sides by 0.9:

$$C = (8,100 / 0.9) \approx 9,000$$

Question 8

CP of 100 flower pots in Rupees = 8000

CP of 1 pot = 80

20 pots were sold at a gain of 5%

CP of 20 pots = $80 \times 20 = 1600$

SP of 20 pots = CP of 20 pots + 5% of

CP of 20 pots

SP of 20 pots = $1600 + 5\% \text{ of } 1600$

SP of 20 pots = $1.05 \times 1600 = 1680$

Overall gain = 20%

SP of 100 pots = CP of 100 pots + 20% of

CP of 100 pots

CP of 100 pots = 8000

SP of 100 pots = $8000 + 20\% \text{ of } 8000$

SP of 100 pots = $1.2 \times 8000 = 9600$

Now,

20 pots have been sold for 1680

Remaining 80 pots will have to be sold

for $9600 - 1680 = 7920$

SP of 80 pots = 7920

SP of 1 pot = 99

We know that CP of 1 pot = 80

% gain = $100 \times (99 - 80) / 80 = 23.75$

The remaining pots will have to be sold at a profit of 23.75%

Question 9

Number of eggs bought = 20

Cost price of 20 eggs = Rs. 56

Selling price per dozen = Rs. 35

First, let's calculate the cost price per egg:

Cost price per egg = Cost price / Number of eggs

Cost price per egg = $56 / 20 = \text{Rs. } 2.80$

Since the selling price is given per dozen, we need to calculate the selling price per egg first.

Selling price per dozen = Rs. 35

Selling price per egg = Selling price per dozen / Number of eggs per dozen

Selling price per egg = $35 / 12 \approx \text{Rs. } 2.92$ (rounded to two decimal places)

Now, let's compare the cost price per egg and the selling price per egg to determine the gain or loss.

If the selling price per egg is greater than the cost price per egg, there is a gain. If it is less, there is a loss.

Selling price per egg (Rs. 2.92) > Cost price per egg (Rs. 2.80)

Therefore, there is a gain.

To calculate the gain percentage, we can use the formula:

Gain percentage = $[(\text{Selling price} - \text{Cost price}) / \text{Cost price}] \times 100$

Substituting the values:

Gain percentage = $[(2.92 - 2.80) / 2.80] \times 100 \approx 4.29\%$

Therefore, the egg-seller has a gain of approximately 4.29%.

Question 10

Cost price of each chair = Rs. 1,200

Loss percentage = 6%

Profit percentage = 10%

1. Selling price of the chair sold at a loss of 6%:

Loss Percentage = $(\text{Loss} / \text{Cost Price}) \times 100$

$6 = (\text{Loss} / 1200) \times 100$

Cross-multiplying:

Loss = $(6/100) \times 1200 = \text{Rs. } 72$

Selling Price of the chair sold at a loss = Cost Price - Loss = $1200 - 72 = \text{Rs. } 1,128$

2. Selling price of the chair sold at a profit of 10%:

Profit Percentage = (Profit / Cost Price) * 100

$$10 = (\text{Profit} / 1200) * 100$$

Cross-multiplying:

$$\text{Profit} = (10/100) * 1200 = \text{Rs. } 120$$

Selling Price of the chair sold at a profit = Cost Price + Profit = 1200 + 120 = Rs. 1,320

Therefore, the selling price of the chair sold at a loss of 6% is Rs. 1,128, and the selling price of the chair sold at a profit of 10% is Rs. 1,320.

To calculate the total profit or loss, we need to compare the total selling price with the total cost price:

Total Cost Price = Cost Price of the first chair + Cost Price of the second chair = 1200 + 1200 = Rs. 2400

Total Selling Price = Selling Price of the first chair + Selling Price of the second chair = 1128 + 1320 = Rs. 2448

Total Profit or Loss = Total Selling Price - Total Cost Price = 2448 - 2400 = Rs. 48

Therefore, the total profit is Rs. 48.

Question 11

Cost price of the old computer set = Rs. 16,800

Repair expenses = Rs. 1,200

Selling price of the old computer set = Rs. 19,200

First, let's calculate the total cost price of the computer set, including the repair expenses:

Total Cost Price = Cost price + Repair expenses

$$\text{Total Cost Price} = 16,800 + 1,200 = \text{Rs. } 18,000$$

Now, let's calculate the gain:

Gain = Selling Price - Total Cost Price

$$\text{Gain} = 19,200 - 18,000 = \text{Rs. } 1,200$$

To calculate the gain percentage, we can use the formula:

$$\text{Gain percentage} = [(\text{Gain} / \text{Total Cost Price})] * 100$$

Substituting the values:

$$\text{Gain percentage} = [(1,200 / 18,000)] * 100$$

Gain percentage \approx 6.67% (rounded to two decimal places)

Therefore, Karim's gain percentage is approximately 6.67%.

Question 12

1. For the table on which the shopkeeper gained 20%:

Selling price = Rs. 1,500

Gain percentage = 20%

Let's assume the cost price of this table is 'C1'.

Selling price = Cost price + Gain

$$1,500 = C1 + (20/100) * C1$$

$$1,500 = C1 + 0.2C1$$

$$1,500 = 1.2C1$$

Dividing both sides by 1.2:

$$C1 = 1,500 / 1.2 = \text{Rs. } 1,250$$

So, the cost price of the table on which the shopkeeper gained 20% is Rs. 1,250.

2. For the table on which the shopkeeper lost 20%:

Selling price = Rs. 1,500

Loss percentage = 20%

Let's assume the cost price of this table is 'C2'.

Selling price = Cost price - Loss

$$1,500 = C2 - (20/100) * C2$$

$$1,500 = C2 - 0.2C2$$

$$1,500 = 0.8C2$$

Dividing both sides by 0.8:

$$C2 = 1,500 / 0.8 = \text{Rs. } 1,875$$

So, the cost price of the table on which the shopkeeper lost 20% is Rs. 1,875.

calculate the overall gain or loss in the whole transaction:

Total Cost Price = Cost Price of the first table + Cost Price of the second table

Total Cost Price = Rs. 1,250 + Rs. 1,875 = Rs. 3,125
 Total Selling Price = Selling Price of the first table + Selling Price of the second table
 Total Selling Price = Rs. 1,500 + Rs. 1,500 = Rs. 3,000
 Loss = Total Cost Price - Total Selling Price
 Loss = Rs. 3,125 - Rs. 3,000 = Rs. 125
 To calculate the overall loss percentage, we can use the formula:
 Loss percentage = $[(\text{Loss} / \text{Total Cost Price})] * 100$
 Substituting the values:
 Loss percentage = $[(125 / 3,125)] * 100$
 Loss percentage = 4%
 Therefore, the shopkeeper incurred an overall loss of 4% in the whole transaction.

Question 13

Let selling price of one pencil be x.
 Total Selling price of 144 pencils = Rs. 144x
 Loss = 6x
 Total Cost Price = Total Selling Price + L
 $144x + 6x = 150x$
 Loss percentage = $(\text{Total Loss} / \text{Total Cost Price}) * 100$
 $6x / 150x * 100 = 4$
 If cost price of 144 pencil = Rs. 3600
 Selling price of 144 pencil at 4% loss = $(1 - 0.04) * CP = 0.96 CP$
 $0.96 * 3600 = \text{Rs. } 3456$
 Selling price of one pencil = $3456 / 144 = 24$

Question 14

let the cp be x loss = 12% of x
 $= 3x / 25$
 so $sp = x - 3x / 25 = 22x / 25$
 if he sold for 3600 more than $sp = 22x / 25 + 3600$ profit = $22x / 25 + 3600 - x$
 $= 3600 - 3x / 25$
 profit% = 18
 $100(3600 - 3x / 25) / x = 18$
 $3600 - 3x / 25 = 18x / 100$
 $3600 = 9x / 50 + 3x / 25$
 $3600 = 15x / 50$
 $3600 = 3x / 10$
 $x = 12000$

Question 15

Let X be the Cost Price of the Study Table.
 SP the selling price = Rs. 2231
 Loss percentage = 3%
 Formula to find the Cost Price (CP) :- $CP = [100 / (100 - \text{Loss}\%)] * SP$
 $= CP = [100 / (100 - 3)] * 2231$
 $= 2300$
 The Cost Price of the Study Table is Rs. 2300
 Deepak needs to sell the table at SP to gain 5%
 Formula to use Profit = $\text{Gain}\% / CP * 100$
 $= \text{Profit} = 5 / 2300 * 100$
 $= \text{Profit} = 23 * 5$
 $= 115$
 The Selling Price will be CP + Profit
 $= 2300 + 115$
 $= 2415$

Ans. The Study Table should be sold at Rs. 2415/- to gain 5% profit.

Question 16

Price including 8% VAT = Rs. 5,400

Let's assume the price before VAT was added is 'P'.

VAT amount = 8% of the price before VAT

VAT amount = $(8/100) * P$

Total price including VAT = Price before VAT + VAT amount

Rs. 5,400 = $P + (8/100) * P$

Simplifying the equation:

Rs. 5,400 = $P + 0.08P$

Rs. 5,400 = $1.08P$

Dividing both sides by 1.08:

$P = \text{Rs. } 5,400 / 1.08 \approx \text{Rs. } 5,000$

Therefore, the price before VAT was added is approximately Rs. 5,000.

Question 17

1. Selling price of the chair sold at a loss of 6%:

Loss Percentage = 6%

Cost price = Rs. 1,200

Selling Price = Cost Price - Loss

Selling Price = $1,200 - (6/100) * 1,200$

Selling Price = $1,200 - (0.06) * 1,200$

Selling Price = $1,200 - 72$

Selling Price = Rs. 1,128

2. Selling price of the chair sold at a profit of 10%:

Profit Percentage = 10%

Cost price = Rs. 1,200

Selling Price = Cost Price + Profit

Selling Price = $1,200 + (10/100) * 1,200$

Selling Price = $1,200 + (0.1) * 1,200$

Selling Price = $1,200 + 120$

Selling Price = Rs. 1,320:

Total Cost Price = Cost Price of the first chair + Cost Price of the second chair

Total Cost Price = $1,200 + 1,200 = \text{Rs. } 2,400$

Total Selling Price = Selling Price of the first chair + Selling Price of the second chair

Total Selling Price = $1,128 + 1,320 = \text{Rs. } 2,448$

Total Profit or Loss = Total Selling Price - Total Cost Price

Total Profit or Loss = $2,448 - 2,400 = \text{Rs. } 48$

Profit or Loss Percentage = $[(\text{Total Profit or Loss} / \text{Total Cost Price})] * 100$

Substituting the values:

Profit or Loss Percentage = $[(48 / 2,400)] * 100$

Profit or Loss Percentage = 2%

Therefore, the total profit or loss percentage in the whole transaction is 2%.

Question 18

S.p of bike = $0.75 \times 20000 = 15000$

s.p of car = $1.05 \times 160000 = 168000$

T.sp = 183000, T. CP = 180000

gain% = $(183000 - 180000 / 180000) * 100$

= $1 \frac{2}{3} \% = 1.67\%$

Question 19

Let say Manoj bought 99P Red Pencil & 99P Blue Pencil

Cost Price of Red Pencils = $99P * 10/9 =$

110P

Cost Price of Blue Pencils = $99P * 10/11$

=90P

Total Cost Price = $110P + 90P = 200P$

Total Pencils = $99P + 99P = 198P$

Selling Price = $198P * 10/10 = 198P$

Selling Price < Cost Price

=> Loss = $200P - 198P = 2P$

Loss % = $(2P/200P) * 100 = 1\%$

1 % Loss

Question 20

Price of the TV = ₹ 13,000

Sales tax on the TV = 12%

Tax = Tax% of Selling Price

Hence, Sales Tax Amount = $(12/100) \times 13000 = ₹ 1560$

Therefore, Amount paid by Vinod = Price of the TV + Sales tax

= $13,000 + 1560 = ₹ 14,560$

Exercise 10.3

Question 1

(i) Discount = MP - SP

Discount Percentage = $(\text{Discount} / \text{MP}) * 100$

S.P. (Selling Price) = Rs. 1675

M.P. (Marked Price) = Rs. 2675

Discount = $2675 - 1675 = \text{Rs. } 1000$

Discount Percentage = $(1000 / 2675) * 100 = 37.38\%$ (approx)

Therefore, the discount is Rs. 1000, and the discount percentage is approximately 37.38%.

(ii) S.P. (Selling Price) = Rs. 18

M.P. (Marked Price) = Rs. 24

Discount = $24 - 18 = \text{Rs. } 6$

Discount Percentage = $(6 / 24) * 100 = 25\%$

Therefore, the discount is Rs. 6, and the discount percentage is 25%.

Question 2

Selling Price = Marked Price - Discount

M.P. (Marked Price) = Rs. 1500

Discount = 25/2%

First, let's calculate the discount amount:

Discount = $(25/2/100) * \text{M.P.}$

= $(25/2/100) * 1500$

= $(25/2) * 15$

= 187.5

Now, calculate the selling price:

Selling Price = M.P. - Discount

= $1500 - 187.5$

= Rs. 1312.5

Therefore, the selling price is Rs. 1312.5.

(ii) M.P. (Marked Price) = Rs. 1120

Discount = 20%

First, let's calculate the discount amount:

Discount = $(20/100) * \text{M.P.}$

= $(20/100) * 1120$

= $0.2 * 1120$

= 224

selling price:

Selling Price = M.P. - Discount

= $1120 - 224$

= Rs. 896 Therefore, the selling price is Rs. 896.

Question 3

Marked Price = Selling Price / (1 - Discount Percentage)

S.P. (Selling Price) = Rs. 990

Discount = 10%

First, let's calculate the discount amount:

Discount = Discount Percentage * S.P.

$$= 10/100 * 990$$

$$= 99$$

Now, calculate the marked price:

Marked Price = S.P. / (1 - Discount Percentage)

$$= 990 / (1 - 10/100)$$

$$= 990 / (1 - 0.1)$$

$$= 990 / 0.9$$

$$= \text{Rs. } 1100$$

Therefore, the marked price is Rs. 1100.

S.P. (Selling Price) = Rs. 1080

Discount = 10%

First, let's calculate the discount amount:

Discount = Discount Percentage * S.P.

$$= 10/100 * 1080$$

$$= 108$$

Marked Price = S.P. / (1 - Discount Percentage)

$$= 1080 / (1 - 10/100)$$

$$= 1080 / (1 - 0.1)$$

$$= 1080 / 0.9$$

$$= \text{Rs. } 1200$$

Therefore, the marked price is Rs. 1200.

Question 4

Let's assume the cost price (C.P.) of an article is x.

To make a profit of 17%, the selling price (S.P.) would be:

S.P. = C.P. + Profit

S.P. = x + 17/100 * x

S.P. = x + 0.17x

S.P. = 1.17x

S.P. = M.P. - Discount

S.P. = M.P. - 25/100 * M.P.

S.P. = M.P. - 0.25M.P.

S.P. = 0.75M.P.

Equating the two expressions for selling price (S.P.), we have:

$$0.75M.P. = 1.17x$$

$$M.P. = (1.17x) / 0.75$$

Amount above C.P. = M.P. - C.P.

Amount above C.P. = [(1.17x) / 0.75] - x

Amount above C.P. = (1.17/0.75 - 1) * x

Amount above C.P. = (0.42/0.75) * x

Amount above C.P. = 0.56 * x

Therefore, the trader must mark his articles at an amount of 56% (0.56) times the cost price (C.P.) above the C.P. to make a profit of 17%.

