ADDITIONAL®
PRACTICE

MATHEMATICS 7

Answer Key

DNA education
New Delhi-110002

Chapter
01 INTEGERS

WORKSHEET 1: ADDITION AND SUBTRACTION OF INTEGERS AND THEIR PROPERTIES

1. (a) – 6 (b) – 7
   (c) – 10 (d) – 356
2. (a) > (b) <
   (c) < (d) <
   (e) < (f) <
3. (a) (3, – 5) ∴ Sum = 3 + (– 5) = – 2
   (b) (– 7, – 4) ∴ Difference = – 7 – (– 4) = – 7 + 4 = – 3
   (c) (7, 4) ∴ Difference = 7 – 4 = 3
   (d) (2, –2) ∴ Sum = 2 + (– 2) = 2 – 2 = 0
   (e) (– 9, 3) ∴ Sum = – 9 + 3 = – 6
   (f) (– 9, – 1) ∴ Difference = – 9 – (– 1) = – 9 + 1 = – 8.
4. (a) T (b) F
   (c) T (d) F
   (e) F
5. Pair of negative integer is (– 3, – 10)
   ∴ Difference = – 3 (– 10) = – 3 + 10 = 7
6. (– 3, 1) ∴ Difference = – 3 (– 1) = – 3 – 1 = – 4.
7. (a) (– 8) + (– 5) = (– 5) + $\underline{(-8)}$
   (b) – 98 + $\underline{0}$ = – 98
   (c) 15 + $\underline{(-15)}$ = 0
   (d) (– 6) + [20 + (– 7)] = [(– 6) + 20] + $\underline{(-7)}$
   (e) $\underline{0}$ – 18 = – 18
   (f) [18 + (– 9)] + $\underline{(-6)}$ = 18 + [(–9) + (– 6)]
8. (a) (iii) (b) (ii)
   (c) (i) (d) (iii)
   (e) (i) (f) (i)
   (g) (i)
9. (a) + ₹ 650 (b) + ₹ 890
   (c) + 500 (d) – ₹ 190
   (e) – 30°C
10. Ascending order:
    (a) – 7, – 5, – 4, 1, 4, 4
    (b) – 10, – 4, 0, 2, 3, 6
    Descending order:
    (a) 4, 4, 1, – 4, – 5, – 7
    (b) 6, 3, 2, 0, – 4, – 10
11. (a) 9, 10, 11, 12, 13, 14
    (b) – 8, – 9, – 10, – 11
    (c) 0, 1, – 1, – 2, – 3, – 4, – 5
    (d) – 1, – 2, – 3, – 4
12. Temperature on Sunday = – 5°C
    Temperature on Monday = Temperature on Sunday – 2°C
    = – 5°C – 2°C
    = – 7°C
    Temperature on Tuesday = Temperature on Monday + 1.5°C
    = – 7°C + 1.5°C
    = – 5.5°C
    ∴ Temperature on Monday and Tuesday is – 7°C and – 5.5°C
13. Height of Plane = 4,200 m
    Depth of submarine = 1100 m
    Distance between plane and submarine
    = 4200 mm – (– 1100) m
    = 4200 mm + 1100 m
    = 5300 m

14. Since the amount withdrawn is represented by a negative integer, the amount deposited will be represented by a positive integer.

Amount deposited = ₹ 5000

Amount withdrawn = – ₹ 1672

Balance in Himanshu's account
= ₹ 5000 + (– 1672)
= ₹ (5000 – 1672) = ₹ 3328

∴ Balance in Himanshu's account after withdrawal is ₹ 3328.

WORKSHEET 2: MULTIPLICATION OF INTEGERS AND THEIR PROPERTIES

1. (a) positive (b) negative
(c) 0 (d) reciprocal
(e) 48
(f) $a \times (b - c) = a \times b - \underline{a} \times \underline{c}$
(g) integer and one (h) positive
(i) positive

2. (a) $-18 \times 15 = (-18 \times 15)$
$= -(270) = -270$
(b) $8 \times (-5) \times (-11) = 8 \times (-5 \times -11)$
$= 8 \times (55) = 440$
(c) $5 \times (-9) \times 4 = (5 \times 4) \times -9$
$= 20 \times (-9) = -180$
(d) $(-9 \times (-52) \times 0 = 0$

3. (a) $(-6) \times 0 \times (-48) \times 48 = 0$
(b) $2245 \times 795 - 245 \times 795$
$= 795\ (2245 - 245) = 795 \times 2000$
$= 1590{,}000$
(c) $(-378) \times (-36) + (-378) \times (-64)$
$= (-378) \times [(-36) + (-64)]$
$= -378 \times [-36 - 64] = -378 \times (-100)$
$= 37{,}800$
(d) $16752 \times (-4) + (-16752) \times 96$
$= 16752\ [(-4) + (-1) \times 96]$
$= 16752 \times [-4 - 96] = 16752 \times (-100)$
$= -1675200$

4. (a) $-30 \times (-1) = \underline{30}$
(b) $26 \times (-1) = \underline{-26}$
(c) $1 \times (-1) = \underline{-1}$
(d) $0 \times (-1) = 0$

5. (a) LHS $= 28 \times [8 + (-5)]$
$= 28 \times [8 - 5] = 28 \times 3 = 84$
RHS $= [28 \times 8] + [28 \times (-5)]$
$= [224] + [-140]$
$= 224 - 140 = 84$
∴ LHS = RHS.
(b) LHS $= (-75) \times [(-8) + (-4)]$
$= -75 \times [-8 - 4] = -75 \times (-12)$
$= 900$
RHS $= [(-75) \times (-8)] + [(-75) \times (-4)]$
$= (600) + (300)$
$= 600 + 300 = 900$
∴ LHS = RHS

6. (a) $9 \times (-55) \times (-6) = 9 \times (-6) \times (-55)$
$= (-54) \times (-55)$
$= 2970$
(b) $(-625) \times 744 \times (-4) \times 4$
$= -625\ (-4) \times 744 \times 4$
$= 2500 \times 4 \times 744$
$= (2500 \times 4) \times 744 = 10{,}000 \times 744$
$= 74{,}40{,}000.$
(c) $(-50) \times 125 \times (-6) \times 11$
$= (-50) \times (-6) \times 125 \times 11$
$= 300 \times 125 \times 11 = 300 \times 11 \times 125$
$= 3300 \times 125$
$= 4{,}12{,}500$
(d) $-125 \times 10 \times 25 \times (-4)$
$= (-125) \times (-4) \times 10 \times 25$
$= 500 \times 10 \times 25$
$= 5000 \times 25 = 1{,}25{,}000$

7. (a) $625 \times 84 = 625 \times (80 + 4)$
$= 625 \times 80 + 625 \times 4$
$= 50000 + 2500$
$= 52500$

(b) [200 × 2543 – 100 × 2543]

= 2543 [200 – 100]

= 2543 × 100 = 2,54,300

8. (a) $5 \times [(-4) - x] = 5 \times (-4) - 5 \times 10$

$\Rightarrow 5 \times (-4 - x) = 5 [(-4) - 10]$

$\Rightarrow 5 \times (-4 - x) = 5 [-14]$

$\Rightarrow -4 - x = -14$

$\Rightarrow -x = -14 + 4 = -10$

$\therefore x = 10$

(b) $2 \times (3 + x) = 2 \times 3 + 6 \times 2$

$\Rightarrow 2 \times (3 + x) = 2 \times (3 + 6)$

$\Rightarrow 3 + x = 9$

$\Rightarrow x = 9 - 3 = 6.$

9. (a) LHS $= 372 \times 462 - (372) \times (-38)$

$= 372 \times [462 - (-38)]$

$= 372 \times [462 + 38] = 372 \times 500$

$= 186000$

RHS $= 372 \times [462 - (-38)]$

$= 372 \times [462 + 38] = 372 \times 500$

$= 186000$

$\therefore$ LHS = RHS.

Associate property.

(b) LHS $= (-25 \times 8) \times (-264)$

$\Rightarrow -200 \times (-264) = 52,800$

RHS $= -25 \times [8 \times (-264)]$

$= -25 \times [-2112]$

$= 52,800.$

Associate property.

10. (a) Marks given for 1 correct answer = 5

Marks given for 4 correct answers = 5 × 4 = 20

Marks deducted for 1 wrong answer = 2

Marks deducted for 9 wrong answers = 2 × 9 = 18

Score obtained by Assem = 20 – 18 = 2

(b) Nitin got nine correct and 6 incorrect answers.

= 9 × 5 – 6 × 2

= 45 – 12 = 33

11. Profit is denoted by a positive integer and loss is denoted by a negative integer.

(a) Profit earned while selling 1 bag of white cement = ₹ 8

Profit earned while selling 1800 bag of white cement = 8 × 1800 = 1,4400

Loss incurred while selling 1 bag of grey cement = – ₹ 3

Loss incurred while selling 4000 bag of grey cement = – 3 × 4000 = – 12000

Total profit/loss = 1,4400 + (– 12000)

= ₹ 2400.