Question 5

CP = Rs 7660

SP = Rs 7660 + 10% of 7660 = 7660 + 766

= Rs 8426

now, his discount on MP is 12 %

Let the MP be x

MP - discount = SP
 $x - 12\% \text{ of } x = \text{Rs } 8426$
 $0.88x = 8426$
 $x = \text{Rs } 9575$
so MP is Rs 9575

Question 6
formula = $s.p. \times 100 / 100 - \text{discount m.p.} = 360 \times 100 / 100 - 20$
m.p. = $36000 / 80$
m.p. = rs 450

Question 7
Discount = 20%
Price of computer = 22000
Cost of the computer after discount = $20/100 * 22000 = 4400$
 $22000 - 4400 = \text{Rs. } 17600$

Question 8
Rate of discount = 20% of M.P.
Sale price (S.P.) = Rs. 64
Discount = Rate of discount * M.P.
Discount = $(20/100) * \text{M.P.}$
Discount = 0.2M.P.
S.P. = M.P. - Discount
 $64 = \text{M.P.} - 0.2\text{M.P.}$
 $64 = 0.8\text{M.P.}$
 $0.8\text{M.P.} = 64$
M.P. = $64 / 0.8$
M.P. = 80

Question 9
To calculate the selling price (S.P.) after applying the discount, we subtract the discount amount from the marked price:
S.P. = M.P. - Discount
S.P. = $1000 - 20/100 * 1000$
S.P. = $1000 - 0.2 * 1000$
S.P. = $1000 - 200$
S.P. = Rs. 800
Profit = S.P. - C.P.
Profit = $20/100 * \text{C.P.}$
Profit = $0.2 * \text{C.P.}$
Substituting the value of S.P., we have:
 $0.2 * \text{C.P.} = 800 - \text{C.P.}$
Now, we can solve for C.P.:
 $0.2\text{C.P.} + \text{C.P.} = 800$
 $1.2\text{C.P.} = 800$
 $\text{C.P.} = 800 / 1.2$
C.P. = Rs. 666.67 (rounded to two decimal places)

Question 10
Let's assume the marked price of the music system is Rs. 5,130.
First, apply a discount of 10% to the marked price:
Discount = $10/100 * \text{Marked Price}$
Discount = $10/100 * 5130$
Discount = Rs. 513
After the 10% discount, the selling price becomes:
Selling Price = Marked Price - Discount

Selling Price = 5130 - 513

Selling Price = Rs. 4617

Now, we apply a discount of 5% to the selling price:

Discount = $\frac{5}{100} \times \text{Selling Price}$

Discount = $\frac{5}{100} \times 4617$

Discount = Rs. 230.85 (rounded to two decimal places)

After the 5% discount, the final selling price becomes:

Selling Price = Selling Price - Discount

Selling Price = 4617 - 230.85

Selling Price = Rs. 4386.15 (rounded to two decimal places)

Question 11

S.P. = C.P. + Profit

S.P. = $x + \frac{10}{100} \times x$

S.P. = $x + 0.1x$

S.P. = $1.1x$

Now, considering the discount of 12% on the list price (M.P.), the selling price (S.P.) would be:

S.P. = M.P. - Discount

S.P. = M.P. - $\frac{12}{100} \times \text{M.P.}$

S.P. = M.P. - 0.12M.P.

S.P. = 0.88M.P.

Equating the two expressions for selling price (S.P.), we have:

$0.88\text{M.P.} = 1.1x$

To find the M.P., we can rearrange the equation:

$\text{M.P.} = \frac{(1.1x)}{0.88}$

To determine how much above the C.P. the grocer must mark his articles, we subtract the C.P. from the M.P.:

Amount above C.P. = M.P. - C.P.

Amount above C.P. = $[\frac{(1.1x)}{0.88}] - x$

Simplifying further:

Amount above C.P. = $(\frac{1.1}{0.88} - 1) \times x$

Amount above C.P. = $(\frac{0.22}{0.88}) \times x$

Amount above C.P. = $(\frac{1}{4}) \times x$

Amount above C.P. = $0.25 \times x$

Therefore, the grocer must mark his articles at an amount of 25% (0.25) times the cost price (C.P.) above the C.P. to make a gain of 10%.

Question 12 .

Let's assume the original price of an item is Rs. 100.

First, apply a discount of 30%:

Discount = $\frac{30}{100} \times \text{Original Price}$

Discount = $\frac{30}{100} \times 100$

Discount = Rs. 30

After the 30% discount, the price becomes:

Price after first discount = Original Price - Discount

Price after first discount = 100 - 30

Price after first discount = Rs. 70

Now, we apply a discount of 10% to the price after the first discount:

Discount = $\frac{10}{100} \times \text{Price after first discount}$

Discount = $\frac{10}{100} \times 70$

Discount = Rs. 7

After the 10% discount, the final price becomes:

Final Price = Price after first discount - Discount

Final Price = 70 - 7

Final Price = Rs. 63

Equivalent Discount = Original Price - Final Price

Equivalent Discount = 100 - 63

Equivalent Discount = Rs. 37 Therefore, a single discount of 37% is equivalent to two successive discounts of 30% and 10%.

Question 13

Let's assume the cost price (C.P.) of the article is Rs. 620.

To determine the selling price (S.P.), we need to calculate the gain first. The gain is calculated as a percentage of the cost price:

$$\text{Gain} = \text{C.P.} \times (\text{Gain percentage}/100)$$

$$\text{Gain} = 620 \times (20/100)$$

$$\text{Gain} = \text{Rs. } 124$$

The selling price (S.P.) is the sum of the cost price and the gain:

$$\text{S.P.} = \text{C.P.} + \text{Gain}$$

$$\text{S.P.} = 620 + 124$$

$$\text{S.P.} = \text{Rs. } 744$$

Now, we can calculate the marked price (M.P.) using the formula:

$$\text{M.P.} = \text{S.P.} / (1 - \text{Discount percentage}/100)$$

$$\text{M.P.} = 744 / (1 - 20/100)$$

$$\text{M.P.} = 744 / (1 - 0.20)$$

$$\text{M.P.} = 744 / 0.80$$

$$\text{M.P.} = \text{Rs. } 930$$

Therefore, the marked price (M.P.) of the article is Rs. 930.

Question 14

After the first discount of 10%, the price becomes:

$$\text{Price after first discount} = \text{M.P.} - (10/100) \times \text{M.P.}$$

$$\text{Price after first discount} = \text{M.P.} - 0.1\text{M.P.}$$

$$\text{Price after first discount} = 0.9\text{M.P.}$$

$$\text{Price after second discount} = \text{Price after first discount} - (20/100) \times \text{Price after first discount}$$

$$\text{Price after second discount} = 0.9\text{M.P.} - 0.2 \times 0.9\text{M.P.}$$

$$\text{Price after second discount} = 0.9\text{M.P.} - 0.18\text{M.P.}$$

$$\text{Price after second discount} = 0.72\text{M.P.}$$

selling price (S.P.) is Rs. 5,760

$$0.72\text{M.P.} = 5,760$$

Now, we can solve for M.P.:

$$\text{M.P.} = 5,760 / 0.72$$

$$\text{M.P.} = \text{Rs. } 8,000$$

Question 15

Rahim purchased the shirt at a 20% discount on the marked price, which means he paid 80% of the marked price.

Cost Price (C.P.) = 80% of M.P.

$$\text{C.P.} = (80/100) \times \text{M.P.}$$

$$\text{C.P.} = 0.8\text{M.P.}$$

Rahim sold the shirt at the marked price, which is M.P.

To find the gain percentage, we can use the formula:

$$\text{Gain Percentage} = [(\text{Selling Price} - \text{Cost Price}) / \text{Cost Price}] \times 100$$

In this case, the selling price (S.P.) is the same as the marked price (M.P.), and the cost price (C.P.) is 0.8M.P.

$$\text{Gain Percentage} = [(\text{M.P.} - 0.8\text{M.P.}) / 0.8\text{M.P.}] \times 100$$

$$\text{Gain Percentage} = [0.2\text{M.P.} / 0.8\text{M.P.}] \times 100$$

$$\text{Gain Percentage} = (0.2/0.8) \times 100$$

$$\text{Gain Percentage} = 25\%$$

Therefore, Rahim gained 25% in this transaction.

CHAPTER 11

(i) Rs. 9,000 for 3 years at 10% per annum:

$$P = \text{Rs. } 9,000$$

$$R = 10\%$$

$$T = 3 \text{ years}$$

$$\text{Compound Interest} = 9000 * (1 + 10/100)^3 - 9000$$

$$\text{Compound Interest} = 9000 * (1.1)^3 - 9000$$

$$\text{Compound Interest} = 9000 * 1.331 - 9000$$

$$\text{Compound Interest} = 11979 - 9000$$

$$\text{Compound Interest} = \text{Rs. } 2,979$$

(ii) Rs. 5000 for 2 years at 5% per annum:

$$P = \text{Rs. } 5000$$

$$R = 5\%$$

$$T = 2 \text{ years}$$

$$\text{Compound Interest} = 5000 * (1 + 5/100)^2 - 5000$$

$$\text{Compound Interest} = 5000 * (1.05)^2 - 5000$$

$$\text{Compound Interest} = 5000 * 1.1025 - 5000$$

$$\text{Compound Interest} = 5512.5 - 5000$$

$$\text{Compound Interest} = \text{Rs. } 512.5$$

(iii) Rs. 3000 for 2 years at 15% per annum:

$$P = \text{Rs. } 3000$$

$$R = 15\%$$

$$T = 2 \text{ years}$$

$$\text{Compound Interest} = 3000 * (1 + 15/100)^2 - 3000$$

$$\text{Compound Interest} = 3000 * (1.15)^2 - 3000$$

$$\text{Compound Interest} = 3000 * 1.3225 - 3000$$

$$\text{Compound Interest} = 3967.5 - 3000$$

$$\text{Compound Interest} = \text{Rs. } 967.5$$

(iv) Rs. 15000 for 3 years at 10% per annum:

$$P = \text{Rs. } 15000$$

$$R = 10\%$$

$$T = 3 \text{ years}$$

$$\text{Compound Interest} = 15000 * (1 + 10/100)^3 - 15000$$

$$\text{Compound Interest} = 15000 * (1.1)^3 - 15000$$

$$\text{Compound Interest} = 15000 * 1.331 - 15000$$

$$\text{Compound Interest} = 19965 - 15000$$

$$\text{Compound Interest} = \text{Rs. } 4,965$$

Question 2

$$\text{Compound Interest} = P * (1 + R/100)^T - P$$

Converting $7\frac{1}{2}\%$ to decimal form:

$$R = 7.5/100 = 0.075$$

Substituting the values into the compound interest formula:

$$\text{Compound Interest} = 9000 * (1 + 0.075)^2 - 9000$$

$$9000 * (1.075)^2 - 9000$$

$$9000 * 1.156625 - 9000$$

$$10409.625 - 9000$$

$$\text{Compound Interest} = \text{Rs. } 1409.625$$

Question 3

$$A = P * (1 + R/100)^T$$

A = Amount paid back at the end of 2 years

P = Principal amount (initial loan amount)

R = Rate of interest (in percentage)

T = Time period (in years)

Substituting the values into the compound interest formula:

$$A = 2,00,000 * (1 + 8/100)^2$$

$$A = 2,00,000 * (1.08)^2$$

$$A = 2,00,000 * 1.1664$$

$$A = \text{Rs. } 2,33,280$$

Question 4 :

$$A = P(1 + r/n)^{nt}$$

Where:

A = Total amount after interest

P = Principal amount (initial investment)

r = Annual interest rate (as a decimal)

n = Number of times interest is compounded per year

t = Number of years

$$A = 12000(1 + 0.08/2)^{2*1}$$

$$A = 12000(1 + 0.04)^2$$

$$A = 12000(1.04)^2$$

$$A \approx 12000(1.0816)$$

$$A \approx 12979.20$$

To find the compound interest, subtract the principal amount from the total amount:

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = 12979.20 - 12000$$

$$\text{Compound Interest} \approx \text{Rs. } 979.20$$

Question 5

$$P = \text{Rs } 15,625$$

$$R = 16\% = 16/4 = 4\% \text{ quarterly}$$

$$n = 9 \text{ months} = 3 \text{ quarters}$$

We know that:

$$A = P(1 + R/100)^n$$

$$= \text{Rs. } 15,625(1 + 4/100)^3$$

$$= \text{Rs } 15,625(1.04)^3$$

$$= \text{Rs } 17,576$$

$$CI = A - P$$

$$= \text{Rs } 17,576 - \text{Rs } 15,625$$

$$= \text{Rs } 1,951$$

Question 6

$$\text{Principal} = 9000 \text{ RS}$$

$$\text{rate} = 16\% \text{ yearly}$$

interest compounded = half yearly means

6 months

so rate also be half for half year ie = 8 %

$$= 9000 \times 108/100 \times 108/100$$

$$= 9 \times 108 \times 108/10$$

$$= 10497.6 \text{ RS}$$

now compound interest is

$$= 10497.6 - 9000$$

$$= 1497.6 \text{ rs}$$

Question 7

$$S.I. = (\text{Principal} * \text{Rate} * \text{Time}) / 100$$

$$S.I. = (3000 * 10 * 3) / 100$$

$$S.I. = 900$$

So, the Simple Interest (S.I.) for 3 years at 10% per annum is Rs. 900.

$$\text{C.I.} = \text{Principal} * [(1 + \text{Rate}/100) ^ \text{Time}] - \text{Principal}$$

$$\text{C.I.} = 3000 * [(1 + 10/100) ^ 3] - 3000$$

$$\text{C.I.} = 3000 * (1.10) ^ 3 - 3000$$

$$\text{C.I.} = 3000 * 1.331 - 3000$$

$$\text{C.I.} = 3993 - 3000$$

$$\text{C.I.} = 993$$

So, the Compound Interest (C.I.) for 3 years at 10% per annum is Rs. 993.

find the difference between C.I. and S.I.:

$$\text{Difference} = \text{C.I.} - \text{S.I.}$$

$$\text{Difference} = 993 - 900$$

$$\text{Difference} = 93$$

Therefore, the difference between Compound Interest (C.I.) and Simple Interest (S.I.) on Rs. 3,000 for 3 years at 10% per annum is Rs. 93.

Question 8

$$\text{C.I.} = P * (1 + r/100)^n - P$$

C.I. is the compound interest

P is the principal amount (Rs. 3,000)

r is the rate of interest (10% per annum)

n is the number of years (3 years)

$$\text{C.I.} = 3000 * (1 + 10/100)^3 - 3000$$

$$\text{C.I.} = 3000 * (1.1)^3 - 3000$$

$$\text{C.I.} = 3000 * 1.331 - 3000$$

$$\text{C.I.} = 3993 - 3000$$

$$\text{C.I.} = 993$$

Therefore, the compound interest on Rs. 3,000 for three years at 10% per annum is Rs. 993.

Now, let's calculate the simple interest (S.I.) using the formula:

$$\text{S.I.} = (P * r * n) / 100$$

$$\text{S.I.} = (3000 * 10 * 3) / 100$$

$$\text{S.I.} = 900$$

The simple interest (S.I.) for three years at 10% per annum is Rs. 900.

To find the difference between compound interest (C.I.) and simple interest (S.I.), we subtract the simple interest from the compound interest:

$$\text{Difference} = \text{C.I.} - \text{S.I.}$$

$$\text{Difference} = 993 - 900$$

$$\text{Difference} = 93$$

Therefore, the difference between the compound interest and simple interest for the given period is Rs. 93.

Question 9

$$A = P * (1 + r/n)^{(n*t)}$$

$$A = 6000 * (1 + 0.10/2)^{(2*2)}$$

$$A = 6000 * (1 + 0.05)^4$$

$$A = 6000 * (1.05)^4$$

$$A = 6000 * 1.21550625$$

$$A = 7293.04$$

The final amount (including the principal and compound interest) is Rs. 7,293.04.

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = 7293.04 - 6000$$

$$\text{Compound Interest} = 1293.04$$

Therefore, the compound interest on Rs. 6,000 for 2 years at a rate of 10% per annum compounded half-yearly is Rs. 1,293.04.

Question 10

$$A = P * (1 + r/n)^{(n*t)}$$

Substituting the values:

$$A = 16000 * (1 + 0.10/2)^{(2 * 1.5)}$$

$$A = 16000 * (1 + 0.05)^{(3)}$$

$$A = 16000 * (1.05)^{(3)}$$

$$A = 16000 * 1.157625$$

$$A = 18,522$$

The final amount (including the principal and compound interest) is Rs. 18,522.

To calculate the compound interest, we subtract the principal amount from the final amount:

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = 18,522 - 16,000$$

$$\text{Compound Interest} = 2,522$$

Therefore, the compound interest on Rs. 16,000 at a rate of 10% per annum compounded half-yearly for 1 1/2 years is Rs. 2,522.

Question 11

$$A = P * (1 + r/n)^{(n*t)}$$

$$A = 20000 * (1 + 0.12/1)^{(1*2)}$$

$$A = 20000 * (1 + 0.12)^2$$

$$A = 20000 * (1.12)^2$$

$$A = 20000 * 1.2544$$

$$A = 25,088$$

The final amount (including the principal and compound interest) is Rs. 25,088.

To calculate the compound interest, we subtract the principal amount from the final amount:

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = 25,088 - 20,000$$

$$\text{Compound Interest} = 5,088$$

Question 12

$$A = P * (1 + r/n)^{(n*t)}$$

$$A = 5000 * (1 + 0.10/1)^{(1*3)}$$

$$A = 5000 * (1 + 0.10)^3$$

$$A = 5000 * (1.10)^3$$

$$A = 5000 * 1.331$$

$$A = 6655$$

The final amount (including the principal and compound interest) is Rs. 6,655.

To find the interest paid, we subtract the principal amount from the final amount: Interest = A - P

$$\text{Interest} = 6655 - 5000$$

$$\text{Interest} = 1655$$

Question 13

$$A = P * (1 + r/n)^{(n*t)}$$

First, let's convert the rate of interest from a mixed fraction to a decimal:

$$6 \frac{1}{2}\% = 6.5\% = 0.065$$

$$A = 8000 * (1 + 0.065/4)^{(4 * 2)}$$

$$A = 8000 * (1 + 0.01625)^{(8)}$$

$$A = 8000 * (1.01625)^{(8)}$$

$$A \approx 8000 * 1.13723109375$$

$$A \approx 9097.85$$

The final amount (including the principal and compound interest) is approximately Rs. 9,097.85.

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = 9097.85 - 8000$$

$$\text{Compound Interest} \approx 1097.85$$

Question 14

$$A = P * (1 + r/n)^{(n*t)}$$

$$A = 1400 * (1 + 0.12/4)^{(4 * 3/4)}$$

$$A = 1400 * (1 + 0.03)^{(3)}$$

$$A = 1400 * (1.03)^{(3)}$$

$$A = 1400 * 1.092727$$

$$A = 1529.91$$

The final amount (including the principal and compound interest) is Rs. 1,529.91.

To calculate the compound interest, subtract the principal amount from the final amount:

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = 1529.91 - 1400$$

$$\text{Compound Interest} = 129.91$$

Exercise 11.2

(i) Using the formula for compound interest:

$$A = P * (1 + r)^t$$

Substituting the values into the formula:

$$A = 2000 * (1 + 0.08)^2$$

$$A = 2000 * (1.08)^2$$

$$A = 2000 * 1.1664$$

$$A = 2332.8$$

The final amount is Rs. 2,332.8.

To find the compound interest:

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = 2332.8 - 2000$$

$$\text{Compound Interest} = 332.8$$

$$(iii) A = P * (1 + r)^t$$

Substituting the values:

$$A = 5000 * (1 + 0.05)^3$$

$$A = 5000 * (1.05)^3$$

$$A = 5000 * 1.157625$$

$$A = 5788.125$$

The final amount is Rs. 5,788.125.

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = 5788.125 - 5000$$

$$\text{Compound Interest} = 788.125$$

$$(iii) A = P * (1 + r)^t$$

First, convert the rate of interest to a decimal:

$$12 \frac{1}{2}\% = 12.5\% = 0.125$$

Substituting the values:

$$A = 72000 * (1 + 0.125)^3$$

$$A = 72000 * (1.125)^3$$

$$A = 72000 * 1.421875$$

$$A = 102187.5$$

The final amount is Rs. 102,187.5.

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = 102187.5 - 72000$$

$$\text{Compound Interest} = 30187.5$$

The compound interest is Rs. 30,187.5.

$$(iv) A = P * (1 + r)^t$$

$$A = 48000 * (1 + 0.065)^3$$

$$A = 48000 * (1.065)^3$$

$$A = 48000 * 1.207638625$$

$$A = 57963.43$$

The final amount after 3 years (including the principal and compound interest) is approximately Rs. 57,963.43.

To calculate the compound interest

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = 57963.43 - 48000$$

Compound Interest = 9963.43

$$(v) A = P * (1 + r)^t$$

$$A = 64000 * (1 + 0.05)^3$$

$$A = 64000 * (1.05)^3$$

$$A = 64000 * 1.157625$$

$$A = 74050$$

The final amount after 3 years (including the principal and compound interest) is Rs. 74,050.

To calculate the compound interest

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = 74050 - 64000$$

$$\text{Compound Interest} = 10,050$$

Question 2

$$A = P * (1 + r/n)^{(n*t)}$$

$$A = 5000 * (1 + 0.10/2)^{(2*1)}$$

$$A = 5000 * (1 + 0.05)^2$$

$$A = 5000 * (1.05)^2$$

$$A = 5000 * 1.1025$$

$$A = 5512.50$$

To calculate the compound interest, subtract the principal amount from the final amount:

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = 5512.50 - 5000$$

$$\text{Compound Interest} = 512.50$$

Question 3

$$A = P(1 + r/n)^{(nt)}$$

Substituting the values into the formula:

$$A = 16,000(1 + 0.16/4)^{(4*0.75)}$$

$$= 16,000(1 + 0.04)^{(3)}$$

$$= 16,000(1.04)^{(3)}$$

$$= 16,000(1.124864)$$

$$\approx \text{Rs. } 17,997.82 \text{ (rounded to two decimal places)}$$

To calculate the compound interest, subtract the principal amount from the final amount:

$$\text{Compound Interest} = A - P$$

$$= \text{Rs. } 17,997.82 - \text{Rs. } 16,000$$

$$= \text{Rs. } 1,997.82$$

Question 4

$$A = P(1 + r)^t$$

Substituting the values into the formula:

$$28,113.75 = P(1 + 0.05)^2$$

Dividing both sides of the equation by $(1 + 0.05)^2$:

$$P = 28,113.75 / (1.05)^2$$

$$P \approx 28,113.75 / 1.1025$$

$$P \approx \text{Rs. } 25,455.35 \text{ (rounded to two decimal places)}$$

Question 5

$$A = 16,000(1 + 0.10)^3$$

$$A = 16,000(1.10)^3$$

$$A = 16,000(1.331)$$

$$A \approx \text{Rs. } 21,296 \text{ (rounded to the nearest rupee)}$$

Therefore, Rashed will receive approximately Rs. 21,296 if he deposits Rs. 16,000 for 3 years at 10% per annum, compounded annually.

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = \text{Rs. } 21,296 - \text{Rs. } 16,000$$

$$\text{Compound Interest} = \text{Rs. } 5,296$$

Question 6

$$A = P(1 + r)^t$$

$$A = 15,000(1 + 0.10)^3$$

$$A = 15,000(1.10)^3$$

$$A = 15,000(1.331)$$

$$A \approx \text{Rs. } 19,965 \text{ (rounded to the nearest rupee)}$$

The final amount (including principal and interest) that Som will receive on maturity is approximately Rs. 19,965.

$$\text{Compound Interest} = A - P$$

$$\text{Compound Interest} = \text{Rs. } 19,965 - \text{Rs. } 15,000$$

$$\text{Compound Interest} = \text{Rs. } 4,965$$

Question 7

$$CI = P(1 + r/n)^{n*t} - P$$

The formula for simple interest is:

$$SI = P * r * t$$

$$CI - SI = \text{Rs. } 30.50$$

Next, substitute the formulas for CI and SI into the equation:

$$P(1 + r/n)^{n*t} - P - P * r * t = \text{Rs. } 30.50$$

We can simplify this equation further:

$$P(1 + r/n)^{n*t} - P * (1 + r * t) = \text{Rs. } 30.50$$

Now, substitute the values into the equation and solve for the principal sum (P):

$$P(1 + 0.05/1)^{1*3} - P * (1 + 0.05 * 3) = 30.50$$

$$P(1.05)^3 - P * 1.15 = 30.50$$

$$1.157625P - 1.15P = 30.50$$

$$0.007625P = 30.50$$

$$P = 30.50 / 0.007625$$

$$P \approx \text{Rs. } 4,000$$

Question 8

$$CI = P(1 + r)^t - P$$

Substituting the given values into the formula:

$$4,347 = 30,000(1 + 0.07)^t - 30,000$$

Let's solve this equation step by step:

$$4,347 = 30,000(1.07)^t - 30,000$$

Adding 30,000 to both sides:

$$4,347 + 30,000 = 30,000(1.07)^t$$

$$34,347 = 30,000(1.07)^t$$

Dividing both sides by 30,000:

$$34,347 / 30,000 = (1.07)^t$$

$$1.1449 = (1.07)^t$$

To solve for the time period (t), we can take the logarithm (base 1.07) of both sides:

$$\log_{\text{base } 1.07} (1.1449) = \log_{\text{base } 1.07} ((1.07)^t)$$

Using logarithm properties, we can simplify further:

$$T = \log_{\text{base } 1.07} (1.1449)$$

Using a calculator or logarithm tables,

$$T \approx 2$$

Question 9

$$SI = P * r * t$$

The formula for compound interest is:

$$CI = P * (1 + r)^t - P$$

$$SI - CI = \text{Rs. } 500$$

$$P * r * t - [P * (1 + r)^t - P] = \text{Rs. } 500$$

Simplifying the equation:

$$P * r * t - P * (1 + r)^t + P = \text{Rs. } 500$$

Now, substitute the values into the equation:

$$P * 0.05 * 2 - P * (1 + 0.05)^2 + P = \text{Rs. } 500$$

$$0.1P - P * 1.1025 + P = \text{Rs. } 500$$

$$0.1P - 1.1025P + P = \text{Rs. } 500$$

$$-0.0025P = \text{Rs. } 500$$

Dividing both sides by -0.0025:

$$P = \text{Rs. } 500 / -0.0025$$

$$P = \text{Rs. } -200,000$$

Question 10

$$A = P(1 + r)^t$$

Substituting the values into the formula:

$$1331 = 1000(1 + 0.10)^t$$

Dividing both sides by 1000:

$$1.331 = (1.10)^t$$

Now, solve for the time period (t) by taking the logarithm (base 1.10) of both sides:

$$\log_{1.10} (1.331) = \log_{1.10} ((1.10)^t)$$

Using logarithm properties, simplify further:

$$t = \log_{1.10} (1.331)$$

Using a calculator or logarithm tables, we find:

$$t \approx 3$$

Question 11

P = initial amount

R = rate of interest per cent per year = 5

T = time period in years = 3

A = amount at the end of period T

Simple Interest

$$SI = \text{Simple interest} = (P * R * T / 100)$$

$$SI = P * 5 * 3 / 100 = 15P / 100$$

$$SI = 0.15P \dots (i)$$

Compound Interest

$$A = P(1 + R/100)^3$$

$$A = P(1 + 5/100)^3$$

$$A = P(1.05)^3$$

$$CI = \text{Compound interest} = A - P$$

$$= CI = P(1.05)^3 - P$$

$$= CI = P[(1.05)^3 - 1]$$

$$= CI = 0.157625P \dots (ii)$$

Given difference in CI and SI = 61

$$= 0.157625P - 0.15P = 61$$

$$= 0.007625P = 61$$

$$= P = 61 / 0.007625$$

$$= P = 8000$$

Question 12

$$A = P(1 + R/100)^T$$

Here, P = Rs. 2000, A = Rs. 2205 and T = 2 years.

$$= 2205 = 2000 \times (1 + R/100)^2$$

$$= 441/400 = (1+R/100)^2$$

$$= 21/20 = (1+R/100)$$

$$= R = 1/20 * 100 = 5\%$$

Question 13

$$SI = 5000 \times 4 \times 3 / 100 = 600$$

$$I = 5000(1+4/100)^3$$

$$5000 \times 52/50 \times 52/50 \times 52/50 = 5,624.32$$

$$CI = 5624.32 - 5000 = 624.32$$

$$CI - SI = 624.32 - 600$$

$$24.32 \text{ rs}$$

Question 14

$$\text{Amount (A)} = \text{Rs } 72900$$

$$\text{Time (t)} = 2 \text{ years}$$

$$\text{Rate (r)} = 8\% \text{ p.a}$$

Let the principle be p

$$A = p(1+rt)$$

Acc. To the question

$$= 72900 = p(1 + 8\% \times 2)$$

$$= 72900 = p(1 + 0.08 \times 2)$$

$$= 72900 = p(1.08 \times 1.08)$$

$$= 72900 = p(1.08 \times 1.08)$$

$$= 72900 = 1.1664p$$

$$= 72900 / 1.1664 = p = 62500$$

Question 15

$$\text{principal} = 5,00,000$$

$$\text{Rate} = 16\%$$

$$\text{time} = 1 \text{ year quarterly}$$

$$\text{Amount} = p(1+R/100)^T$$

$$= 500000(1+16/400)^4$$

$$= 500000(1+1/25)^4$$

$$= 500000(26/25)^4$$

$$= 584929.28$$

Question 16

$$A = p(1+r\%)^n$$

$$676 = 625 = (1+4/100)^n$$

$$676/625 = (26/25)^n$$

$$(26/25)^2 = (26/25)^n$$

$$^2 = ^n$$

$$n = 2 \text{ years}$$

Question 17

$$P = \text{Rs. } 1600$$

$$A = 1852.20$$

$$R = 5\%$$

$$A = P(1+R/100)^n$$

$$= 1852.20 = 1600(1+5/100)^n$$

$$= 1852.20 = 1600(105/100)^n$$

$$= 1852.20/1600 = (1.05)^n$$

$$= 1.157625 = (1.05)^n$$

$$= (1.05)^3 = (1.05)^n$$

$$= n = 3 \text{ years}$$

Exercise 11.3

Question 1

Original price = Rs, 50,000

Rate of decrement = 10%

Price after 1 year = $50000 (1 - 10/100)$

$$= 50000 \times 90/100 = 45000$$

Price after 2 years = $45000(1 - 10/100) = 45000 \times 90/100$

$$= 40500$$

Question 2

Population after n years = Initial population $\times (1 + \text{growth rate})^n$

Given:

Initial population (P) = 15,000

Growth rate (r) = 10% = 0.10 (expressed as a decimal)

Number of years (n) = 2

Using the formula

Population after 2 years = $15,000 \times (1 + 0.10)^2$

Population after 2 years = $15,000 \times (1.10)^2$

$$= 15,000 \times 1.21$$

$$= 18,150$$

Question 3

Principle - 160000

Rate of principle - 10% value after 1 year - ?