$\therefore$ A profit of ₹ 2400 will be incurred by the company.

(b) Loss incurred while selling 1 bag of grey cement = – ₹ 3

Loss incurred while selling 6300 bag of grey cement = (– 3) × 6300 = – 18,900

Let the number of bags of white cement to be sold be x.

Profit earned while selling 1 bag of white cement = ₹ 8

Profit earned while selling x bags of white cement = x × 8 = 8x

In condition of no profit or no loss.

Profit earned + Loss incurred = 0

$\Rightarrow 8x + (-18900) = 0$

$\Rightarrow 8x = 18900$

$\therefore x = \sqrt{6} = 2362.5.$

$\therefore$ 2363 bags of white cement must be sold.

WORKSHEET 3: DIVISION OF INTEGERS AND ITS PROPERTIES

1. (a) positive (b) disobey
   (c) 1 (d) $275 \div \underline{1} = 275$
   (e) $0 \div \underline{627} = 0$ (f) $\underline{-584} \div 584 = -1$
2. (a) T (b) F
   (c) F (d) F
3. (i) $5 \div (-1) = -5$ $(5, -1)$
   (ii) $-5 \div 1 = -5$ $(-5, 1)$
   (iii) $15 \div (-3) = -5$ $(15, -3)$
   (iv) $-15 \div 3 = -5$ $(-15, 3)$
   (v) $20 \div (-4) = -5$ $(20, -4)$
4. Marks obtained for 1 Right answer = + 5
   Marks obtained for 1 Wrong answer = – 5
   (a) Marks scored by Divya = 30
   Marks obtained for 12 correct answers
   = 12 × 5 = 60
   Marks obtained for incorrect answers
   = Total score
   – Marks obtained for 12 correct answers
   = 31 – 60 = – 29
   Thus, the number of incorrect answer
   = (– 29) ÷ (– 5)
   = (5.8) $\simeq$ (6) approx.
   ∴ She attempted 6 questions wrongly.
   (b) Marks obtained for 11 correct answer
   = 11 × 5 = 55
   Marks obtained for incorrect answer = – 10
   ∴ She attempted incorrectly 13 × (– 5) = (– 65)
   ∴ (– 65) + (55) = – 10
   ∴ She attempted 13 questions.
5. Initial temperature c.c. at 12 noon = 20°C
   Charge in temperature per hour = – 3°C
   Temperature at 1 : 00 pm = 20°C + (– 3°C)
   = 17°C
   Temperature at 2 : 00 pm = 17°C + (– 3°C)
   = 14°C
   Temperature at 3 : 00 pm = 14°C + (– 3°C)
   = + 11°C
   Temperature at 4 : 00 pm = 11°C + (– 3°C)
   = 8°C
   Temperature at 5 : 00 pm = 8°C + (– 3°C)
   = 5°C
   Temperature at 6 : 00 pm = 5°C + (– 3°C)
   = 2°C
   Temperature at 7 : 00 pm = 2°C + (– 3°C)
   = – 1°C
   Temperature at 8 : 00 pm = – 1°C + (– 3°C)
   = – 4°C
   Temperature at 9 : 00 pm = – 4°C + (– 3°C)
   = – 7°C
   ∴ The temperature will be 7°C below zero at 9.00 p.m.
   It will take 12 hours to be midnight (i.e., 12.00 a.m.) after 12.00 noon.
   Change in temperature in 12 hours = – 3°C × 12 = – 36°C
   At in night, the temperature will be = 20 + (– 36°) = – 16°C
   ∴ The temperature at in midnight will be – 16°C.

WORKSHEET (BASED ON COMPLETE CHAPTER)

1. (a) – 15°C (b) + 31°C
   (c) – 7 km (d) + ₹ 600
2. Ascending Order:
   (a) – 24, – 6, – 2, 1, 14, 24
   (b) – 35, – 16, – 13, 15, 28
3. (a) (– 21) × (– 9) × (– 8) = (– 21) × 72
   = – 1512
   (b) 7 × (– 11) × (25)
   = (– 77) × 25
   = – 1925
4. (a) Negative sign.
   (b) Positive sign.

5. (a) $-32 \times (-1) = 32$

(b) $55 \times (-1) = -55$

(c) $0 \times (-1) = 0$.

6. (a) $3725 \div (-25) = -149$

(b) $-4096 \div (-16) = 256$

(c) $-6561 \div 9 = -729$.

7. (a) $-52 + \underline{0} = -52$

(b) $(-91) + [24 + (-8)] = [24 + (-91)] + \underline{(-8)}$

(c) $\underline{(-6)} \times 16 = -96$

(d) $(-207) \div \underline{(-207)} = 1$

8. (a) $2052 \times (-25) + 2052 \times (-15) + 2052 \times (-10)$

$= 2052 \times [(-25) + (-15) + (-10)]$

$= 2052 \times [-25 - 15 - 10]$

$= 2052 \times (-50) = -102600$

(b) $(-875) \times 25 + (-875) \times 371 + (-875) \times 373$

$= (-875) \times [25 + 371 + 373]$

$= (-875) \times (769) = -6,72,875$.

9. (a) LHS $= [(-15) + 132] \times (-200)$

$= [-15 + 132] \times (-200)$

$= (117) \times (-200) = -23,400$

RHS $= (-15) \times (-200) + 132 \times (-200)$

$= 3000 - 26,400$

$= -23,400$

$\therefore$ LHS = RHS

(b) LHS $= [(-20) \times 5] \times (-125)$

$= (-100) \times (-125) = 12500$

RHS $= (-20) \times [5 \times -125]$

$= -20 \times [-625] = 12500$

$\therefore$ LHS = RHS

10. 1 hours (–10) liters water leaked.

In tank ii filled with 1000 litres of water.

$\therefore$ (– 10) litres water leaked – In 1 hour

1000 litres water leaked

$= \frac{1 \times 1000}{10}$ hours

= 100 hours = 4.17 Days

$\therefore$ A tank will empty in 100 hours on 4.17 days.

11. A hot iron piece was at 700°C

2 minutes change temperature = – 30°C

$\therefore$ 25 minutes change temperature = (?)

$= \frac{-30^\circ \times 25}{2}$

$= -15^\circ \times 25$

$= -375^\circ C$

$\therefore$ A hot iron piece was after 25 minutes temperature

$= 700^\circ - 375^\circ$

$= 325^\circ C$.

12. (a) (iii)

(b) (i)

(c) (iii)

Chapter 02

Fractions and Decimals

WORKSHEET 1: SUM AND DIFFERENCE OF FRACTIONS

1. (a) Proper fraction: A fraction where the numerator is less than the denominator is called a proper fraction.

(b) Mixed fraction: A whole number and a fraction combined into one mixed number is called a mixed fraction.

(c) Improper fraction: A fraction whose numerator is bigger than the denominator.

(d) Vulgar fraction: A fraction in which there is a horizontal line with one number about it and one number below it or a fraction that is shown as numbers above and below a line.

(e) Like fractions: Fractions with same denominators are called like fractions.

(f) Unlike fractions: Fractions with different denominators are called unlike fractions.

(g) Equivalent fractions: Fractions which have the same value, even though they may look different, are called equivalent fractions.

2. (a) $\frac{6}{7}+\frac{3}{8}$ LCM of 7 and 8 = 56

$$\frac{48+21}{56} = \frac{69}{56} = 1\frac{13}{56}$$

(b) $3\frac{4}{5}+7\frac{2}{9} = \frac{19}{5}+\frac{65}{9}$

LCM of 5 and 9 = 45

$$= \frac{19\times 9+65\times 5}{45} = \frac{171+325}{45}$$

$$= \frac{496}{45} = 11\frac{1}{45}$$

(c) $8\frac{3}{11}+10\frac{2}{6} = \frac{91}{11}+\frac{62}{6}$

LCM of 11 and 6 = 66

$$\frac{91\times 6+11\times 62}{66}$$

$$= \frac{546+682}{66} = \frac{1228}{66}$$

$$= 18\frac{40}{66}$$

3. (a) $\frac{3}{11}-\frac{4}{15} = \frac{3\times 15-11\times 4}{165} = \frac{45-44}{165} = \frac{1}{165}$