Rs. $\{160000 \times (1 - 10/100)\}$

= Rs $\{160000 \times 9/10\}$

= Rs 144000

Question 4

$$p = p. (1 + R/100)^T$$

$$p = 540000 (1 + -10/100)^2$$

$$p = 540000 \times 9 \times 9 / 10 \times 10$$

$$p = 437,400,000$$

After the third year, let the price be P

$$P' = P (1 + R'/100)^T$$

$$P' = 437,400,000 (1 + -20/100)^1$$

$$P' = 437,400,000 \times 80 / 100$$

$$P' = 349,920,000$$

Question 5

Final count = Initial count $\times (1 + \text{growth rate})^{\text{time}}$

Given:

Initial count of bacteria = 2,50,000

Growth rate per hour = 5% = 0.05 (expressed as a decimal)

Time = 3 hours

Using the formula, calculate the count of bacteria at the end of 3 hours: Final count = $2,50,000 \times (1 + 0.05)^3$

Final count = $2,50,000 \times (1.05)^3$

$$= 2,50,000 \times 1.157625$$

$$\approx 2,89,406.25$$

Question 6

Given:

Initial population two years ago = 1,60,000

Increase in population in the first year = 3%
Increase in population in the second year = 5%

calculate the population after each year:

$$\begin{aligned}\text{Population after the first year} &= \text{Initial population} \times (1 + \text{growth rate}) \\ &= 1,60,000 \times (1 + 0.03) \\ &= 1,60,000 \times 1.03 \\ &= 1,64,800\end{aligned}$$

$$\begin{aligned}\text{Population after the second year} &= \text{Population after the first year} \times (1 + \text{growth rate}) \\ &= 1,64,800 \times (1 + 0.05) \\ &= 1,64,800 \times 1.05 \\ &= 1,73,040\end{aligned}$$

Exercise 12.1

Question 1 and 2 = do yourself

Question 3

Given:

Distance traveled = 60 km
Petrol consumed = 3 litres
Distance / Petrol = Constant
60 km / 3 litres = Constant

To find the constant, we can calculate the value of the left side of the proportion:

$$60 \text{ km} / 3 \text{ litres} = 20 \text{ km/litre}$$

Now, we can use this constant to find the distance traveled in 12 litres of petrol:

$$\begin{aligned}\text{Distance} &= \text{Petrol} \times \text{Constant} \\ \text{Distance} &= 12 \text{ litres} \times 20 \text{ km/litre} \\ \text{Distance} &= 240 \text{ km}\end{aligned}$$

Question 4

Boxes packed = 275 boxes
Cartons used = 25 cartons
Boxes / Cartons = Constant
275 boxes / 25 cartons = Constant

$$275 \text{ boxes} / 25 \text{ cartons} = 11 \text{ boxes/carton}$$

Now, use this constant to find the number of boxes packed in 16 cartons:

$$\begin{aligned}\text{Boxes} &= \text{Cartons} \times \text{Constant} \\ \text{Boxes} &= 16 \text{ cartons} \times 11 \text{ boxes/carton} \\ \text{Boxes} &= 176 \text{ boxes}\end{aligned}$$

Question 5

cost of 2 dozen bananas is Rs. 48.

Let's first determine the cost of 1 dozen bananas:

$$\text{Cost of 1 dozen bananas} = \text{Rs. } 48 / 2 = \text{Rs. } 24$$

Now, we can calculate the cost of 1 banana:

$$\text{Cost of 1 banana} = \text{Rs. } 24 / 12 = \text{Rs. } 2$$

$$\text{Cost of 180 bananas} = \text{Rs. } 2 \times 180 = \text{Rs. } 360$$

Question 6.

Given:

Scale on the map: 1 cm represents 6 km
Distance driven by Aneesh: 72 km
Distance on map / Distance in reality = Scale on map
Let "x" represent the distance covered on the map.

Using the given information, we can set up the proportion as follows:

$$x / 72 \text{ km} = 1 \text{ cm} / 6 \text{ km}$$

To solve for "x," we cross-multiply:

$$x = (72 \text{ km} * 1 \text{ cm}) / 6 \text{ km}$$

Simplifying: $x = 12 \text{ cm}$

Question 7

Height of the mast in the model ship: 9 m

Height of the mast in the actual ship: 12 m

Length of the actual ship: 27 m

Let's set up a proportion using the height of the mast:

Height of mast in model ship / Height of mast in actual ship = Length of model ship / Length of actual ship

Using the given values:

$$9 \text{ m} / 12 \text{ m} = \text{Length of model ship} / 27 \text{ m}$$

cross-multiply:

$$\text{Length of model ship} = (9 \text{ m} * 27 \text{ m}) / 12 \text{ m}$$

$$\text{Length of model ship} = 243 \text{ m} / 12 \text{ m}$$

$$\text{Length of model ship} = 20.25 \text{ m}$$

Question 8

Given:

Initial speed = 45 km/hr

Initial time = 3 hours

Speed \times Time = Constant

For the initial condition:

$$45 \text{ km/hr} \times 3 \text{ hours} = \text{Constant}$$

To find the time for the new speed of 90 km/hr:

New Speed \times New Time = Constant

$$90 \text{ km/hr} \times \text{New Time} = 45 \text{ km/hr} \times 3 \text{ hours}$$

Simplifying:

$$90 \times \text{New Time} = 45 \times 3$$

Dividing both sides by 90:

$$\text{New Time} = (45 \times 3) / 90$$

$$\text{New Time} = 1.5 \text{ hours}$$

Question 9

Speed = Distance/Time or Distance =

Speed \times Time

Convert Time to Hours = 40/60 hours

$$\text{Distance} = 12 * (40/60) \Rightarrow 8 \text{ Km}$$

Now you have distance to her school, find Time taken to reach school with a speed of 30km/h

Again, Time = Distance/Speed

$$\text{Time} = 8 / 30 \text{ hours}$$

$$\text{Convert Time to mins} = (8 / 30) * 60 \Rightarrow 16$$

mins

Question 10

Do yourself

Question 11

(i) Number of sugar crystals in 5 kg of sugar:

To find the number of sugar crystals in 5 kg of sugar, we can set up a proportion:

Number of crystals / Weight of sugar = Constant

Number of crystals in 3 kg / 3 kg = Number of crystals in 5 kg / 5 kg

$$9 * 10^8 \text{ crystals} / 3 \text{ kg} = x \text{ crystals} / 5 \text{ kg}$$

To solve for "x," we can cross-multiply:

$$(9 * 10^8 \text{ crystals} * 5 \text{ kg}) / 3 \text{ kg} = x \text{ crystals}$$

Simplifying:

$$(45 * 10^8) / 3 = x \text{ crystals}$$

$$\text{Dividing both sides by 3: } 15 * 10^8 = x \text{ crystals}$$

(ii) Number of sugar crystals in 1.2 kg of sugar:

Let's set up a proportion to find the number of sugar crystals in 1.2 kg of sugar: Crystals / Sugar = Constant
Number of crystals in 3 kg / 3 kg = Number of crystals in 1.2 kg / 1.2 kg

Using the given information:

$$9 * 10^8 \text{ crystals} / 3 \text{ kg} = x \text{ crystals} / 1.2 \text{ kg}$$

To solve for "x," we can cross-multiply:

$$(9 * 10^8 \text{ crystals} * 1.2 \text{ kg}) / 3 \text{ kg} = x \text{ crystals}$$

Simplifying:

$$x = (9 * 10^8 \text{ crystals} * 1.2) / 3$$

$$x = (10.8 * 10^8) / 3$$

$$x = 3.6 * 10^8$$

Question 12

Given:

Payment for 6 days = Rs. 720

Payment / Number of days = Constant

Payment for 6 days / 6 days = Payment for 15 days / 15 days

Payment for 6 days / 6 days = Payment for 21 days / 21 days

Payment for 6 days / 6 days = Payment for 39 days / 39 days

Payment for 15 days = (Payment for 6 days * 15 days) / 6 days

Payment for 21 days = (Payment for 6 days * 21 days) / 6 days

Payment for 39 days = (Payment for 6 days * 39 days) / 6 days

Simplifying:

Payment for 15 days = Rs. 720 * (15/6) = Rs. 1,800

Payment for 21 days = Rs. 720 * (21/6) = Rs. 2,520

Payment for 39 days = Rs. 720 * (39/6) = Rs. 4,680

Question 13

a) The scale of the map is 1:2000, which means that 1 cm on the map represents 2000 cm (or 20 meters) in real life.

Therefore, the actual distance between the two cities is:

$$6 \text{ cm} \times 20 \text{ meters/cm} = 120 \text{ meters or } 0.12 \text{ km}$$

b) 1 km = 1000 meters, so 7.2 km = 7200 meters.

To find the distance between the two cities on the map, we need to convert 7200 meters to centimeters using the scale of the map:

1 cm on the map represents 2000 cm (or 20 meters) in real life, so 1 meter represents 1/20 cm on the map.

Therefore, 7200 meters represents:

$$7200 \text{ meters} \times (1/20) \text{ cm/meter} = 360 \text{ cm on the map}$$

Exercise 12.2

Question 1

= option 3 is the answer

Question 2 = do yourself

Question 3

distance = speed x time.

$$\text{distance} = 6 \text{ km/hr} \times (20/60) \text{ hr} = 2 \text{ km}$$

distance = speed x time

$$2 \text{ km} = \text{speed} \times (24/60) \text{ hr}$$

$$\text{speed} = 2 \text{ km} / (24/60) \text{ hr} = 5 \text{ km/hr}$$

Question 4

total work = 1 well

work = rate x time

To find the rate of each labourer:

$$1/10 \text{ well} = \text{rate} \times 6 \text{ days}$$

rate = $1/60$ well per day

To finish the work in 4 days, find the total number of labourers required:

work = rate x time

1 well = $(1/60)$ well per day x 4 days x $(10 + x)$ labourers

where x is the number of extra labourers required.

Simplifying this equation, we get:

$$10 + x = 15$$

$$x = 5$$

Question 5

6 taps of equal capacity can fill a tub in 30 minutes.

total work = 1 tub:

work = rate x time

to find the rate of each tap:

$$1/6 \text{ tub} = \text{rate} \times 30 \text{ minutes}$$

$$\text{rate} = 1/180 \text{ tub per minute}$$

To fill the tub in 20 minutes, find the total number of taps required:

work = rate x time

$$1 \text{ tub} = (1/180) \text{ tub per minute} \times 20 \text{ minutes} \times x \text{ taps}$$

where x is the number of taps required.

Simplifying this equation, we get:

$$x = 9$$

Question 6

In a military camp, there is food for 30 days for 50 soldiers.

$$\text{total food} = 30 \text{ days} \times 50 \text{ soldiers} = 1500 \text{ soldier-days}$$

To find how many days the food will last if 25 more soldiers join, find the new total amount of food available:

$$\text{new total food} = (50 + 25) \text{ soldiers} \times \text{days} \times \text{average meals per day}$$

Let's assume that each soldier has one meal per day, so the average meals per day is equal to the number of soldiers.

$$\text{new total food} = 75 \text{ soldiers} \times \text{days} \times 75 \text{ meals per day}$$

the total amount of food available is the same, so:

$$1500 \text{ soldier-days} = 75 \text{ soldiers} \times \text{days} \times 75 \text{ meals per day}$$

Simplifying this equation

$$\text{days} = 20$$

Question 7

Given that 45 men can complete the work in 20 days, we can calculate the total man-days required as follows:

$$\text{Man-days} = \text{Number of men} \times \text{Number of days}$$

$$\text{Man-days} = 45 \text{ men} \times 20 \text{ days}$$

$$\text{Man-days} = 900$$

So, the total man-days required to complete the work is 900.

Now, let's determine how many men will be required to complete the same work in 75 days:

$$\text{Number of men} = \text{Total man-days required} / \text{Number of days}$$

$$\text{Number of men} = 900 / 75$$

$$\text{Number of men} = 12$$

Question 8

Given that 45 goats can graze the field in 13 days, we can calculate the total goat-days required as follows:

$$\text{Goat-days} = \text{Number of goats} \times \text{Number of days}$$

$$\text{Goat-days} = 45 \text{ goats} \times 13 \text{ days}$$

$$\text{Goat-days} = 585$$

So, the total goat-days required to graze the field is 585.

Now, let's determine how many goats will be required to graze the same field in 9 days:

$$\text{Number of goats} = \text{Total goat-days required} / \text{Number of days}$$

$$\text{Number of goats} = 585 / 9$$

$$\text{Number of goats} \approx 65$$

Therefore, approximately 65 goats will be required to graze the same field in 9 days.

Question 9

Amount spent on 50 kg of rice = $50 \text{ kg} \times \text{Rs. } 15/\text{kg}$

Amount spent on 50 kg of rice = Rs. 750

Now, let's determine how much rice Rakesh should buy at Rs. 25 per kg to spend the same amount:

Amount spent on rice at Rs. 25 per kg = Amount spent on 50 kg of rice = Rs. 750

Let's denote the unknown quantity of rice he should buy at Rs. 25 per kg as "x" kg.

Amount spent on x kg of rice at Rs. 25 per kg = $x \text{ kg} \times \text{Rs. } 25/\text{kg}$

Amount spent on x kg of rice = Rs. 25x

Rs. 25x = Rs. 750

To find the value of "x," we can solve this equation:

$$x = 750 / 25$$

$$x = 30$$

Question 10

Initial man-days = Number of men \times Number of days

Initial man-days = 210 men \times 60 days

Initial man-days = 12,600

Now, let's calculate the man-days contributed by the 70 additional men who joined after 16 days. They work for the remaining days, which is $(60 - 16) = 44$ days:

Additional man-days = Number of additional men \times Number of remaining days

Additional man-days = 70 men \times 44 days

Additional man-days = 3,080

The total man-days contributed by all the workers is the sum of the initial man-days and the additional man-days:

Total man-days = Initial man-days + Additional man-days

Total man-days = 12,600 + 3,080

Total man-days = 15,680

Now, let's determine the number of days required to complete the remaining work.

The remaining work is the difference between the total man-days required and the work done so far (up to 16 days):

Remaining work = Total man-days - Work done in 16 days

Remaining work = 15,680 - $(210 \text{ men} \times 16 \text{ days})$

Remaining work = 15,680 - 3,360

Remaining work = 12,320

Number of days = Remaining work / Number of men

Number of days = $12,320 / (210 + 70)$

Number of days = $12,320 / 280$

Number of days ≈ 44

Exercise 12.3

Question 1

rate of Mohan = $1/10$

Similarly, given that Suman can do the same piece of work in 15 days, we can find her rate of work as follows:

rate of Suman = $1/15$

When Mohan and Suman work together, their combined rate of work can be calculated as:

combined rate = rate of Mohan + rate of Suman

$$= 1/10 + 1/15$$

$$= 3/30 + 2/30$$

$$= 5/30$$

$$= 1/6$$

This means that Mohan and Suman can complete the work together at a combined rate of $1/6$ per day.

work = rate \times time

where work is the amount of work to be done, rate is the rate at which work is done, and time is the amount of time taken to do the work.

Let's call the amount of work to be done as W.

Using the formula, we get:

$W = \text{rate} \times \text{time}$

$$W = (1/6) \times t$$

where t is the number of days required to complete the work when Mohan and Suman work together.

Solving for t , we get:

$$t = 6 \times W$$

$$t = 6 \text{ days}$$

Question 2

Question 3

time = work / rate

Let's assume that the total work to fill the cistern is 1 unit.

rate of first tap = $1/5$

The rate of the second tap is:

rate of second tap = $1/6$

When both taps are open, their combined rate is:

combined rate = rate of first tap + rate of second tap

$$\text{combined rate} = 1/5 + 1/6$$

$$\text{combined rate} = 11/30$$

Using the formula, we can find the time taken to fill the cistern as:

time = work / rate

$$\text{time} = 1 / (11/30)$$

$$\text{time} = 30/11$$

Question 4

Part filled in 2 hours = $2/6 = 1/3$

Remaining part = $1 - 1/3 = 2/3$

A and B's 7 hour work = $2/3$

A and B's 1 hour work = $2/21$

C's 1 hour work = (A + B + C)'s 1 hr work - (A + B)'s 1 hr work = $1/6 - 2/21 = 1/14$

C can fill the tank alone in 14 hours

Question 5

Let's assume that the total work is 60 units (the LCM of 20 and 15).

Sohan can do $60/20 = 3$ units of work per day.

Rohan can do $60/15 = 4$ units of work per day.

When they work together, they can do $3 + 4 = 7$ units of work per day.

Therefore, they will complete the work in $60/7 = 8.57$ days, which can be rounded up to 9 days. So, they will take 9 days to complete the work if they work together.

Question 6

Let's assume that the total work is 80 units (the LCM of 10, 16, and 4).

Reshma can do $80/10 = 8$ units of work per day.

Roni can do $80/16 = 5$ units of work per day.

When they work together with Sohna, they can do $80/4 = 20$ units of work per day.

Let's assume that Sohna can do x units of work per day.

Therefore, the equation for the amount of work done in 4 days is:

$$4(8 + 5 + x) = 80$$

Simplifying the equation, we get:

$$52 + 4x = 80$$

$$4x = 28$$

$$x = 7$$

Question 7

Let's assume that the capacity of the cistern is 24 units (the LCM of 6 and 8).

Tap X can fill $24/6 = 4$ units of water per hour.

Tap Y can empty $24/8 = 3$ units of water per hour.

When both taps are opened together, the net rate of filling the cistern is:

$4 - 3 = 1$ unit of water per hour.

Therefore, the cistern will be filled up in $24/1 = 24$ hours.

Question 8

Let's assume that the total work is 100 units (the LCM of 25 and 20).

A can do $100/25 = 4$ units of work per day.

B can do $100/20 = 5$ units of work per day.

When they work together for 5 days, the amount of work done is:

$5(4 + 5) = 45$ units.

Therefore, the amount of work remaining is:

$100 - 45 = 55$ units.

Since B can do 5 units of work per day, he will finish the remaining work in:

$55/5 = 11$ days.(approx)

Question 9

Let's assume that the total work is 15 units (the LCM of 5 and 3).

The carpenter can do $15/5 = 3$ units of work per day.

When the carpenter and his son work together, they can do $15/3 = 5$ units of work per day.

Let's assume that the son can do x units of work per day.

Therefore, the equation for the amount of work done in a day is:

$3 + x = 5$

Simplifying the equation, we get: $x = 2$

Therefore, the son can do the work alone in: $15/2 = 7.5$ days.

Question 10

tap A to fill the cistern = 12 hours.

tap B to fill the cistern = 16 hours.

tap C to empty the full cistern = 8 hours.

A's 1 hour's work = $1/12$

B's 1 hour's work = $1/16$

C's 1 hour's work = $-1/8$ (cistern being emptied by C)

(A + B + C)'s 1 hours net work = $(1/12 + 1/16 - 1/8) = 1/48$

time taken by (A + B + C) to fill the cistern = 48 hours

Question 11

$A+B(1\text{day's})=1/12$

$B+C(1\text{day's})=1/15$ work

$A+C(1\text{day's}) = 1/20$ work

Adding all the above,

$2(A+B+C)(1\text{day's})=1/12+1/15+1/20$

$=5+4+3/60= 12/60 = 1/5$ work

$A+B+C(1\text{day's})=1/10$ work

$\therefore C(1\text{day's})=(A+B+C)(1\text{day's})-(A+B$

$=1/10-1/12 = 6-5/60= 1/60$

$= 60$ days

Question 12

Let's assume that the total capacity of the tank is 60 units (the LCM of 10, 12, and 15).

The first pipe can fill $60/10 = 6$ units of water per hour.

The second pipe can fill $60/12 = 5$ units of water per hour.
 The third pipe can empty $60/15 = 4$ units of water per hour.
 When all three pipes are opened together, the net rate of filling the tank is:
 $6 + 5 - 4 = 7$ units of water per hour.
 Therefore, the tank will be filled up in:
 $60/7 = 8.57$ hours (approximately).

Question 13

Let's assume that the total capacity of the tank is 6 units (the LCM of 3 and 6).
 Tap A can fill $6/3 = 2$ units of water per hour.
 Tap B can fill $6/6 = 1$ unit of water per hour.
 When both taps are opened together, the net rate of filling the tank is:
 $2 + 1 = 3$ units of water per hour.
 Therefore, the tank will be filled up in: $6/3 = 2$ hours.

Question 14

Let's assume that both Mohit and Rohit can complete the work together in 'x' days.

If Rohit can do $1/5$ th of the work in 5 days, his work rate per day is:
 Rohit's work rate = $1/5 / 5 = 1/25$
 Similarly, if Mohit can do $2/3$ rd of the work in 8 days, his work rate per day is: Mohit's work rate = $2/3 / 8 = 1/12$
 Now, let's add their work rates to find their combined work rate per day:
 Combined work rate = Rohit's work rate + Mohit's work rate
 $= 1/25 + 1/12$
 $= (12 + 25) / (25 * 12)$
 $= 37 / 300$

Therefore, both Mohit and Rohit together can complete $37/300$ th of the work in a day.
 To find the number of days required for them to complete the whole work together,
 $(37/300) * x = 1$
 Multiplying both sides by $300/37$, we get: $x = 300/37$, Therefore, both Mohit and Rohit together can complete the work in approximately 8.11 days.

Question 15

Let's assume that the total work is 60 units (the LCM of 12 and 30).
 Let's assume that A can do x units of work per day.
 Therefore, B can do $60/30 = 2$ units of work per day.
 When both A and B work together, the net rate of doing the work is:
 $x + 2 = 60/12 = 5$ units of work per day.
 Therefore, A can do: $x = 3$ units of work per day.
 Therefore, A can complete the work in: $60/3 = 20$ days.

Exercise 13.1

Question 1 and 2 = do yourself

Question 3

The sum of the angles in a quadrilateral is 360 degrees.
 Let's assume that the two equal angles are x degrees each.
 Therefore, we can write an equation:
 $67 + 115 + 2x = 360$
 Simplifying the equation, we get: $2x = 360 - 67 - 115$
 $2x = 178$
 $x = 89$ Therefore, each of the equal angles is 89 degrees.

Question 4

Let's denote the measure of the third angle as $2x$ and the measure of the fourth angle as $3x$, where x is a common factor.

The sum of the angles in a quadrilateral is 360 degrees. So we can set up an equation based on the given information:

$$53 + 67 + 2x + 3x = 360$$

Simplifying the equation, we have: $120 + 5x = 360$

Subtracting 120 from both sides, we get:

$$5x = 240$$

Dividing both sides by 5, we find:

$$x = 48$$

Now we can calculate the values of the third and fourth angles:

$$\text{Third angle: } 2x = 2 * 48 = 96 \text{ degrees}$$

$$\text{Fourth angle: } 3x = 3 * 48 = 144 \text{ degrees}$$

Question 5

Regular Pentagon

Question 6

No, because the sum of the angles of a quadrilateral is 360 degree.

Question 7

Let's assume the four angles of the quadrilateral are $2x$, $2x$, $3x$, and $3x$, where x is a common factor.

The sum of the angles in a quadrilateral is 360 degrees. So we can set up an equation based on the given information:

$$2x + 2x + 3x + 3x = 360$$

Simplifying the equation, we have:

$$10x = 360$$

Dividing both sides by 10, we find:

$$x = 36$$

Now we can calculate the values of the four angles:

$$\text{First angle: } 2x = 2 * 36 = 72 \text{ degrees}$$

$$\text{Second angle: } 2x = 2 * 36 = 72 \text{ degrees}$$

$$\text{Third angle: } 3x = 3 * 36 = 108 \text{ degrees}$$

$$\text{Fourth angle: } 3x = 3 * 36 = 108 \text{ degrees}$$

Question 8

Interior angle of a polygon = $(n - 2) \times 180^\circ / n$

Here, we know that the interior angle is 160° . We can set up an equation and solve for 'n':

$$160 = (n - 2) \times 180^\circ / n$$

To eliminate the fraction, we can cross-multiply:

$$160n = 180(n - 2)$$

$$\text{Expanding the equation: } 160n = 180n - 360$$

$$\text{Subtracting } 160n \text{ from both sides: } 0 = 180n - 160n - 360$$

$$\text{Combining like terms: } 0 = 20n - 360$$

$$\text{Adding } 360 \text{ to both sides: } 360 = 20n$$

$$\text{Dividing both sides by } 20: n = 360 / 20$$

Simplifying the equation:

$n = 18$ Therefore, a regular polygon with each interior angle measuring 160° has 18 sides.

Question 9

Let's assume that the three angles of the quadrilateral are x , $2x$, and $3x$.

Therefore, the sum of these angles is: $x + 2x + 3x = 6x$

The sum of the least and the greatest of these angles is equal to 180 degrees: $x + 3x = 180$

$$4x = 180$$

$$x = 45$$

Therefore, the three angles of the quadrilateral are: $x = 45$ degrees

$$2x = 90 \text{ degrees}$$

$$3x = 135 \text{ degrees}$$

The fourth angle can be found by subtracting the sum of the other three angles from 360 degrees:

$360 - (45 + 90 + 135) = 90$ degrees Therefore, the four angles of the quadrilateral are 45, 90, 135, and 90 degrees.

Question 10

The sum of the angles in a quadrilateral is 360 degrees.

Let's assume that the three equal angles are x degrees each.

Therefore, we can write an equation:

$$3x + 150 = 360$$

Simplifying the equation, we get:

$$3x = 210$$

$x = 70$ Therefore, each of the three equal angles is 70 degrees.

Question 11 = do yourself

Question 12 = do yourself

Question 13

(i) diagonal (ii) two (iii) 360 degree (iv) 360 degree (v) two

Question 14 = do yourself

Exercise 13.2

Question 1

CHAPTER 14

DO YOURSELF (construction)

CHAPTER 15

Exercise 15.1

Question 1

(i) 6,8,12,14,14 (ii) 6,8,12,14,14 (iii) 4,4,6,8,8 (iv) 6,8,12,14,14 (v) 5,5,8,10,10

Question 2

Do yourself

Question 3

So, in this case, we have 10 vertices and 6 faces.

$$10 + 6 - E = 2$$

Simplifying this equation, we get:

$$E = 10 + 6 - 2$$

$E = 14$ Therefore, the polyhedron has 14 edges.

Question 4

Use Euler's formula to solve

So, in this case, we have 8 faces and 12 edges.

$$V + 8 - 12 = 2$$

Simplifying this equation, we get:

$$V - 4 = 2$$

$V = 6$ Therefore, the polyhedron has 6 vertices.

Question 5

Fill ups:

(i) edge (ii) vertex (iii) Tetrahedron (iv) $F-E+V=2$

Exercise 15.2

Question 1

(i) cylinder (ii) cylinder (iii) cuboid (iv) cuboid (v) cylinder (vi) cuboid

Question 2

(i) Cube (ii) triangular prism (iii) triangular prism (iv) square pyramid (v) cube (vi) hexagonal pyramid

Question 3 , Question 4 , Question 5, Question 6

Do yourself

Exercise 15.3

Question 1 - do yourself

Question 2

(i) street A (ii) street C (iii) Link Road (iv) River

Question 3 and 4

Do yourself

CHAPTER 16

Exercise 16.1

Question 1

Area = (sum of parallel sides) x (distance between them) / 2

In this case, the sum of the parallel sides is $10 + 19 = 29$ cm, and the distance between them is 12 cm. Plugging these values into the formula, we get:

$$\text{Area} = (29 \times 12) / 2$$

$$\text{Area} = 348 / 2$$

Area = 174 Therefore, the area of the trapezium is 174 square centimeters.

Question 2

Area = (sum of parallel sides) x (distance between them) / 2

In this case, the sum of the parallel sides is $24 + 20 = 44$ m, and the distance between them is 6 m.

$$\text{Area} = (44 \times 6) / 2$$

$$\text{Area} = 264 / 2$$

$$\text{Area} = 132$$

Question 3

Length of parallel sides = 15 cm and 40 cm

To find height...

by Pythagoras theorem.

$$c^2 = a^2 + b^2$$

$$41^2 = a^2 + 40^2$$

$$1681 - 1600 = a^2$$

$$81 = a^2$$

$$a = 9$$

so, the height of the trapezium is 9 cm.

$$\text{Area of trapezium} = \frac{1}{2} \times h \times (a+b)$$

$$= \frac{1}{2} \times 9 \times (15+40)$$

$$= 4.5 \times 55$$

$$= 247.5 \text{ cm}^2$$

Question 4

According to the figure-

APC is a right-angled triangle. Therefore, by using Pythagoras theorem,

$$AC^2 = AP^2 + CP^2 \quad 13^2 = AP^2 + 5^2$$

$$AP^2 = 169 - 25$$

$$AP = \sqrt{144}$$

$$AP = 12 \text{ cm}$$

ABCD is a rectangle of length 10 cm and breadth 12 cm.

Area of trapezium ABCD = Area of rectangle PQBA + Area of triangle ACP + Area of triangle BQD

$$= 10 \times 12 + \frac{1}{2} \times 12 \times 5 + \frac{1}{2} \times 12 \times 5 \quad (AP = BQ = 12 \text{ cm})$$

$$= 120 + 30 + 30 \text{ cm}^2$$

$$= 180 \text{ cm}^2$$

Question 5

Area = (sum of parallel sides) x (height) / 2

In this case, we know that the area is 69 cm^2 and SR is 8 cm. We also know that PQ is twice SR minus 1, or $PQ = 2(8) - 1 = 15 \text{ cm}$.

$$69 = (15 + 8) \times (\text{height}) / 2$$

$$69 = 11.5 \times (\text{height})$$

$$\text{height} = 69 / 11.5$$

$$\text{height} = 6$$

Question 6

Area = $(1/2) \times (\text{sum of parallel sides}) \times \text{height}$

Given that the parallel sides of the trapezium are 85 cm and 63 cm, and the area is 2664 cm^2

$$2664 = (1/2) \times (85 + 63) \times \text{height}$$

$$2664 = (1/2) \times 148 \times \text{height}$$

$$2664 = 74 \times \text{height}$$

Divide both sides of the equation by 74: $2664/74 = \text{height}$

$$\text{height} \approx 36$$

Question 7

Let the lengths of the parallel sides be $3x$ and $2x$.

Area = $(\text{sum of parallel sides}) \times (\text{height}) / 2$

area is 450 cm^2 .

$$450 = (3x + 2x) \times 15 / 2$$

Simplifying the equation

$$450 = 5x \times 15 / 2$$

$$450 = 37.5x$$

$$x = 12$$

Therefore, the lengths of the parallel sides are:

$$3x = 36 \text{ cm}$$

$2x = 24 \text{ cm}$, the lengths of the parallel sides are 36 cm and 24 cm.

Question 8

ABCD is a Trapezium whose sides.

AB=25 cm, BC=13 cm, CD=11 cm and DA=15 cm

Now do some construction, draw a line DE which is parallel to BC. Hence forming a parallelogram DEBC.

$$DE = BC$$

Now to find the area of trapezium, add area $\triangle DAE$ to the area of $\parallel \text{gm}$.

Now for area of $\triangle DAE$, find S first, then use Heron's formula.

$$S = (AE + DE + DA) / 2 = (25 - 11) + 13 + 15 / 2 = 42 / 2 = 21$$

$$\text{Area of triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{21(21-15)(21-14)(21-13)} = 84 \text{ cm}^2$$

Now draw $DF \perp$ to E hence \rightarrow

$$\text{Area of } \triangle ADE = 1/2 \times \text{Base} \times \text{height}$$

$$84 \text{ cm}^2 = 1/2 \times 14 \times h$$

$$h = 12 \text{ cm}$$

$$\text{area of parallelogram} = 11 \times 12 = 132 \text{ cm}^2$$

$$\text{Area of Trapezium} = 216 \text{ cm}^2 \quad (\text{i.e., } 132 + 84)$$

Question 9 – do yourself

Question 10

Let the distance between the parallel side of trapezium be h .