(b) $6\frac{4}{9}-1\frac{7}{12} = \frac{58}{9}-\frac{19}{12}$; LCM of 9 and 12 = 36

$$= \frac{58\times 4-19\times 3}{36} = \frac{232-57}{36} = \frac{175}{36}$$

$$= 4\frac{31}{36}$$

(c) $7\frac{1}{2}-3\frac{5}{8}$

$$= \frac{15}{2}-\frac{29}{8}$$

$$\frac{15\times 4-29}{8} = \frac{60-29}{8}$$

$$= \frac{31}{8} = 3\frac{7}{8}$$

4. (a) $8\frac{5}{6}-2\frac{2}{7}+1\frac{6}{11}$

$$= \frac{53}{6}-\frac{16}{7}+\frac{17}{11}$$

LCM of 6, 7 and 11 = 462

$$= \frac{53\times 77-16\times 66+17\times 42}{462}$$

$$= \frac{4081-1056+714}{462} = \frac{4795-1056}{462}$$

$$= \frac{3739}{462} = 8\frac{43}{462}$$

(b) $\frac{4}{11} - \left[\left\{\left(1\frac{3}{44} + \left\{2\frac{1}{88} - \left(1\frac{1}{22} - \frac{1}{11}\right)\right\}\right)\right\}\right]$

Sol:

$$= \frac{4}{11} - \left[\left\{1\frac{3}{44} + 2\frac{1}{88} - \left(\frac{23}{22} - \frac{1}{11}\right)\right\}\right]$$

$$= \frac{4}{11} - \left[\left\{\frac{47}{44} + \left(\frac{177}{88} - \left(\frac{23-2}{22}\right)\right)\right\}\right]$$

$$= \frac{4}{11} - \left[\left\{\frac{47}{44} + \left(\frac{177}{88} - \frac{21}{22}\right)\right\}\right]$$

$$= \frac{4}{11} - \left[\left\{\frac{47}{44} + \frac{177-84}{88}\right\}\right] = \frac{4}{11} - \left[\left\{\frac{47}{44} + \frac{93}{88}\right\}\right]$$

$$= \frac{4}{11} - \left[\frac{94+93}{88}\right] = \frac{4}{11} - \frac{187}{88}$$

$$= \frac{32-187}{88} = \frac{-155}{88} = -1\frac{67}{88}$$

5. Quantity of pears purchased by Palak = $5\frac{1}{2}$ Kg

Quantity of apples purchased by Palak = $3\frac{9}{10}$ Kg

$$\text{Total Weight} = 5\frac{1}{2}\text{Kg} + 3\frac{9}{10}\text{Kg}$$

$$= \frac{11}{2}\text{Kg} + \frac{39}{10}\text{Kg}$$

$$= \left(\frac{11\times 5+39}{10}\right)\text{Kg} = \left(\frac{55+39}{10}\right)\text{Kg}$$

$$= \frac{94}{10}\text{Kg} = 9\frac{4}{10}\text{Kg}$$

6. Number of hours studied by Muskan daily

$$= 6\frac{1}{8}\text{hrs} = \frac{49}{8}\text{hrs}$$

Time devoted for Science and Maths = $3\frac{7}{16}$hrs

$$= \frac{55}{16}\text{hrs}$$

Time devoted for other subjects

$$= \left(\frac{49}{8} - \frac{55}{16}\right) \text{ hrs}$$

$$= \frac{98-55}{16}\text{hrs} = \frac{43}{16}\text{hrs} = 2\frac{11}{16}\text{hrs}$$

7. Perimeter of the Δ XYZ

$$= \frac{5}{3}\text{cm} + 7\frac{2}{3}\text{cm} + 3\frac{2}{5}\text{cm}$$

$$= \frac{5}{3}\text{cm} + \frac{23}{3}\text{cm} + \frac{17}{5}\text{cm}$$

$$= \left(\frac{5}{3} + \frac{23}{3} + \frac{17}{5}\right)\text{cm}$$

$$= \left(\frac{5\times 5 + 23\times 5 + 17\times 3}{15}\right)\text{cm}$$

$$= \left(\frac{25+115+51}{15}\right)\text{cm}$$

$$= \frac{191}{15}\text{cm}$$

$$= 12\frac{11}{15}\text{ cm}$$

8. Perimeter of the rectangle PQRS

$$= 2(l + b)$$

$$= 2\left(1\frac{1}{4} + 1\frac{1}{2}\right)\text{m} = 2\left(\frac{5}{4} + \frac{3}{2}\right)\text{m}$$

$$= 2\left(\frac{5+6}{4}\right)\text{m} = 2\times\frac{11}{4}\text{m}$$

$$= \frac{11}{2}\text{m} = 5\frac{1}{2}\text{m}$$

9. Width of the picture = $6\frac{4}{5}\text{cm} = \frac{34}{5}\text{cm}$

Required width = $5\frac{7}{8}\text{cm} = \frac{47}{8}\text{cm}$

The picture should be trimmed by

$$= \frac{34}{5} - \frac{47}{8}$$

$$= \frac{34\times 8 - 47\times 5}{40} = \frac{272-235}{40} \text{ cm}$$

$$= \frac{37}{40} \text{ cm}$$

10. Total piece of rope = $7\frac{1}{3}$ m

One piece of rope = $2\frac{2}{5}$m

Other piece of rope $= 7\frac{1}{3}m - 2\frac{2}{5}m$

$$= \frac{22}{3}m - \frac{12}{5}m = \left(\frac{22}{3} - \frac{12}{5}\right)m$$

$$= \left(\frac{22\times5 - 12\times3}{15}\right)m$$

$$= \left(\frac{110-36}{15}\right)m = \frac{74}{15}m$$

$$= 4\frac{14}{15}m$$

11. $\frac{13}{84} - \frac{15}{21}$

$$= \frac{13 - 15\times4}{84} = \frac{13-60}{84} = \frac{-47}{84}$$

12. Quantity of tea in a cup $= \frac{1}{4}$

Part of cup to be filled to make it full

$$= 1 - \frac{1}{4} = \frac{4-1}{4} = \frac{3}{4}$$

WORKSHEET 2: COMPARISON OF FRACTIONS

1. (a) $\frac{6}{8}$ or $\frac{9}{11}$

$$\frac{6}{8} = \frac{6\times11}{8\times11} = \frac{66}{88}$$

$$\frac{9}{11} = \frac{9\times8}{11\times8} = \frac{72}{88}$$

$\therefore \quad \frac{72}{88} > \frac{66}{88}$

$\frac{9}{11} > \frac{6}{8}$

$\therefore \quad \frac{9}{11}$ is greater

(b) $\frac{13}{15}$ or $\frac{15}{16}$

$$\frac{13}{15} = \frac{13\times16}{15\times16} = \frac{208}{240}$$

$$\frac{15}{16} = \frac{15\times15}{16\times15} = \frac{225}{240}$$

$\frac{225}{240} > \frac{208}{240}$

$\frac{15}{16} > \frac{13}{15}$

$\therefore \quad \frac{15}{16}$ is greater

2. (a) $\frac{13}{21}$ or $\frac{15}{17}$

$$\frac{13}{21} = \frac{13\times17}{21\times17} = \frac{221}{357}$$

$$\frac{15}{17} = \frac{15\times21}{17\times21} = \frac{315}{357}$$

$\frac{221}{357} < \frac{315}{357}$

$\frac{13}{21} < \frac{15}{17}$

$\therefore \quad \frac{13}{21}$ is smaller

(b) $\frac{35}{39}$ or $\frac{33}{38}$

$$\frac{35}{39} = \frac{35\times38}{39\times38} = \frac{1330}{1482}$$

$$\frac{33}{38} = \frac{33\times39}{38\times39} = \frac{1287}{1482}$$

$\frac{1287}{1482} < \frac{1330}{1482}$

$\frac{33}{38} < \frac{35}{39}$

$\therefore \quad \frac{33}{38}$ is smaller

3. (a) $\frac{5}{9}, \frac{4}{5}, \frac{8}{13}, \frac{78}{25}$

LCM of 9,5,13 and 25 = 2925

$$\frac{5}{9} = \frac{5\times325}{9\times325} = \frac{1625}{2925}$$

$$\frac{4}{5} = \frac{4\times585}{5\times585} = \frac{2340}{2925}$$

$$\frac{8}{13} = \frac{8\times225}{13\times225} = \frac{1800}{2925}$$

$$\frac{78}{25} = \frac{78\times117}{25\times117} = \frac{9126}{2925}$$

$\frac{9126}{2925} > \frac{2340}{2925} > \frac{1800}{2925} > \frac{1625}{2925}$

$\frac{78}{25}, \frac{4}{5}, \frac{8}{13}, \frac{5}{9}$

(b) $\frac{3}{4}, \frac{6}{9}, \frac{12}{13}, \frac{18}{19}$

LCM of 4,9,13 and 19 = 8892

$$\frac{3}{4} = \frac{3\times2223}{4\times2223} = \frac{6669}{8892}$$

$$\frac{6}{9} = \frac{6\times988}{9\times988} = \frac{5928}{8892}$$

$$\frac{12}{13} = \frac{12\times684}{13\times684} = \frac{8208}{8892}$$

and $\frac{18}{19} = \frac{18\times468}{19\times468} = \frac{8424}{8892}$

$$\frac{8424}{8892} > \frac{8208}{8892} > \frac{6669}{8892} > \frac{5928}{8892}$$