We know that;

$$\text{Area of trapezium} = 1/2 \times \text{sum of parallel sides} \times h$$

According to the question;

$$= 1/2 \times (46 + 34) \times h = 960 \text{ cm}^2$$

$$= 80 / 2 \times h = 960$$

$$= 40h = 960$$

$$= h = 960 / 40$$

= h = 24 cm
Hence, The distance between the parallel side = 24 cm

Question 11

Area of trapezium = 405m^2
Ratio in parallel sides = 4:5
Distance between them = 18 cm
Sum of parallel sides = $\text{Area} \times 2 / \text{Altitude} = 405 \times 2 / 18 = 45\text{m}$
Let first parallel sides = $4x$
Second side = $5x$
 $4x + 5x = 45 \Rightarrow 9x = 45$
 $x = 45 / 9 = 5$
First side = $4x = 4 \times 5 = 20$, second side = $5 \times 5 = 25$

Question 12

Do yourself

Question 13

Let's denote the lengths of the parallel sides of the trapezium as x and $x + 2$ (since one side is longer than the other by 2 cm).

Given that the area of the trapezium is 78 cm^2 and the height is 13 cm, use the formula for the area of a trapezium to set up an equation:

$$\text{Area} = \frac{1}{2} \times (\text{sum of parallel sides}) \times \text{height}$$

Substituting the given values:

$$78 = \frac{1}{2} \times (x + (x + 2)) \times 13$$

$$78 = \frac{1}{2} \times (2x + 2) \times 13$$

$$78 = \frac{1}{2} \times 26 \times (x + 1)$$

$$78 = 13 \times (x + 1)$$

Divide both sides of the equation by 13:

$$78 / 13 = x + 1$$

$$6 = x + 1$$

Subtract 1 from both sides: $6 - 1 = x$

$$5 = x$$

Therefore, $x = 5$.

find the lengths of the parallel sides:

Shorter side = $x = 5$ cm

Longer side = $x + 2 = 5 + 2 = 7$ cm Hence, the lengths of the two parallel sides of the trapezium are 5 cm and 7 cm.

Question 14

Draw $CE \perp AD$ and $CF \perp AB$.

$$\text{Now, } EB = (AB - AE) = (AB - DC) = (78 - 52)$$

$$\text{cm} = 26 \text{ cm,}$$

$$CE = AD = 28 \text{ cm and } BC = 30 \text{ cm.}$$

Now, in $\triangle CEB$, we have

$$s = \frac{1}{2} (28 + 26 + 30) \text{ cm} = 42 \text{ cm.}$$

$$(s - a) = (42 - 28) \text{ cm} = 14 \text{ cm,}$$

$$(s - b) = (42 - 26) \text{ cm} = 16 \text{ cm, and}$$

$$(s - c) = (42 - 30) \text{ cm} = 12 \text{ cm.}$$

$$\text{area of } \triangle CEB = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{42 \times 14 \times 16 \times 12} \text{ cm}^2$$

$$= 336 \text{ cm}^2$$

$$\text{Also, area of } \triangle CEB = \frac{1}{2} \times EB \times CF$$

$$= \frac{1}{2} \times 26 \times CF \text{ cm}^2$$

$$= (13 \times CF) \text{ cm}^2$$

$$\text{Therefore, } 13 \times CF = 336$$

$$\begin{aligned}
&= CF = 336/13 \text{ cm} \\
&\text{Area of a trapezium ABCD} \\
&= \left(\frac{1}{2} \times (AB + CD) \times CF\right) \\
&\text{square units} \\
&= \left(\frac{1}{2} \times (78+5) \times 336/13\right) \text{cm}^2 \\
&= 1680 \text{ cm}^2
\end{aligned}$$

Question 15

$$\begin{aligned}
&\text{area of trapezium} = \frac{1}{2} \times (\text{sum of parallel sides}) \times \text{height} \\
&37.5 = \frac{1}{2} \times (8 + \text{other side}) \times 3 \\
&8 + \text{other side} = 37.5 \times \frac{2}{3} \\
&\text{other side} = 25 - 8 \\
&= 17
\end{aligned}$$

Exercise 16.2

Question 1

$$\begin{aligned}
&\text{Area(ABC)} = \left(\frac{1}{2}\right) \times \text{base} \times \text{height} \\
&\text{Area(ABC)} = \left(\frac{1}{2}\right) \times 24 \text{ m} \times 13 \text{ m} \\
&= 12 \text{ m} \times 13 \text{ m} \\
&= 156 \text{ m}^2
\end{aligned}$$

$$\text{Area(ACD)} = \left(\frac{1}{2}\right) \times \text{base} \times \text{height}$$

The base of triangle ACD is also the length of AC, which is 24 m. The height is the length of the perpendicular drawn from vertex D onto AC, which is 8 m.

$$\begin{aligned}
&\text{Area (ACD)} = \left(\frac{1}{2}\right) \times 24 \text{ m} \times 8 \text{ m} \\
&= 12 \text{ m} \times 8 \text{ m} \\
&= 96 \text{ m}^2
\end{aligned}$$

$$\text{Total Area} = \text{Area(ABC)} + \text{Area(ACD)}$$

$$= 156 \text{ m}^2 + 96 \text{ m}^2$$

$$= 252 \text{ m}^2 \text{ Therefore, the area of the field is 252 square meters.}$$

Question 2

$$\text{Area(ABC)} = \left(\frac{1}{2}\right) \times \text{base} \times \text{height:}$$

$$\begin{aligned}
&\text{Area(ABC)} = \left(\frac{1}{2}\right) \times 28.4 \text{ cm} \times 7.20 \text{ cm} \\
&= 14.2 \text{ cm} \times 7.20 \text{ cm} \\
&= 102.24 \text{ cm}^2
\end{aligned}$$

$$\text{Area(ACD)} = \left(\frac{1}{2}\right) \times \text{base} \times \text{height}$$

The base of triangle ACD is also the length of AC, which is 28.4 cm. The height is the length of the perpendicular drawn from vertex D onto AC, which is 8.80 cm. Plugging in these values, we get:

$$\begin{aligned}
&\text{Area (ACD)} = \left(\frac{1}{2}\right) \times 28.4 \text{ cm} \times 8.80 \text{ cm} \\
&= 14.2 \text{ cm} \times 8.80 \text{ cm} \\
&= 125.36 \text{ cm}^2
\end{aligned}$$

$$\text{Total Area} = \text{Area(ABC)} + \text{Area(ACD)}$$

$$= 102.24 \text{ cm}^2 + 125.36 \text{ cm}^2$$

$$= 227.6 \text{ cm}^2 \text{ Therefore, the area of the quadrilateral is 227.6 square cm.}$$

Question 3

$$\text{Area (ABC)} = \left(\frac{1}{2}\right) \times \text{base} \times \text{height}$$

The base of triangle ABC is the length of AC, which is 60 cm. The height is the length of the perpendicular drawn from vertex B onto AC, which is 16 cm.

$$\begin{aligned}
&\text{Area (ABC)} = \left(\frac{1}{2}\right) \times 60 \text{ cm} \times 16 \text{ cm} \\
&= 30 \text{ cm} \times 16 \text{ cm} \\
&= 480 \text{ cm}^2
\end{aligned}$$

$$\text{Area(ACD)} = \left(\frac{1}{2}\right) \times \text{base} \times \text{height}$$

The base of triangle ACD is also the length of AC, which is 60 cm. The height is the length of the perpendicular drawn from vertex D onto AC, which is 14 cm.

$$\text{Area (ACD)} = \left(\frac{1}{2}\right) \times 60 \text{ cm} \times 14 \text{ cm}$$

$$= 30 \text{ cm} * 14 \text{ cm}$$

$$= 420 \text{ cm}^2$$

$$\text{Total Area} = \text{Area(ABC)} + \text{Area(ACD)}$$

$$= 480 \text{ cm}^2 + 420 \text{ cm}^2$$

$$= 900 \text{ cm}^2 \text{ Therefore, the area of the field is 900 square cm.}$$

Question 4 – do yourself

Question 5

$$\text{Area} = (1/2) * d1 * d2$$

where d1 and d2 are the lengths of the diagonals.

In this case, the length of the first diagonal, d1, is 14 cm, and the length of the second diagonal, d2, is 10 cm.

$$\text{Area} = (1/2) * 14 \text{ cm} * 10 \text{ cm}$$

$$= 7 \text{ cm} * 10 \text{ cm}$$

$$= 70 \text{ cm}^2$$

Question 6

To find the area of quadrilateral PQRS, divide it into two triangles and then calculate the area of each triangle separately.

label the vertices of the quadrilateral as P, Q, R, and S, in order. PR has a length of 36 cm, and the perpendicular distances from Q and S onto PR are 16 cm and 18 cm, respectively. Then, label the intersection points of the perpendiculars as E and F, with QE = 16 cm and SF = 18 cm.

Then, divide the quadrilateral into two triangles: PQE and RSF.

$$\text{Area(PQE)} = (1/2) * \text{base} * \text{height.}$$

$$\text{Area(PQE)} = (1/2) * 36 \text{ cm} * 16 \text{ cm}$$

$$= 18 \text{ cm} * 16 \text{ cm}$$

$$= 288 \text{ cm}^2$$

area of triangle RSF.

$$\text{Area(RSF)} = (1/2) * \text{base} * \text{height}$$

The base of triangle RSF is PR, which is 36 cm. The height is the length of the perpendicular drawn from vertex S onto PR, which is 18 cm.

$$\text{Area (RSF)} = (1/2) * 36 \text{ cm} * 18 \text{ cm}$$

$$= 18 \text{ cm} * 18 \text{ cm}$$

$$= 324 \text{ cm}^2$$

$$\text{Total Area} = \text{Area(PQE)} + \text{Area(RSF)}$$

$$= 288 \text{ cm}^2 + 324 \text{ cm}^2$$

$$= 612 \text{ cm}^2$$

Question 7

$$\frac{1}{2} * B * P$$

$$\frac{1}{2} * 6 * 10 * 2$$

Cancel 2 and 2

$$= 6 * 10 = 60 \text{ cm}^2$$

Question 8,9,10 – do yourself

CHAPTER 17

Exercise 17.1

(i) For the cuboid with dimensions:

Length = 10 cm

Breadth = 6 cm

Height = 3 cm

Volume of the cuboid = Length * Breadth * Height

$$\text{Volume} = 10 \text{ cm} * 6 \text{ cm} * 3 \text{ cm}$$

$$\text{Volume} = 180 \text{ cm}^3$$

Total surface area of the cuboid = 2 * (Length * Breadth + Length * Height + Breadth * Height)

$$\text{Surface area} = 2 * (10 \text{ cm} * 6 \text{ cm} + 10 \text{ cm} * 3 \text{ cm} + 6 \text{ cm} * 3 \text{ cm})$$

$$\text{Surface area} = 2 * (60 \text{ cm}^2 + 30 \text{ cm}^2 + 18 \text{ cm}^2)$$

$$\text{Surface area} = 2 * 108 \text{ cm}^2$$

$$\text{Surface area} = 216 \text{ cm}^2$$

(ii) For the cuboid with dimensions:

$$\text{Length} = 12 \text{ cm}$$

$$\text{Breadth} = 4 \text{ cm}$$

$$\text{Height} = 2 \text{ cm}$$

$$\text{Volume of the cuboid} = \text{Length} * \text{Breadth} * \text{Height}$$

$$\text{Volume} = 12 \text{ cm} * 4 \text{ cm} * 2 \text{ cm}$$

$$\text{Volume} = 96 \text{ cm}^3$$

$$\text{Total surface area of the cuboid} = 2 * (\text{Length} * \text{Breadth} + \text{Length} * \text{Height} + \text{Breadth} * \text{Height})$$

$$\text{Surface area} = 2 * (12 \text{ cm} * 4 \text{ cm} + 12 \text{ cm} * 2 \text{ cm} + 4 \text{ cm} * 2 \text{ cm})$$

$$\text{Surface area} = 2 * (48 \text{ cm}^2 + 24 \text{ cm}^2 + 8 \text{ cm}^2)$$

$$\text{Surface area} = 2 * 80 \text{ cm}^2$$

$$\text{Surface area} = 160 \text{ cm}^2$$

(iii) For the cuboid with dimensions:

$$\text{Length} = 11 \text{ cm}$$

$$\text{Breadth} = 7 \text{ cm}$$

$$\text{Height} = 10 \text{ cm}$$

$$\text{Volume of the cuboid} = \text{Length} * \text{Breadth} * \text{Height}$$

$$\text{Volume} = 11 \text{ cm} * 7 \text{ cm} * 10 \text{ cm}$$

$$\text{Volume} = 770 \text{ cm}^3$$

$$\text{Total surface area of the cuboid} = 2 * (\text{Length} * \text{Breadth} + \text{Length} * \text{Height} + \text{Breadth} * \text{Height})$$

$$\text{Surface area} = 2 * (11 \text{ cm} * 7 \text{ cm} + 11 \text{ cm} * 10 \text{ cm} + 7 \text{ cm} * 10 \text{ cm})$$

$$\text{Surface area} = 2 * (77 \text{ cm}^2 + 110 \text{ cm}^2 + 70 \text{ cm}^2)$$

$$\text{Surface area} = 2 * 257 \text{ cm}^2$$

$$\text{Surface area} = 514 \text{ cm}^2$$

(iv) For the cuboid with dimensions:

$$\text{Length} = 9 \text{ cm}$$

$$\text{Breadth} = 7.5 \text{ cm}$$

$$\text{Height} = 50 \text{ cm}$$

$$\text{Volume of the cuboid} = \text{Length} * \text{Breadth} * \text{Height}$$

$$\text{Volume} = 9 \text{ cm} * 7.5 \text{ cm} * 50 \text{ cm}$$

$$\text{Volume} = 3375 \text{ cm}^3$$

$$\text{Total surface area of the cuboid} = 2 * (\text{Length} * \text{Breadth} + \text{Length} * \text{Height} + \text{Breadth} * \text{Height})$$

$$\text{Surface area} = 2 * (9 \text{ cm} * 7.5 \text{ cm} + 9 \text{ cm} * 50 \text{ cm} + 7.5 \text{ cm} * 50 \text{ cm})$$

$$\text{Surface area} = 2 * (67.5 \text{ cm}^2 + 450 \text{ cm}^2 + 375 \text{ cm}^2)$$

$$\text{Surface area} = 2 * 892.5 \text{ cm}^2$$

$$\text{Surface area} = 1785 \text{ cm}^2$$

Question 2

(i) For the cube with edge length 10 cm:

$$\text{Volume of the cube} = (\text{Edge length})^3$$

$$\text{Volume} = 10 \text{ cm} * 10 \text{ cm} * 10 \text{ cm}$$

$$\text{Volume} = 1000 \text{ cm}^3$$

$$\text{Total surface area of the cube} = 6 * (\text{Edge length})^2$$

$$\text{Surface area} = 6 * (10 \text{ cm})^2$$

$$\text{Surface area} = 6 * 100 \text{ cm}^2$$

$$\text{Surface area} = 600 \text{ cm}^2$$

(ii) For the cube with edge length 4.5 dm:

Since 1 dm = 10 cm, we can convert the edge length to cm:

$$\text{Edge length} = 4.5 \text{ dm} * 10 \text{ cm/dm}$$

$$\text{Edge length} = 45 \text{ cm}$$

$$\text{Volume of the cube} = (\text{Edge length})^3$$

$$\text{Volume} = 45 \text{ cm} * 45 \text{ cm} * 45 \text{ cm}$$

$$\text{Volume} = 91125 \text{ cm}^3$$

Total surface area of the cube = $6 * (\text{Edge length})^2$
Surface area = $6 * (45 \text{ cm})^2$
Surface area = $6 * 2025 \text{ cm}^2$
Surface area = 12150 cm^2

(iii) For the cube with edge length 3.6 cm:
Volume of the cube = $(\text{Edge length})^3$
Volume = $3.6 \text{ cm} * 3.6 \text{ cm} * 3.6 \text{ cm}$
Volume = 46.656 cm^3
Total surface area of the cube = $6 * (\text{Edge length})^2$
Surface area = $6 * (3.6 \text{ cm})^2$
Surface area = $6 * 12.96 \text{ cm}^2$
Surface area = 77.76 cm^2

(iv) For the cube with edge length 8 cm:
Volume of the cube = $(\text{Edge length})^3$
Volume = $8 \text{ cm} * 8 \text{ cm} * 8 \text{ cm}$
Volume = 512 cm^3
Total surface area of the cube = $6 * (\text{Edge length})^2$
Surface area = $6 * (8 \text{ cm})^2$
Surface area = $6 * 64 \text{ cm}^2$
Surface area = 384 cm^2

Question 3

Total Surface Area = $6s^2$
where s is the length of each edge.
Substituting the given value, we get:
 $600 \text{ sq. cm} = 6s^2$
 $s^2 = 100 \text{ sq. cm}$
Taking the square root on both sides, we get:
 $s = 10 \text{ cm}$ Therefore, the length of each edge of the cube is 10 cm.