$\therefore \frac{18}{19}, \frac{12}{13}, \frac{3}{4}, \frac{6}{9}$

4. (a) $\frac{6}{13}, \frac{3}{26}, \frac{5}{65}, \frac{7}{39}$

LCM of 13, 26, 65, 39 = 390

$$\frac{6}{13} = \frac{6\times30}{13\times30} = \frac{180}{390}$$

$$\frac{3}{26} = \frac{3\times15}{26\times15} = \frac{45}{390}$$

$$\frac{5}{65} = \frac{5\times6}{65\times6} = \frac{30}{390}$$

$$\frac{7}{39} = \frac{7\times10}{39\times10} = \frac{70}{390}$$

$$\frac{30}{390} < \frac{45}{390} < \frac{70}{390} < \frac{180}{390}$$

$\therefore \frac{5}{65} < \frac{3}{26} < \frac{7}{39} < \frac{6}{13}$

(b) $\frac{7}{18}, \frac{6}{21}, \frac{7}{27}, \frac{12}{15}$

LCM of 18, 21, 27 and 15 = 1890

$$\frac{7}{18} = \frac{7\times105}{18\times105} = \frac{735}{1890}$$

$$\frac{6}{21} = \frac{6\times90}{21\times90} = \frac{540}{1890}$$

$$\frac{7}{27} = \frac{7\times70}{27\times70} = \frac{490}{1890}$$

$$\frac{12}{15} = \frac{12\times126}{15\times126} = \frac{1512}{1890}$$

$$\frac{490}{1890} < \frac{540}{1890} < \frac{735}{1890} < \frac{1512}{1890}$$

$$\frac{7}{27} < \frac{6}{21} < \frac{7}{18} < \frac{12}{15}$$

5. (a) $\frac{25}{125} = \frac{25\div25}{125\div25} = \frac{1}{5}$

(b) $\frac{42}{216} = \frac{42\div6}{216\div6} = \frac{7}{36}$

(c) $\frac{51}{-119} = \frac{51\div17}{-119\div17} = \frac{3}{-7}$

6. (a) $25\frac{11}{3} = \frac{25\times3+11}{3} = \frac{75+11}{3} = \frac{86}{3}$

(b) $80\frac{5}{9} = \frac{80\times9+5}{9} = \frac{720+5}{9} = \frac{725}{9}$

(c) $95\frac{1}{4} = \frac{95\times4+1}{4} = \frac{380+1}{4} = \frac{381}{4}$

7. (a) $\frac{45}{13} = 3\frac{6}{13}$

(b) $\frac{81}{10} = 8\frac{1}{10}$

(c) $\frac{56}{19} = 2\frac{18}{19}$

8. (a) $\frac{15}{16} = \frac{30}{32} = \frac{45}{48} = \frac{60}{64}$

(b) $\frac{25}{19} = \frac{50}{38} = \frac{75}{57} = \frac{100}{76}$

(c) $\frac{4}{21} = \frac{8}{42} = \frac{12}{63} = \frac{16}{84}$

9. Sanchit finished colouring a picture in

$= 2\frac{9}{13}\text{hrs} = \frac{35}{13}\text{hrs}$

Kanchan finished colouring the same picture in

$= 2\frac{4}{26}\text{hrs} = \frac{56}{26}\text{hrs}$

$\therefore \frac{35}{13} = \frac{35\times2}{13\times2} = \frac{70}{26}$

Sanchit worked longer by = $\frac{70}{26}-\frac{56}{26}=\frac{70-56}{26}$

$=\frac{14}{26}=\frac{7}{13}$ hrs

10. Kanika ate chocolate = $\frac{3}{8}$

Her sister ate $=1-\frac{3}{8}=\frac{8-3}{8}=\frac{5}{8}$

Arushi ate $\frac{5}{8}$ part of the chocolate

Arushi ate the larger share.

WORKSHEET 3: MULTIPLICATION OF FRACTIONS

1. (a) $\frac{2}{5}\times 0=\underline{0}$

(b) $\frac{9}{11}\times 1=\frac{9}{11}$

(c) $2\frac{7}{8}\times 1=\underline{2\frac{7}{8}}$

(d) $\frac{9}{7}\times\frac{1}{5}=\frac{1}{5}\times\underline{\frac{9}{7}}$

2. (a) $\frac{1}{5}$ of a rupee = $\frac{1}{2}\times 100$ P = 50P

(b) $\frac{2}{5}$ of 1 Kg = $\frac{2}{5}\times 1000$ g = 2 × 200g = 400g

(c) $\frac{1}{10}$ of metre = $\frac{1}{10}\times 100$ cm = 10cm

(d) $\frac{3}{5}$ of a litre = $\frac{3}{5}\times 1000$ ml = 3 × 200 ml

= 600 ml

3. (a) $\frac{5}{9}\times 729=\frac{5\times 729}{9}=5\times 81$

$=405$

(b) $\frac{15}{60}\times 480=\frac{15\times 8\times 160}{60}=120$

$=120$

(c) $\frac{16}{11}\times\frac{33}{20}\times\frac{5}{3}=\frac{16\times 5\times 33}{20\times 33}=\frac{4\times 4\times 5\times 33}{4\times 5\times 33}$

$=4$

(d) $\frac{7}{15}\times 225=7\times 15=105$

4. (a) $6\times\frac{5}{12}=\frac{5}{2}$

(b) $7\times 2\frac{1}{12}=7\times\frac{25}{12}=\frac{175}{12}$

(c) $5\times\frac{6}{25}=\frac{6}{5}$

5. (a) $\frac{39}{76}\times\frac{2}{13}=\frac{39\times 2}{13\times 76}=\frac{3\times 1}{1\times 38}=\frac{3}{38}$

(b) $\frac{6}{17}\times\frac{51}{72}=\frac{6\times 51}{17\times 72}=\frac{1\times 3}{1\times 12}=\frac{1}{4}$

(c) $\frac{18}{19}\times\frac{57}{90}=\frac{18\times 57}{19\times 90}=\frac{1\times 3}{1\times 5}=\frac{3}{5}$

6. Let, proper fraction is $\frac{3}{4}$ and improper fraction

(i) is $\frac{11}{7}$, product is $\frac{3}{4}\times\frac{11}{7}=\frac{33}{28}$ is less than the

improper fraction $\frac{11}{7}=\frac{11\times 4}{7\times 4}=\frac{44}{28}$

1. $\therefore\quad \frac{33}{28}<\frac{44}{28}$

$\therefore\quad \frac{33}{28}<\frac{11}{4}$.

Same $\frac{33}{28}$ is greater then the proper fraction

$\frac{3}{4}=\frac{3\times 7}{4\times 7}=\frac{21}{28}$

$\therefore\quad \frac{33}{28}>\frac{21}{28};\frac{33}{28}>\frac{3}{4}$

2. ** same, as above $\frac{7}{10}$ is proper fraction and $\frac{13}{5}$

is improper fraction, product is $\frac{7}{10}\times\frac{13}{5}=\frac{91}{50}$

is less than the improper fraction $\frac{13}{5}$

$\therefore\quad \frac{91}{50}<\frac{130}{50};\frac{91}{50}<\frac{13}{5}=\frac{13\times 10}{5\times 10}=\frac{130}{50}$

Now, $\frac{91}{50}$ is greater than the proper fraction

$\frac{91}{50} > \frac{35}{50}, \frac{91}{50} > \frac{7}{10} = \frac{7}{10} = \frac{7 \times 5}{10 \times 5} = \frac{35}{50}$

7. 1. Suppose $\frac{3}{5}$ and $\frac{2}{5}$ are proper fraction

Product is $\frac{3}{5} \times \frac{2}{5} = \frac{6}{15}$,

$\frac{6}{15}$ is less than the $\frac{3}{5} = \frac{3 \times 3}{5 \times 3} = \frac{9}{15}$

$\therefore \frac{6}{15} < \frac{9}{15}; \frac{6}{15} < \frac{3}{5}$, and

$\frac{6}{15}$ is less than the $= \frac{2}{3} = \frac{2 \times 5}{3 \times 5} = \frac{10}{15}$,

$\frac{6}{15} < \frac{10}{15}; \frac{6}{15} < \frac{2}{3}$

2. Suppose $\frac{3}{7}$ and $\frac{4}{11}$ are proper fraction.

Product of $\frac{3}{7} \times \frac{4}{11} = \frac{12}{77}$

$\frac{12}{77}$ is less than the $\frac{3}{7} = \frac{3 \times 11}{7 \times 11} = \frac{33}{77}$

$\frac{12}{77} < \frac{33}{77}, \frac{12}{17} < \frac{3}{7}$

and $\frac{12}{77}$ is less than the $\frac{4}{11} = \frac{4 \times 7}{11 \times 7} = \frac{28}{77}$

$\frac{12}{77} < \frac{28}{77}; \frac{12}{77} < \frac{4}{11}$

8. (a) $\frac{13}{5} \times \frac{2}{\boxed{2}} = \frac{26}{10}$

(b) $\frac{25}{9} \times \frac{\boxed{5}}{9} = \frac{125}{81}$

9. Mr. Chawla's monthly salary = ₹ 2400

He spends = $\frac{3}{8}$

Money spent by him = $\frac{3}{8}$ × ₹ 2400

= ₹ 3 × 300 = ₹ 900

10. Kavita's mom has apple Juice = 2.5 l

She gave = $\frac{1}{5}$th of it to her five friends

Quantity consumed by each of her friends

$5 \times \frac{1}{5} \times 2.5 = 2.5$ l.