Question 4

Surface Area = $6s^2$
where " s " is the length of each edge of the cube.
To find the length of each edge of the cube, use the formula for the volume of a cube:
Volume = s^3
Substituting the given value, we get:
 $s^3 = 4913 \text{ cm}^3$
Taking the cube root on both sides, we get:
 $S = 17 \text{ cm}$
Now we can substitute the value of " s " in the formula for the surface area of a cube: Surface Area = $6 * (17 \text{ cm})^2$
Surface Area = 1734 cm^2

Question 5

Total Surface Area = $6s^2$
Substituting the given value, we get:
 $1176 \text{ cm}^2 = 6s^2$
 $s^2 = 196 \text{ cm}^2$
Taking the square root on both sides, we get:
 $s = 14 \text{ cm}$
Now substitute the value of " s " in the formula for the volume of a cube: Volume = s^3
Volume = 14^3 cm^3
Volume = 2744 cm^3

Question 6

$$d = \sqrt{l^2 + b^2 + h^2}$$

where l , b , and h are the length, breadth, and height of the cuboid respectively.

Substituting the given values, we get:

$$d = \sqrt{9^2 + 3^2 + 8^2}$$

$$d = \sqrt{81 + 9 + 64}$$

$$d = \sqrt{154} = d \approx 12.41 \text{ cm}$$

Now, find the diagonal of the cube:

$$d = \sqrt{3} \times a$$

where a is the edge length of the cube.

$$d = \sqrt{3} \times 11 = d \approx 19.06 \text{ cm}$$
 Therefore, the diagonal of the cube is larger than the diagonal of the cuboid.

Question 7

The formula for the surface area of a cuboid is: Surface Area = $2(lw + lh + wh)$ where " l ", " w ", and " h " are the length, width, and height of the cuboid.

$$\text{Surface Area} = 2(12.5 \text{ cm} \times 4 \text{ cm} + 12.5 \text{ cm} \times 8.2 \text{ cm} + 4 \text{ cm} \times 8.2 \text{ cm})$$

$$\text{Surface Area} = 2(50 \text{ cm}^2 + 102.5 \text{ cm}^2 + 32.8 \text{ cm}^2)$$

$$\text{Surface Area} = 2(185.3 \text{ cm}^2)$$

$$\text{Surface Area} = 370.6 \text{ cm}^2$$

Therefore, the surface area of the cuboidal box is 370.6 cm^2 .

The formula for the lateral surface area of a cuboid is: Lateral Surface Area = $2h(l + w)$ where " h " is the height of the cuboid, and " l " and " w " are the length and width of the base of the cuboid, respectively.

Substituting the given values, we get: Lateral Surface Area = $2 \times 8.2 \text{ cm} \times (12.5 \text{ cm} + 4 \text{ cm})$

$$\text{Lateral Surface Area} = 2 \times 8.2 \text{ cm} \times 16.5 \text{ cm}$$

$$\text{Lateral Surface Area} = 270.6 \text{ cm}^2$$
 , Therefore, the lateral surface area of the cuboidal box is 270.6 cm^2 .

Question 8

$$\text{Total Surface Area} = 6s^2$$

Substituting the given value, we get:

$$6 \times 12^2 = 6s^2$$

$$6s^2 = 864$$

$$s^2 = 144$$

Taking the square root on both sides, we get:

$$s = 12 \text{ cm}$$

Now substitute the value of " s " in the formula for the diagonal of a cube: Diagonal = $\sqrt{3} \times s$

$$\text{Diagonal} = \sqrt{3} \times 12 \text{ cm}$$

$$\text{Diagonal} \approx 20.78 \text{ cm}$$
 Therefore, the diagonal of the cube is approximately 20.78 cm .

Question 9

Let's first find the volume of the cuboidal box:

$$\text{Volume} = l \times b \times h$$

Substituting the given values, we get:

$$72 \text{ cm}^3 = 9 \text{ cm} \times 4 \text{ cm} \times h$$

$$72 \text{ cm}^3 = 36 \text{ cm}^2 \times h$$

$$h = 72 \text{ cm}^3 \div 36 \text{ cm}^2$$

$$h = 2 \text{ cm}$$
 Therefore, the height of the cuboidal box is 2 cm .

Question 10

$$\text{Volume} = l \times b \times h$$

where " l ", " b ", and " h " are the length, breadth, and height of the cuboidal box, respectively.

Substituting the given values, we get:

$$\text{Volume} = 80 \text{ cm} \times 30 \text{ cm} \times 20 \text{ cm}$$

$$\text{Volume} = 48,000 \text{ cm}^3$$
 , Therefore, the volume of the cuboidal box is $48,000$ cubic centimeters.

Question 11

$$\text{Surface Area} = 2(lw + lh + wh)$$

Substituting the given values, we get: $88 \text{ cm}^2 = 2(x \times 2x + x \times 3x + 2x \times 3x)$

$$88 \text{ cm}^2 = 2(2x^2 + 3x^2 + 6x^2)$$

$$88 \text{ cm}^2 = 22x^2$$

$$x^2 = 4$$

$$x = 2$$

Therefore, the length, breadth, and height of the cuboid are 2 cm, 4 cm, and 6 cm, respectively.

Now, let's find the volume of the cuboid: Volume = $l \times b \times h$

Substituting the given values:

$$\text{Volume} = 2 \text{ cm} \times 4 \text{ cm} \times 6 \text{ cm}$$

Volume = 48 cm^3 Therefore, the volume of the cuboid is 48 cubic centimeters.

Question 12

$$\text{Area of the first wall} = \text{length} \times \text{height} = 150 \text{ cm} \times 6 \text{ cm} = 900 \text{ cm}^2$$

$$\text{Area of the second wall} = \text{length} \times \text{height} = 150 \text{ cm} \times 6 \text{ cm} = 900 \text{ cm}^2$$

$$\text{Area of the third wall} = \text{width} \times \text{height} = 25 \text{ cm} \times 6 \text{ cm} = 150 \text{ cm}^2$$

$$\text{Area of the fourth wall} = \text{width} \times \text{height} = 25 \text{ cm} \times 6 \text{ cm} = 150 \text{ cm}^2$$

Now, let's find the total area of the four walls by adding the areas of all four walls:

Total area of four walls = Area of the first wall + Area of the second wall + Area of the third wall + Area of the fourth wall

$$\text{Total area of four walls} = 900 \text{ cm}^2 + 900 \text{ cm}^2 + 150 \text{ cm}^2 + 150 \text{ cm}^2$$

$$\text{Total area of four walls} = 2100 \text{ cm}^2$$

Question 13

The total surface area of the walls can be calculated by finding the sum of the areas of the four walls, excluding the area of the ceiling.

$$\text{Area of one wall} = \text{length} \times \text{height}$$

$$\text{Area of two adjacent walls} = 2 \times (\text{length} \times \text{height})$$

$$\text{Area of the other two adjacent walls} = 2 \times (\text{breadth} \times \text{height})$$

$$\text{Total wall surface area} = \text{Area of two adjacent walls} + \text{Area of the other two adjacent walls}$$

$$\text{Total wall surface area} = 2 \times (\text{length} \times \text{height}) + 2 \times (\text{breadth} \times \text{height})$$

Given:

$$\text{Length of the room (l)} = 6 \text{ m}$$

$$\text{Breadth of the room (b)} = 4.5 \text{ m}$$

$$\text{Height of the room (h)} = 3 \text{ m}$$

$$\text{Total wall surface area} = 2 \times (6 \times 3) + 2 \times (4.5 \times 3)$$

$$= 2 \times 18 + 2 \times 13.5$$

$$= 36 + 27$$

$$= 63 \text{ square meters}$$

The surface area of the ceiling is equal to the area of the length multiplied by the breadth.

$$\text{Ceiling surface area} = \text{length} \times \text{breadth}$$

$$= 6 \times 4.5$$

$$= 27 \text{ square meters}$$

$$\text{Total surface area} = \text{Total wall surface area} + \text{Ceiling surface area}$$

$$= 63 + 27$$

$$= 90 \text{ square meters}$$

Now, we can calculate the cost of white washing the walls and ceiling.

$$\text{Cost} = \text{Total surface area} \times \text{Rate per square meter}$$

$$= 90 \times 8$$

= Rs. 720 Therefore, the cost of white washing the walls and ceiling of the room at the rate of Rs. 8 per square meter is Rs. 720.

Question 14

Given:

$$\text{Length of the cuboid} = 60 \text{ cm}$$

$$\text{Breadth of the cuboid} = 54 \text{ cm}$$

$$\text{Height of the cuboid} = 30 \text{ cm}$$

$$\text{Volume of the cuboid} = \text{Length} \times \text{Breadth} \times \text{Height}$$

$$= 60 \text{ cm} \times 54 \text{ cm} \times 30 \text{ cm}$$

$$= 97200 \text{ cm}^3$$

Volume of a small cube = Side \times Side \times Side

$$= 6 \text{ cm} \times 6 \text{ cm} \times 6 \text{ cm}$$

$$= 216 \text{ cm}^3$$

Number of small cubes = Volume of the cuboid / Volume of a small cube

$$= 97200 \text{ cm}^3 / 216 \text{ cm}^3$$

$$= 450$$

Question 15

$$L = 100 \text{ cm}$$

$$L = 85 \text{ cm}$$

$$L = 60 \text{ cm}$$

Surface area of box = lateral surface area

$$\text{of cuboid} + \text{base area} = 2h (L + b) + Lb = 2 * 60 * (100 + 85) + 100 * 85$$

$$= 120 * 185 + 8500$$

$$= 30700 \text{ cm}^2$$

$$\text{cost of tin} : - 30700 * 0.5 = \text{Rs. } 15350$$

Question 16

$$\text{Length} = 3 \text{ m} = 300 \text{ cm}$$

$$\text{Width} = 2 \text{ m} = 200 \text{ cm}$$

$$\text{Height} = 250 \text{ cm}$$

$$\text{Volume of the wall} = \text{Length} \times \text{Width} \times \text{Height}$$

$$\text{Volume of the wall} = 300 \text{ cm} \times 200 \text{ cm} \times 250 \text{ cm}$$

$$\text{Volume of the wall} = 15000000 \text{ cubic centimeters}$$

Next, let's find the volume of one brick:

$$\text{Volume of one brick} = \text{Length} \times \text{Width} \times \text{Height}$$

$$\text{Volume of one brick} = 15 \text{ cm} \times 10 \text{ cm} \times 5 \text{ cm}$$

$$\text{Volume of one brick} = 750 \text{ cubic centimeters}$$

$$\text{Number of bricks required} = \text{Volume of the wall} / \text{Volume of one brick}$$

$$\text{Number of bricks required} = 15000000 \text{ cubic centimeters} / 750 \text{ cubic centimeters}$$

$$\text{Number of bricks required} = 20000$$

Question 17

$$\text{Volume of the water tank} = \text{Length} \times \text{Width} \times \text{Depth}$$

$$\text{Volume of the water tank} = 25 \text{ m} \times 20 \text{ m} \times 10 \text{ m}$$

$$\text{Volume of the water tank} = 5000 \text{ cubic meters}$$

Now, convert the volume of the water tank from cubic meters to liters: 1 cubic meter = 1000 liters

$$\text{Therefore, } 5000 \text{ cubic meters} = 5000 \times 1000 = 5,000,000 \text{ liters}$$

Question 18

To find the surface area of the cuboid, we need to know the dimensions of its length, breadth, and height. Let's assume the common ratio is 'x', so the dimensions can be expressed as:

$$\text{Length} = 5x$$

$$\text{Breadth} = 4x$$

$$\text{Height} = x$$

$$\text{Volume} = \text{Length} \times \text{Breadth} \times \text{Height}$$

Substituting the given values:

$$540 = (5x) \times (4x) \times (x)$$

$$540 = 20x^3$$

To solve for 'x', we divide both sides of the equation by 20:

$$x^3 = 540/20$$

$$x^3 = 27$$

$$x = \sqrt[3]{27}$$

$$x = 3$$

Now, we can find the actual dimensions of the cuboid:

Length = $5x = 5 \times 3 = 15$ cm
 Breadth = $4x = 4 \times 3 = 12$ cm
 Height = $x = 3$ cm
 Surface Area = $2 \times (\text{Length} \times \text{Breadth} + \text{Breadth} \times \text{Height} + \text{Height} \times \text{Length})$
 Surface Area = $2 \times (15 \times 12 + 12 \times 3 + 3 \times 15)$
 Surface Area = $2 \times (180 + 36 + 45)$
 Surface Area = 2×261
 Surface Area = 522 cm^2

Question 19.

Outer dimensions:

Length = 60 cm

Breadth = 45 cm

Height = 32 cm

Thickness of the wood = 2.5 cm

Inner dimensions: Length of inner box = Length - $2 \times$ Thickness = $60 \text{ cm} - 2 \times 2.5 \text{ cm} = 55 \text{ cm}$

Breadth of inner box = Breadth - $2 \times$ Thickness = $45 \text{ cm} - 2 \times 2.5 \text{ cm} = 40 \text{ cm}$

Height of inner box = Height - $2 \times$ Thickness = $32 \text{ cm} - 2 \times 2.5 \text{ cm} = 27 \text{ cm}$

Volume of the outer box = Length \times Breadth \times Height = $60 \text{ cm} \times 45 \text{ cm} \times 32 \text{ cm}$

Volume of the inner box = Length of inner box \times Breadth of inner box \times Height of inner box = $55 \text{ cm} \times 40 \text{ cm} \times 27 \text{ cm}$

Volume of the wood used = Volume of the outer box - Volume of the inner box

Volume of the outer box = $60 \text{ cm} \times 45 \text{ cm} \times 32 \text{ cm} = 86,400 \text{ cm}^3$

Volume of the inner box = $55 \text{ cm} \times 40 \text{ cm} \times 27 \text{ cm} = 59,400 \text{ cm}^3$

Volume of the wood used = $86,400 \text{ cm}^3 - 59,400 \text{ cm}^3 = 27,000 \text{ cm}^3$

Therefore, the volume of wood used to make the closed rectangular box is $27,000 \text{ cm}^3$.

To find the capacity of the box, we can use the inner dimensions of the box: Capacity = Length of inner box \times

Breadth of inner box \times Height of inner box = $55 \text{ cm} \times 40 \text{ cm} \times 27 \text{ cm}$

Capacity = $59,400 \text{ cm}^3$, Therefore, the capacity of the box is $59,400 \text{ cm}^3$.

Question 20

Given:

Length of the container = 60 cm

Width of the container = 24 cm

Let's assume the height of the container is 'h' cm.

Volume of the container = Length \times Width \times Height

Substituting the given values: $9000 = 60 \times 24 \times h$

To find the value of 'h', we can rearrange the equation and solve for it: $h = 9000 / (60 \times 24)$

$h = 9000 / 1440$

$h \approx 6.25 \text{ cm}$

Question 21

The volume of the cube with side 12 cm is:

Volume = (Side of cube)³ = $12^3 = 1728$ cubic cm

The volume of each 6 cm cube is:

Volume = (Side of cube)³ = $6^3 = 216$ cubic cm

Therefore, the number of 6 cm cubes that can be obtained from the cube whose side is 12 cm is:

Number of 6 cm cubes = (Volume of the cube with side 12 cm) / (Volume of each 6 cm cube)

Number of 6 cm cubes = $1728 / 216$

Number of 6 cm cubes = 8, Hence, 8 cubes of 6 cm can be obtained from the cube whose side is 12 cm.

Question 22

Let's denote the side length of the cube as 'a'.

The total surface area of a cube is given by the formula: $6a^2$

The cost of white washing the total surface area is given as Rs. 396.90.

The rate of white washing is 15 paise per square centimeter, which is equal to $15/100 = 0.15$ rupees per square centimeter.

Therefore, the cost of white washing the total surface area can also be expressed as: $0.15 * 6a^2$

We can set up the equation:

$$0.15 * 6a^2 = 396.90$$

Dividing both sides by 0.15:

$$6a^2 = 396.90 / 0.15$$

$$6a^2 = 2646$$

Dividing both sides by 6:

$$a^2 = 2646 / 6$$

$$a^2 = 441$$

Taking the square root of both sides:

$$a = \sqrt{441}$$

$$a = 21$$

So, the side length of the cube is 21 cm.

To find the volume of the cube, we can use the formula:

$$\text{Volume} = a^3$$

Substituting the value of 'a':

$$\text{Volume} = 21^3$$

Volume = 9261 cubic cm , Therefore, the volume of the cube is 9261 cubic cm.

Question 23

Given:

Length of the field = 78 m

Breadth of the field = 27 m

Length of the pit = 13 m

Breadth of the pit = 12 m

Thickness of the mud spread = 25 cm = 0.25 m

Volume of mud removed from the pit = Length of the pit × Breadth of the pit × Depth of the pit

Volume of mud removed = 13 m × 12 m × Depth of the pit

Next, calculate the area of the remaining part of the field:

Area of the remaining part of the field = (Length of the field × Breadth of the field) - (Length of the pit × Breadth of the pit)

Volume of mud spread = Area of the remaining part of the field × Thickness of the mud spread

Since the volume of mud removed from the pit is equal to the volume of mud spread, equate the two equations:

$13 \text{ m} \times 12 \text{ m} \times \text{Depth of the pit} = \text{Area of the remaining part of the field} \times \text{Thickness of the mud spread}$

Now, let's substitute the given values and solve for the depth of the pit:

$$13 \text{ m} \times 12 \text{ m} \times \text{Depth of the pit} = [(78 \text{ m} \times 27 \text{ m}) - (13 \text{ m} \times 12 \text{ m})] \times 0.25 \text{ m}$$

$$156 \text{ m}^2 \times \text{Depth of the pit} = (2106 \text{ m}^2 - 156 \text{ m}^2) \times 0.25 \text{ m}$$

$$156 \text{ m}^2 \times \text{Depth of the pit} = 1950 \text{ m}^2 \times 0.25 \text{ m}$$

$$156 \text{ m}^2 \times \text{Depth of the pit} = 487.5 \text{ m}^3$$

$$\text{Depth of the pit} = 487.5 \text{ m}^3 / 156 \text{ m}^2$$

Depth of the pit \approx 3.125 m , Therefore, the depth of the pit is approximately 3.125 meters.

Question 24

The total surface area of a cube is given by the formula: $6a^2$, where 'a' is the length of one edge.

Given:

$$\text{Total surface area} = 1,014 \text{ cm}^2$$

We can set up the equation:

$$6a^2 = 1,014$$

Divide both sides by 6:

$$a^2 = 1,014 / 6$$

$$a^2 = 169$$

Taking the square root of both sides:

$$a = \sqrt{169}$$

$$a = 13$$

So, the length of one edge of the cube is 13 cm.

Now, we can find the volume of the cube using the formula: $\text{Volume} = a^3$

Substituting the value of 'a':

$$\text{Volume} = 13^3$$

Volume = 2,197 cm³, Therefore, the volume of the cube is 2,197 cm³.

Question 25

Given:

Side length of the first cube = 6 cm

Side length of the second cube = 8 cm

Side length of the third cube = 10 cm

Volume of each cube = (Side length)³

Volume of the first cube = (6 cm)³ = 216 cm³

Volume of the second cube = (8 cm)³ = 512 cm³

Volume of the third cube = (10 cm)³ = 1000 cm³

Total volume of the smaller cubes = Volume of the first cube + Volume of the second cube + Volume of the third cube

$$\text{Total volume} = 216 \text{ cm}^3 + 512 \text{ cm}^3 + 1000 \text{ cm}^3$$

$$\text{Total volume} = 1728 \text{ cm}^3$$

Now, to find the side length of the new cube, we can use the formula: Volume = (Side length)³

$$1728 \text{ cm}^3 = (\text{Side length})^3$$

Taking the cube root of both sides:

$$\text{Side length} = \sqrt[3]{1728 \text{ cm}^3}$$

Side length = 12 cm, Therefore, the side length of the new cube formed by melting the smaller cubes is 12 cm.

Exercise 17.2

Question 1

(i) radius of the base = 0.21 m = 21 cm, h = 9 cm

$$\text{Volume of cylinder} = \pi r^2 h = 22/7 * 21 * 21 * 9 = 9702 \text{ cm}^3$$

$$\text{Lateral surface area} = 2 * 22/7 * 21 * 9 = 924 \text{ cm}^2$$

$$\text{Total surface area} = 2 * 22/7 * 21 (21+9) = 924 * 30/7 = 3960 \text{ cm}^2$$

(ii) Volume = $\pi r^2 h = 22/7 * 3.5 * 3.5 * 12 = 462 \text{ m}^3$

$$\text{Lateral surface area} = 2 * 22/7 * 3.5 * 12 = 264 \text{ m}^2$$

$$\text{TSA} = 2 * 22/7 * 3.5 (3.5+12) = 22(15.5) = 341 \text{ m}^2$$

(iii) Volume = $\pi r^2 h = 22/7 * 21 * 21 * 4 = 5544 \text{ cm}^3$

$$\text{LSA} = 2 \pi r h = 2 * 22/7 * 4 * 21 = 528 \text{ cm}^2$$

$$\text{TSA} = 2 * 22/7 * 21 (21+4) = 2 * 22 * 3 * (25) = 3300 \text{ cm}^2$$

(iv) Radius = 10.5 dm = 105 cm, h = 12 dm = 120 cm

$$\text{Volume} = 22/7 * 105^2 * 120$$

Question 2

Volume of the cylinder = $\pi r^2 h$

$$= 22/7 * 3.5 * 3.5 * 21^3$$

$$= 66 * 21.25$$

$$= 808.5 \text{ m}^3$$

$$1 \text{ m}^3 = 1000 \text{ L}$$

$$808.5 \text{ m}^3 = 808.5 \text{ m}^3 * 1000 = 808500 \text{ L}$$

$$\text{Now, } 1000 \text{ L} = 1 \text{ kilolitre} = 808500/1000 = 808.5 \text{ kilolitre}$$

Question 3

Let's assume the diameters of the two cylinders are 3x and 4x, where x is a common factor.

The radius of the first cylinder would be half its diameter, which is (3x)/2. The radius of the second cylinder would be half its diameter, which is (4x)/2 = 2x.

Let's assume the height of the first cylinder is h₁ and the height of the second cylinder is h₂.

$$V = \pi r^2 h$$

$$V_1 = \pi ((3x)/2)^2 * h_1$$

$$V_2 = \pi (2x)^2 * h_2$$

$$V_1 = V_2$$

$$\pi((3x)/2)^2 * h_1 = \pi(2x)^2 * h_2$$

$$((3x)/2)^2 * h_1 = (2x)^2 * h_2$$

$$(9x^2/4) * h_1 = 4x^2 * h_2$$

Canceling the common factor of x^2 , we have:

$$(9/4) * h_1 = 4 * h_2$$

Cross-multiplying, we get: $9h_1 = 16h_2$

$h_1/h_2 = 16/9$ Therefore, the ratio of the heights of the two cylinders is 16:9.

Question 4

Radius of the cylinder = 10.5cm

height of the cylinder = 14cm

CSA of the cylinder = $2\pi rh$

$$= 2 \times \frac{22}{7} \times 10.5 \times 14 = 924 \text{cm}^2$$

area of base of the cylinder = πr^2

$$= \frac{22}{7} \times 10.5 \times 10.5 = 346.5 \text{cm}^2$$

Total area to be painted = CSA + area of

base = $924 + 346.5 = 1270.5 \text{cm}^2$

Cost of painting of 1 cm^2 = 10

Therefore,

Cost of painting of 1270.5cm^2 = $1270.5 \times$

10 = Rs. 12705

Question 5

$$V = \pi r^2 h$$

where V is the volume, π is a mathematical constant approximately equal to 3.14159, r is the radius, and h is the height or depth of the cylinder.

Given that the capacity of the tank is 1848m^3 and the diameter of the base is 28 m, we can determine the radius by dividing the diameter by 2:

$$r = 28 \text{ m} / 2$$

$$r = 14 \text{ m}$$

We can rearrange the formula for volume to solve for height: $h = V / (\pi r^2)$

$$\text{Substituting the values: } h = 1848 \text{ m}^3 / (3.14159 * (14 \text{ m})^2)$$

$$h \approx 1848 \text{ m}^3 / (3.14159 * 196 \text{ m}^2)$$

$$h \approx 3 \text{ m}$$

Question 6

meters to dug = volume of well = $\pi r^2 h$

h = height of well = 22.5 m

r = radius of well = $1/2 \times$ diameter = $7\text{m}/2 =$

3.5m

$$\pi r^2 h = \frac{22}{7} \times 3.5\text{m}^2 \times 22.5\text{m} = 866.25\text{m}^3$$

13.

So, 866.25m^3 is must be dug.

Question 7

Circumference of base = 66cm

$$2\pi r = 66\text{cm} = \pi r = 33$$

$$r = 33/\pi \dots (1)$$

Volume of cylinder = $\pi r^2 h$

$$= \pi * 33 * 33 * 60 / \pi * \pi = 65,340 / \pi$$

$$= 20,808.91 \text{ cm}^3 \quad (\pi = 22/7)$$

$$\text{Surface area} = 2\pi rh = 2 * \frac{22}{7} * 33 / \frac{22}{7} * 60 = 3960 \text{ cm}^2$$

Question 8

Let's assume that the radius of the cylinder is 3x, and the height is 4x, where x is the common ratio.

$$\text{Volume} = \pi * r^2 * h$$

Substituting the given values, we have:

$$5346 \text{ cm}^3 = \pi * (3x)^2 * (4x)$$

$$5346 \text{ cm}^3 = \pi * 9x^2 * 16x$$

$$5346 \text{ cm}^3 = \pi * 144x^3$$

To find the value of x , we can divide both sides of the equation by $\pi * 144$:

$$5346 \text{ cm}^3 / (\pi * 144) = x^3$$

Using the value of $\pi \approx 3.14159$, we can calculate x :

$$x^3 \approx 5346 \text{ cm}^3 / (3.14159 * 144)$$

$$x^3 \approx 12.0717$$

$$x \approx \sqrt[3]{12.0717}$$

$$x \approx 2.289$$

Now, find the radius by multiplying x by 3:

$$\text{radius} = 3 * x$$

$$\text{radius} \approx 3 * 2.289$$

$$\text{radius} \approx 6.867 \text{ cm}$$

Therefore, the radius of the cylinder is approximately 6.867 cm.

Question 9:

$$\text{Volume} = \pi * r^2 * h.$$

Given that the diameter of the well is 8 meters, the radius is half of that:

$$\text{Radius} = 8 \text{ m} / 2 = 4 \text{ m}$$

The height (depth) of the well is given as 30 meters.

Substituting these values into the formula:

$$\text{Volume} = \pi * (4 \text{ m})^2 * 30 \text{ m}$$

$$\text{Volume} = 3.14159 * 16 \text{ m}^2 * 30 \text{ m}$$

Volume $\approx 1507.96 \text{ m}^3$ Therefore, approximately 1507.96 cubic meters of earth must be dug out to sink the well.

Question 10

$$\text{Lateral surface area} = 2\pi rh$$

r = radius of the cylinder

h = height of the cylinder

$$\text{Area} = \pi r^2$$

Radius of the cylindrical tank (r) = 2.8 m

Height of the cylindrical tank (h) = 120 m

$$\text{Lateral surface area} = 2\pi rh$$

$$\text{Lateral surface area} = 2 * 3.14 * 2.8 * 120$$

$$\text{Lateral surface area} \approx 2117.76 \text{ square meters}$$

The area of one circular base is given by:

$$\text{Base area} = \pi r^2$$

$$\text{Base area} = 3.14 * (2.8)^2$$

$$\text{Base area} \approx 24.616 \text{ square meters}$$

Since it is an open cylindrical tank, we don't consider the top area as it is not present.

$$\text{Total surface area} = \text{Lateral surface area} + \text{Base area}$$

$$\text{Total surface area} = 2117.76 + 24.616$$

$$\text{Total surface area} \approx 2142.376 \text{ square meters (approx)}$$

Question 11

H of the cylindrical pipe = 35cm

External diameter = 2.8 cm

External radius = $R = 2.8/2 = 1.4 \text{ cm}$

Thickness = 0.7cm

Internal radius $r = 1.4 \text{ cm} - 0.7 \text{ cm} = 0.7 \text{ cm}$

Volume of steel = External volume – Internal volume

$$\text{Volume of the steel} = \pi R^2 h - \pi r^2 h$$

$$\text{Volume of steel} = 22/7 (1.4^2 - 0.7^2) (35)$$

$$\text{Volume of steel} = 161.7 \text{ cm}^2$$

Weight of 1 cubic cm = 4g

Weight of 161.7 cubic cm = $4 \times 161.7 = 646.8$ g

Question 12

The radius of each disc is 7 cm and the thickness is 0.5 cm.

The volume of a cylinder is given by the formula:

$$\text{Volume} = \pi r^2 h$$

where:

r = radius of the cylinder

h = height of the cylinder

Let's calculate the volume of each disc:

Radius of each disc (r) = 7 cm

Thickness of each disc (h) = 0.5 cm

Volume of each disc = $\pi \times r^2 \times h$

Volume of each disc = $\pi \times 7^2 \times 0.5$

Volume of each disc $\approx 77 \pi \text{ cm}^3$

Since there are 40 discs stacked, we can calculate the total volume of the cylinder:

Total volume = Volume of each disc * Number of discs

Total volume = $77 \pi \text{ cm}^3 \times 40$

Total volume = $3080 \pi \text{ cm}^3$

Question 13

Its radius should be $140/2 = 70$ cm.

Its width is its height = 120 cm.

It is a cylinder.

In one revolution its would have covered an area of

$2\pi rh$

Therefore its area covered in one revolution is $2 \times 3.14 \times 70 \times 120 = 52572 \text{ cm}^2$.

In 50 revolutions the area covered would be 2637600 cm^2 or 263.76 m^2 .

Question 14

Volume remains equal.

$$(a)^3 = \pi r^2 h$$

$$= 28 \times 28 \times 28 = \frac{22}{7} \times \frac{35}{2} \times 10000 \times \frac{35}{104} \times H$$

$$= 4 \times 28 \times 28 \times 28 \times 108 \times \frac{7}{35} \times 22 \times 35 \times 104 = H$$

$$= 2.28$$

Question 15

Volume of cylinder = $\pi r^2 h$

$$= \left(\frac{22}{7}\right) (10 \text{ cm})^2 \times 21 \text{ cm}$$

$$= 6600 \text{ cm}^3$$

Volume of cube = a^3

$$= (19 \text{ cm})^3$$

$$= 6859 \text{ cm}^3$$

The cube has greater volume by

$$6859 \text{ cm}^3 - 6600 \text{ cm}^3$$

$$= 259 \text{ cm}^3$$