11. Cost of movie ticket = $₹48\frac{1}{2} = ₹\frac{97}{2}$

Tickets Sold = 390

Total amount collected = ₹ 97 × 195

= ₹18,915

12. Total students in a class = 56

Boys = $\frac{7}{8}$ of 56 = $\frac{7}{8} \times 56 = 7 \times 7 = 49$

Girls = 56 – 49 = 7

WORKSHEET 4: DIVISION OF FRACTIONS

1. (a) Reciprocal of $\frac{3}{7} = \frac{7}{3}$

$\therefore$ It is an improper fraction.

(b) Reciprocal of $\frac{9}{5} = \frac{5}{9}$

$\therefore$ It is a proper fraction.

(c) $\frac{1}{11} = \frac{11}{1}$

$\therefore$ It is a whole number.

(d) Reciprocal of $\frac{5}{21} = \frac{21}{5}$

$\therefore$ It is an improper fraction.

(e) Reciprocal of $\frac{25}{8} = \frac{8}{25}$

$\therefore$ It is a proper fraction.

(f) Reciprocal of $\frac{13}{5} = \frac{5}{13}$

$\therefore$ It is a proper fraction.

2. (a) $7 \div \frac{3}{5} = 7 \times \frac{5}{3} = \frac{7 \times 5}{3} = \frac{35}{3}$

(b) $6 \div \frac{7}{8} = 6 \times \frac{8}{7} = \frac{6 \times 8}{7} = \frac{48}{7}$

(c) $5\frac{1}{6} \div 2\frac{1}{2} = \frac{31}{6} \div \frac{5}{2} = \frac{31}{6} \times \frac{2}{5} = \frac{31 \times 1}{3 \times 5} = \frac{31}{15}$

(d) $\frac{4}{9} \div \frac{2}{3} = \frac{4}{9} \times \frac{3}{2} = \frac{2 \times 1}{3 \times 1} = \frac{2}{3}$

(e) $2\frac{1}{3} \div \frac{3}{5} = \frac{7}{3} \div \frac{3}{5} = \frac{7}{3} \times \frac{5}{3} = \frac{35}{9}$

(f) $\frac{2}{5} \div 1\frac{1}{2} = \frac{2}{5} \div \frac{3}{2} = \frac{2}{5} \times \frac{2}{3} = \frac{4}{15}$

3. (a) $5\frac{1}{3} \div 12 = \frac{16}{3} \div 12 = \frac{16}{3} \times \frac{1}{12} = \frac{4}{3 \times 3} = \frac{4}{9}$

(b) $7\frac{2}{9} \div 26 = \frac{65}{9} \div 26 = \frac{65}{9} \times \frac{1}{26} = \frac{5 \times 1}{9 \times 2} = \frac{5}{18}$

(c) $16\frac{2}{3} \div 2\frac{2}{9}$

$= \frac{50}{3} \div \frac{20}{9} = \frac{50}{3} \times \frac{9}{20} = \frac{5 \times 3}{1 \times 2} = \frac{15}{2}$

4. $37\frac{1}{2} \div 5\frac{5}{8}$

$= \frac{75}{2} \div \frac{45}{8} = \frac{75}{2} \times \frac{8}{45}$

$= \frac{20}{3}$

5. Total distance = $20\frac{5}{7}$ km

Time taken = $6\frac{2}{3}$ hrs.

$= 20\frac{5}{7}\text{km} \div 6\frac{2}{3}\text{hrs.}$

$= \frac{145}{7} \div \frac{20}{3} = \frac{145}{7} \times \frac{3}{20}$ km / hr.

$= \frac{29 \times 3}{7 \times 4} = \frac{87}{28} = 3\frac{3}{28}$ km / hr.

6. Cost of a silk chocolate = ₹ $12\frac{6}{7}$ = ₹ $\frac{90}{7}$

Total chocolate purchased = ₹ $35\frac{4}{5}$ ÷ ₹ $\frac{90}{7}$

= ₹ $\frac{179}{ü} \times \frac{7}{—}$

= $\frac{1253}{450}$ = ₹ $2\frac{353}{450}$

7. Product of two fractions = $65\frac{1}{4} = \frac{261}{4}$

One fraction = $5\frac{7}{16} = \frac{87}{16}$

Other fraction = $\frac{261}{4} \div \frac{87}{16} = \frac{261}{4} \times \frac{16}{87}$

$= \frac{3 \times 4}{1 \times 1} = 12$

8. Area of a rectangular room = $67\frac{1}{2}$ sq. m.

$= \frac{135}{2}$ sq. m.

Breadth = $7\frac{1}{2}\text{m} = \frac{15}{2}\text{m.}$

Length = Area ÷ breadth

$= \left(\frac{135}{2} \div \frac{15}{2}\right)\text{m} = \left(\frac{135}{2} \times \frac{2}{15}\right)\text{m}$

= 9 m.

9. Total length of rope = $8\frac{3}{4} = \frac{35}{4}$ m.

A.T.Q. $\frac{35}{4} \div \frac{8}{1} = \frac{35}{4} \times \frac{1}{8} = \frac{35}{32}$ m.

Length of each piece = $1\frac{3}{32}$ m.

10. Suppose a book has a x pages

Kaveri reads $\frac{3}{7}$ pages of a book = $\frac{3x}{7}$

∴ Left pages are = $\left(x - \frac{3x}{7}\right) = \left(\frac{7x - 3x}{7}\right) = \frac{4x}{7}$

∴ given; $56 = \frac{4x}{7}$

$x = \frac{56 \times 7}{4} = 14 \times 7 = 98$

∴ total no. of pages are = 98.

WORKSHEET 5: OPERATIONS ON DECIMAL NUMBERS

1. (a) 0.5 or 0.7

$0.5 = \frac{5}{10}$ and $0.7 = \frac{7}{10}$.

It can be observed that both fractions have the same denominator. As 10.

0.7 > 0.5

(b) 9 or 0.9, $9 = \frac{9}{1} = \frac{9 \times 10}{1 \times 10} = \frac{90}{10}$

and $0.9 = \frac{9}{10}$

As, 90 > 9

∴ 9 > 0.9.

(c) 0.6 or 0.66

$0.6 = \frac{6}{10} \times \frac{10}{10} = \frac{60}{100}$ and $0.66 = \frac{66}{100}$

⇒ 66 > 60

∴ 0.66 > 0.6

(d) 4.05 or 4.50

$4.05 = \frac{405}{100}$ or $4.50 = \frac{450}{100}$

$\Rightarrow$ 450 > 405

$\therefore$ 4.50 > 4.05

(e) 11.37 or 11.49

$11.37 = \frac{1137}{100}$ or $11.49 = \frac{1149}{100}$

$\Rightarrow$ 1149 > 1137

$\therefore$ 11.49 > 11.37.

(f) 0.4 or 0.44

$0.4 = \frac{4}{10} = \frac{4 \times 10}{10 \times 10} = \frac{40}{100}$ or $0.44 = \frac{44}{100}$

$\Rightarrow$ 44 > 40

$\therefore$ 0.44 > 0.4

2. 500 – 29.56

= 470.44

$$\begin{array}{r} 500.00 \\ -29.56 \\ \hline 470.44 \end{array}$$

3. 26.54 + 9.843 + 57.2

= 93.583

$$\begin{array}{r} 26.54 \\ +\ 9.843 \\ +57.2 \\ \hline 93.583 \end{array}$$

4. (a) 83.6 – 29.76 + 67.2 – 42.78

= (83.6 + 67.2) – (29.76 + 42.78)

= (150.8) – (72.54)

= 150.8 – 72.54 = 78.26

(b) 18.6 + 206.37 – 8.009 – 25.6 – 56

= (18.6 + 206.37) – (8.009 + 25.6 + 56)

= (224.97) – (89.609)

$\Rightarrow$ 224.97 – 89.609 = 135.361

(c) 52.9 – 30.46 + 83.3 – 30.78

= (52.9 + 83.3) – (30.46 + 30.78)

= (136.2) – (61.24)

= 136.2 – 61.24 = 74.96

5. (a) $0.07 \times 10 = \frac{7}{100} \times 10 = \frac{7}{10} = 0.7$

(b) $0.8 \times 100 = \frac{8}{10} \times 100 = 8 \times 10 = 80$

(c) $8.34 \times 1000 = \frac{834}{100} \times 1000 = 8340$

(d) $6.001 \times 1000 = \frac{6001}{1000} \times 1000 = 6001$

6. (a) $3.81 \times 5 = \frac{381}{100} \times 5 = \frac{381}{20} = 19.05$

(b) $2.4 \times 0.3 = \frac{24}{10} \times \frac{3}{10} = \frac{24 \times 3}{100} = \frac{72}{100} = 0.72$

(c) $0.014 \times 0.046 =$

$\frac{14}{1000} \times \frac{46}{1000} = \frac{14 \times 46}{1000000} = \frac{644}{1000000} = 0.000644$

(d) $15 \times 1.5 \times 0.15 =$

$15 \times \frac{15}{10} \times \frac{15}{100} = \frac{225 \times 15}{1000} = \frac{3375}{1000} = 3.375$

7. (a) $3.15 \div 3 = \frac{315}{100} \times \frac{1}{3} = \frac{315}{300} = 1.05$

(b) $651.2 \div 4 = \frac{6512}{10} \times \frac{1}{4} = \frac{6512}{40} = 162.8$

(c) $0.07869 \div 53 = \frac{7869}{5300000} = 0.00148$

(d) $0.00829 \div 16 = 0.000518$

(e) $3094 \div 0.7 = 3094 \div$

$\frac{7}{10} = 3094 \times \frac{10}{7} = \frac{30940}{7} = 4420$

(f) $288 \div 0.9 = 288 \div$

$\frac{9}{10} = 288 \times \frac{10}{9} = \frac{2880}{9} = 320.$

8. (a) $0.8 \div 10 = \frac{8}{10} \div \frac{10}{1} = \frac{8}{10} \times \frac{1}{10} = 0.08$

(b) $372.35 \div 10 = \frac{37235}{100} \times \frac{1}{10} = \frac{37235}{1000} = 37.235$

(c) $3.008 \div 100 =$

$\frac{3008}{1000} \times \frac{1}{100} = \frac{3008}{100000} = 0.03008$

(d) $0.98 \div 100 = \frac{98}{100} \times \frac{1}{100} = \frac{98}{10000} = 0.0098$

(e) $0.6 \div 1000 = \frac{6}{10} \times \frac{1}{1000} = \frac{6}{10000} = 0.0006$

(f) $0.0028 \div 1000 =$

$\frac{28}{10000} \times \frac{1}{1000} = \frac{6}{10000 \times 1000} = 0.0000028$

9. 63.29 – 37.52
= 25.77

$$\begin{array}{r} 63.29 \\ 37.52 \\ \hline 25.77 \end{array}$$

10. 13.01 – 4.978
= 8.032

$$\begin{array}{r} 13.01 \\ -\ 4.978 \\ \hline 8.032 \end{array}$$

11. 71.23 – 43.68
= 27.55

$$\begin{array}{r} 71.23 \\ 43.68 \\ \hline 27.55 \end{array}$$

12. Price of a wrist watch = ₹ 783.75
Price of 48 watches = ₹ 783.75 × 48
= ₹ 37620.

WORKSHEET (BASED ON COMPLETE CHAPTER)

1. (a) (i) (b) (i) (c) (ii)
(d) (i) (e) (ii) (f) (iii)
(g) (ii)

2. 7.042 – 4.958 – 4.
= 7.042 –(4.958 + 4)
= 7.042 – 8.958 = – 1.916

3. (a) 3.467 × 8 = 27.736
(b) 6.538 × 9 = 58.842
(c) $893.25 \times 1000 = \frac{89325}{100} \times 1000 = 893250$

4. (a) $458.5 \div 50 = \frac{4585}{10} \times \frac{1}{50} = \frac{4585}{500} = 9.17$
(b) $236.6 \div 0.26 =$
$\frac{2366}{10} \div \frac{26}{100} = \frac{2366}{10} \times \frac{100}{26} = \frac{23660}{26} = 910$
(c) $0.8085 \div 0.35 =$
$\frac{8085}{10000} \div \frac{35}{100} = \frac{8085}{10000} \times \frac{100}{35} = \frac{8085}{3500} = 2.31$

5. (a) $1 \times \frac{4}{7} \times 1\frac{13}{22} \times 1\frac{1}{5} = 1 \times \frac{4}{7} \times \frac{35}{22} \times \frac{6}{5}$
$= \frac{4 \times 35 \times 6}{7 \times 22 \times 5} = \frac{4 \times 7 \times 6}{7 \times 22}$
$= \frac{4 \times 6}{1 \times 22} = \frac{2 \times 6}{1 \times 11} = \frac{12}{11} = 1\frac{1}{11}$

(b) $2\frac{2}{17} \times 7\frac{2}{9} \times 2\frac{33}{52} = \frac{36}{17} \times \frac{65}{9} \times \frac{137}{52}$
$= \frac{36 \times 65 \times 137}{17 \times 9 \times 52}$
$= \frac{4 \times 65 \times 137}{17 \times 52} = \frac{35620}{884} = \frac{17810}{442} = \frac{8905}{221}$
$= \frac{685 \times 13}{17 \times 13} = \frac{685}{17} = 40\frac{5}{17}$

6. (a) $\frac{1}{3} \times 36 = \frac{36}{3} = 12$

(b) $\frac{5}{9} \times 45\text{ m} = \frac{5 \times 45}{9}\text{ m} = 5 \times 5\text{ m} = 25\text{ m}$

7. Fruit seller buys fruits = 396
Mangoes = $\frac{3}{4}$
$\therefore \quad \frac{3}{4}$ of $396 = \frac{3}{4} \times 396 = 297$
$\frac{5}{11}$ of 297 area rotten mangoes = $\frac{5}{11} \times 297$
$= 5 \times 27$
$= 135$
$\therefore$ Remaining good mangoes = 297 – 135 = 162
$\therefore$ He sold good mangoes at the rate
$= ₹ 7\frac{1}{5} \times 162$
$= = ₹ 1215.$

8. Height of a Yacht on water $= 3\frac{4}{5}\text{ m} = \frac{19}{5}\text{ m}$
Yacht's Height which is underwater = $\frac{1}{7^{th}}$
Height of the Yacht visible above the water
$= \frac{19}{5} - \frac{1}{7}\text{m}$
$= \frac{19 \times 7 - 5}{35} = \frac{133 - 5}{35} = \frac{128}{35}\text{m} = 3\frac{23}{35}\text{m}$

9. Lalit earns per month= ₹ 21000
Income spent by Lalit = $\frac{6}{7}$ of ₹ 21000
$= ₹ 21000 \times \frac{6}{7}$

= ₹ 3000 × 6

= ₹ 18000

Amount of money deposited by Lalit in bank

= ₹ 21000 – ₹ 18000 = ₹ 3000 per month.

10. Total amount collected in a circus = ₹ 7776

Total tickets sold = ₹ 7776 ÷ ₹ 48 $\frac{3}{5}$

$= 7776 \div \frac{243}{5}$

$= 7776 \times \frac{5}{243} = 5 \times 32 = ₹160$

11. Taxi driver charges per km = ₹ 8.25

Total charge for a Journey of 18.5 km

= ₹ 8.25 × ₹ 18.5 = ₹ 152.625

12. (a) 4.17 × 15 = 62.55

(b) 41.7 × 15 = 625.5

(c) 0.417 × 15 = 6.255

(d) 0.00417 × 15 = 0.06255

13. Weight of 34 bags = 3483.3 kg

Weight of one bag = 3483.3 ÷ 34 kg

$= \frac{34833}{340} = 102.45$ kg.

Chapter
03 Data Handling

WORKSHEET 1: ARITHMETIC MEAN OF DATA

1. (a) First ten natural numbers are 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Arithmetic Mean

$$= \frac{1+2+3+4+5+6+7+8+9+10}{10}$$

$$= \frac{55}{10} = 5.5$$

(b) First eight odd numbers are = 1, 3, 5, 7, 9, 11, 13, 15

Arithmetic Mean

$$= \frac{1+3+5+7+9+11+13+15}{8}$$

$$= \frac{64}{8} = 8$$

(c) First six prime numbers are 2, 3, 5, 7, 11, 13

$$\text{Arithmetic Mean} = \frac{2+3+5+7+11+13}{6}$$

$$= \frac{41}{6} = 6.83$$

2. Runs scored by cricketer in 9 innings are

57, 75, 40, 36, 47, 46, 0, 100, 102

Mean score

$$= \frac{57+75+40+36+47+46+0+100+102}{9}$$

$$= \frac{503}{9} = 55.88$$

3. Enrollment in a school during six consecutive years are:

1450, 1675, 1850, 2113, 2440, 2820

Mean

$$= \frac{1450+1675+1850+2113+2440+2820}{6}$$

$$= \frac{12348}{6} = 2058$$

4. Mean

$$= \frac{6+1+2+3+4+5+3+6+5+6+5+8+6+8+5+5+7+6+4+4}{20}$$

$$= \frac{99}{20} = 4.95$$

5. (a) Height of the tallest boy = 152 cm

(b) Height of the shortest boy = 129 cm

(c) Mean

$$= \frac{149+152+140+135+151+141+150+136+138+129}{10}$$

$$= \frac{1421}{10} = 142.1$$

(d) 4 boys have height more than the mean.

6. Let the number = x

Given, $72 = x/8$

$x = 72 \times 8$

$x = 576.$

7. $$\text{Mean} = \frac{36+38+35+x+34}{5}$$

$$37 = \frac{36+38+35+x+34}{5}$$

[$\because$ Mean = 37 given]

$37 \times 5 = 143 + x$

$185 - 143 = x$

$x = 42$

8. Factors of 15 = 1, 3, 5, 15

$$\text{Mean} = \frac{1+3+5+15}{4} = \frac{24}{4} = 6$$

WORKSHEET 2: RANGE OF DATA

1.

Members in a family	Tally Marks	Frequency
3	II	2
4	I	1
5	IIII	4
6	$\cancel{\text{IIII}}$ II	7
7	$\cancel{\text{IIII}}$ I	6
8	II	2
9	II	2
Total		24

2. (a) Maximum Weight in the school = 62 kg

(b) Weight of thinnest girl = 36 kg

(c) Range of the Data = H – L

= 62 – 36 = 26

(d) Arithmetic Mean $= \frac{\text{Sum of weights}}{\text{Total weight}}$

$$= \frac{55+45+48+36+39+40+42+53+60+62}{10}$$

$$= \frac{480}{10} = 48$$

3. Mean weight $= \frac{\text{Sum of weights}}{\text{Total no. of students}}$

$$= \frac{(67\times 4)+(70\times 3)+(72\times 2)+(73\times 2)+(75\times 1)}{12}$$

$$= \frac{268+210+144+146+75}{12} = 70.25$$

4. (a) Range = Highest rainfall – Lowest rainfall

= 20.5 – 0.0 = 20.5 mm

(b) Mean $= \frac{\text{Sum of all observations}}{\text{Number of observations}}$

$$= \frac{0.0+12.2+2.1+0.0+20.5+5.5+1.0}{7}$$

$$= \frac{41.3}{7} = 5.9\,\text{mm}$$

$\therefore$ Mean rainfall = 5.9 m

(c) From the table, we can infer that 5 days received less rainfall than the mean rainfall.

5. In Tabular form

Class grades in a class amount	Tally Marks	Number of marks
0	I	1
1	I	2
2	II	1
3	III	3
4	$\cancel{\text{IIII}}$	5
5	IIII	4
6	I	1
7	I	1
8	II	2
9	II	2
Total		22

(a) Highest number is = 9

(b) Lowest number is = 0

(c) Range of the data = H – L

= 9 – 0 = 9

6. $\text{Mean}(\bar{x}) = \frac{\text{Sum of all the observations}}{\text{Total no. of observations}}$

$\Rightarrow$ $98 = \frac{\text{Sum of all observations}}{15}$

$\Rightarrow$ Sum of all observations = 98 × 15

= 1470

WORKSHEET 3: MODE AND MEDIAN OF DATA

1. We arrange the data in ascending order.

We get:

31, 34, 40, 41, 42, 50, 55, 56, 66, 68, 71, 80, 84, 91, 93

Here, n = 15 is odd

$\therefore$ Median $= \frac{n+1}{2}$ th observation

$= \frac{15+1}{2} = 8$ th observation

Hence, median = 56

2. For median, we arrange the data in ascending order.

We get:

5, 9, 10, 12, 15, 16, 19, 20, 20, 20, 20, 23, 24, 25, 25

Here n = 15

$\therefore$ Median $= \frac{n+1}{2}$th observation

$\Rightarrow$ Median = 8th observation = 20

For mode,

Mode = observation with highest frequency mode = 20

Yes, they are same.

3. (a) We arrange the data in ascending order, we get

34, 37, 38, 39, 40, 40, 40, 42, 44, 45, 45, 45, 47, 49, 52

Mode of this data is 40 and 45 because both occurs three times more than the other observations.

Median = $\frac{n+1}{2}$th obsrevation = $\left(\frac{15+1}{2}\right)$th

observation = 8th observation = 42

$\therefore$ 42 is the median

(b) Yes, there are two modes 40 and 45.

4. We arrange the data in ascending order we get

22, 28, 33, 34, 35, 38, 51, 54, 62

Median $= \frac{9+1}{2}$th observation = 5th observation

$\therefore$ Median = 35

If 28 is replaced by 82, then

22, 33, 34, 35, 38, 51, 54, 62, 82

New Median = 38

5. Mode = 15 (given)

$\Rightarrow$ x – 1 = 15 $\Rightarrow$ x = 15 + 1 = 16

6.

Number (m)	Frequency
20	7
21	8
22	9
23	17
24	18
25	14
26	13
27	20
28	11

Highest frequency is 20 so, mode is 27.

7. Highest weight is 45 hence mode is 5.

8. x, 35, 45, (x – 1), 65, 75

N is sum = 6

Median $= \frac{1}{2}\left[\frac{N}{2}\text{th} + \left(\frac{N}{2}+1\right)\text{th}\right]$

$= \frac{1}{2}\left[\frac{6}{2}\text{th} + \left(\frac{6}{2}+1\right)\text{th}\right]$

$= \frac{1}{2}(3\text{th} + 4\text{th}) = \frac{(45 + x - 1)}{2}$

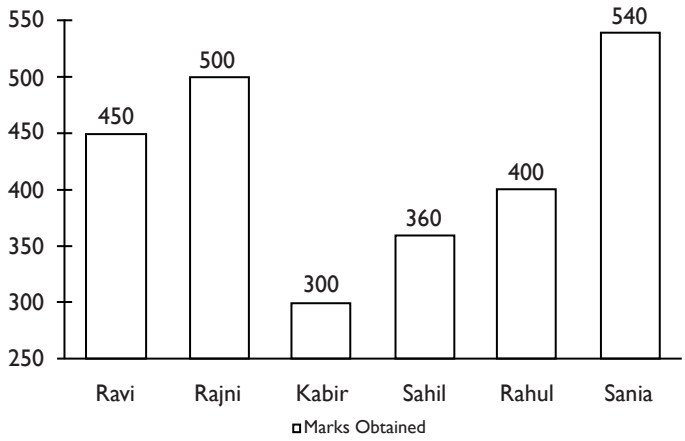
$\Rightarrow$ 50 $= \frac{44+x}{2}$ [$\because$ Median = 50 given]

$\Rightarrow$ 100 – 44 = x

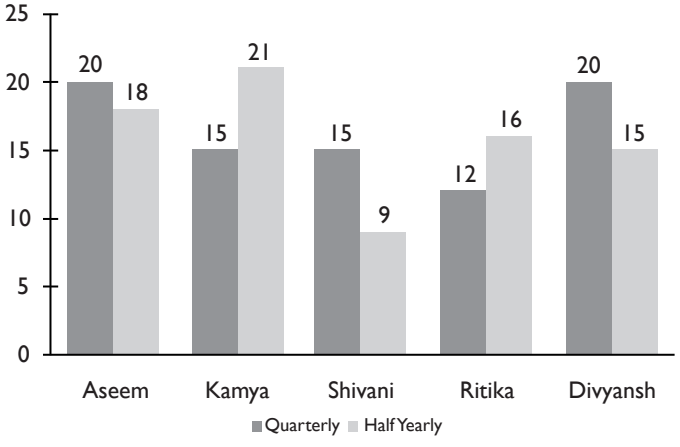
$\therefore$ x = 56

WORKSHEET 4: BAR GRAPH

1.



2.



3. (a) Highest Peak = 8800 m

(b) Difference = Highest Peak – Smallest Peak
= 8800 – 6000 = 2800 m

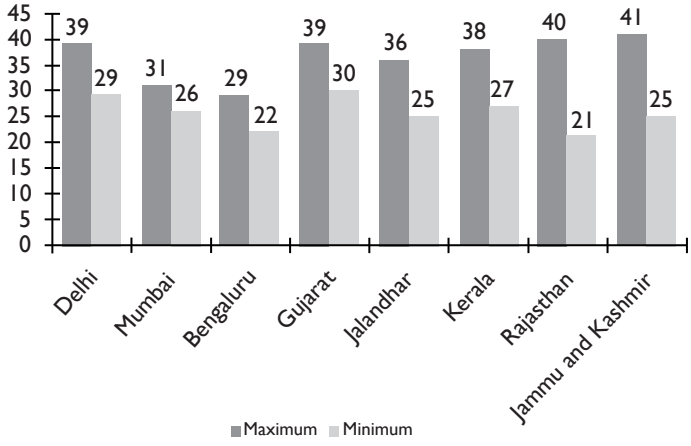
(c) Second highest peak = 8600 m

(d) In ascending order
6000, 65000, 7500, 8002, 8600, 8800
Average of the middle two peaks
$= \frac{7500 + 8002}{2}$
= 7751 m

4. (a) Dog

(b) 11 students have dog as a pot.

5. Double bar graph



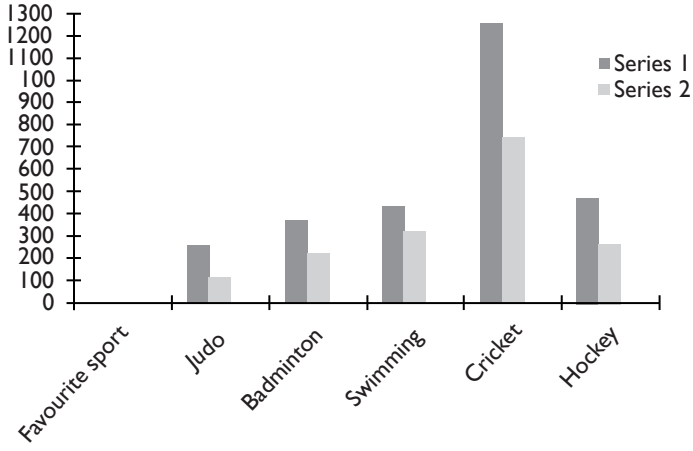
(a) Rajasthan

(b) Jammu and Kashmir is the coldest city and Rajasthan is the hottest city.

(c) Rajasthan and Jammu & Kashmir

(d) Mumbai

6. (a)



(b) Cricket

(c) Watching sports of cricket

7. (a) Number of newspapers published in 8 languages.

(b) Total number = 4500 + 4000 + 3000 + 1500
= 13000

(c) Excess number of newspaper
= 4500 – 3000
= 1500

(d) Percentage =
$$\frac{2500 + 1500 + 3500 + 2000 + 4500 + 2000 + 4000 + 3500}{4500} \times 100$$
$$= \frac{4,50,000}{23100} = 19.48\%$$

WORKSHEET 5: CHANCE AND PROBABILITY

1. (a) (i)

(b) (i)

(c) (ii)

(d) (iii)

2. (a) event

(b) random experiment

(c) $\frac{1}{2}$

3. (a) T (b) F (c) T

(d) F (e) F

4. (a) Total outcomes = 6

(Probability of getting 4) = $\frac{1}{6}$

(b) Even numbers = 2, 4, 6

P (an even number) = $\frac{3}{6} = \frac{1}{2}$

5. (a) P (a tail) = $\frac{54}{100}$ = 0.54

(b) Outcomes for heads = 100 – 54 = 46

P (a head) = $\frac{46}{100}$ = 0.46

6. Total socks = 14 + 6 + 8 = 28

(a) P (black socks) = $\frac{6}{28} = \frac{3}{14}$

(b) P (red socks) $= \frac{8}{28} = \frac{2}{7}$

(c) P (white socks) $= \frac{14}{28} = \frac{2}{4} = \frac{1}{2}$

7. (a) P (born on Wednesday) $= \frac{1}{7}$

(b) P (not born on Wednesday) $= \frac{6}{7}$

8. When we flipp a coin then possibilities are, H and T.

$\therefore$ P (team will start) $= \frac{1}{2}$

9. (a) It can happen but not certain

(b) It can happen but not certain

(c) Impossible

(d) It can happen but not certain

WORKSHEET (BASED ON COMPLETE CHAPTER)

1. (a) (iii)

(b) (iii)

(c) (i)

(d) (iii)

(e) (ii)

(f) (iii)

(g) (ii)

2.

Number of children	Tally Marks	Frequency
0	𝍸	5
1	𝍸 II	7
2	𝍸 𝍸 I	11
3	𝍸	5
4	𝍸 I	6
5	III	3
6	III	3
Total		40

3.

4. (a) P (Rajiv hits a boundary) $= \frac{15}{90} = \frac{1}{6}$

(b) Outcomes for Rajiv not hitting a boundary
= 90 – 15 = 75
P (Rajiv did not hit a boundary)

$= \frac{75}{90} = \frac{15 \times 5}{15 \times 6} = \frac{5}{6}$

5. Mean $= \frac{145+155+150+159+156}{5}$

$= \frac{765}{5}$

= 153

6. Mean of 8 numbers = 35

Sum of 8 numbers = 35 × 8

= 280.

Sum of 7 numbers = (35 – 3) × 7 = 32 × 7

= 224

$\therefore$ enclosed number = 280 – 224

= 56.

7. Sanjana scored in English = 42 Marks

Sanjana scored in Hindi = 35 Marks

Sanjana scored in SST = 48 Marks

Sanjana scored in Maths = 50 Marks

Sanjana scored in Science = x Marks

Mean = 44

Mean $= \frac{42+35+48+50+x}{5}$

$\Rightarrow \quad 44 = \frac{175+x}{5}$

$\Rightarrow \quad 44 \times 5 - 175 = x$

$\Rightarrow$ $220 - 175 = x$

$x = 45$

$\therefore$ Sanjana scored 45 marks in Science.

8. Runs scored by Sachin Tendulkar = 320 x 45
= 14400 runs
Runs scored by Brian Lara = 280 x 48
= 13440 runs
Sachin tendulkar scored more runs.

9. Mode = 23

10. Mean = $\frac{\text{Sum of the observations}}{\text{Number of observations}}$

$\Rightarrow$ $45 = \frac{\text{Sum of the observations}}{\text{Number of observations}}$

$\therefore$ Sum of observations = $45 \times 20 = 900$

11. Mean = $\frac{45+21+57+41+36}{5}$

$= \frac{200}{5} = 40$

12. Newly born babies = 200
Girls = 115

Probability (newly born baby girl) = $\frac{115}{200} = \frac{23}{40}$

13. Mean of 15 numbers is 18
Remaining numbers = 25 – 10 = 15 numbers
$\therefore$ Mean of 10 numbers is 13.

Mean (x) = $\frac{n_1x_1 + n_2x_2}{n_1n_2}$

$= \frac{15\times18+10\times13}{25} = \frac{270+130}{25} = \frac{400}{25} = 16$

= 12.4

14. Mean of 16 items is 30

$\therefore$ Correct mean = $\frac{16 \times 30 - 20 + 16}{16}$

$= \frac{480-4}{16} = \frac{476}{16} = 29.75$

15. (a) Production of cloth over the years.
(b) 6 years
(c) In 2005
(d) In 2002
(e) 55 : 25 = 11 : 5

Chapter 04

Simple Equations

WORKSHEET 1: INTRODUCTION TO SIMPLE EQUATIONS

1. (a) $5n = 65$ (b) $6 + y = 12$

(c) $x - 7 = 15$ (d) $x + 3y = 21$

(e) $a - 9 = 5$ (f) $\frac{x}{8} = 9$

(g) $9x - 5 = 8$ (h) $\frac{x}{3} + x = 12$

(i) $4(8 - x) + 3 = 0$

2. (a) (i) 5 subtracted from a number x is 9.
(ii) Difference between x and 5 is 9.

(b) (i) Four times x is 28.
(ii) If we multiply x by 4 it gives 28.

(c) (i) 8 subtracted from one fourth of x gives 0.
(ii) Difference between one fourth of x and 8 is 0.

(d) (i) One-ninth of x is 72.
(ii) Nine divided by x gives 72.

(e) (i) One sixth of x is 3.
(ii) If we divide x by 6 it gives 3.

(f) (i) When 6 is subtracted from 4 times a number x the result is 20.
(ii) Difference between four times x and 6 is 20.

(g) (i) When 4 is added to one-fourth of a number x gives 10.
(ii) One-fourth of a number x is added to 4 it gives 10.

(h) (i) One ninth of x gives 25.
(ii) When x is divided by 9, the result is 25.

3. (a) $x + 10 = 18 \Rightarrow x = 18 - 10 = 8$

(b) $x - 9 = 6 \Rightarrow x = 6 + 9 = 15$

(c) $5x = 35 \Rightarrow x = \frac{35}{5} = 7$

(d) $\frac{x}{9} = 25 \Rightarrow x = 25 \times 9 = 225$

(e) $2x + 10 = 4x \Rightarrow 2x - 4x = -10$

$\Rightarrow -2x = -10$

$\therefore x = \frac{-10}{-2} = 5$

(f) $\frac{42}{x} = 6 \Rightarrow 42 = 6x$

$\therefore x = \frac{42}{6} = 7$

4. (a) $2x - 4 = 6$ when $x = 5$

$LHS = 2x - 4$

$= 2(5) - 4$

$= 10 - 4 = 6 = RHS$

True; $LHS = RHS$

(b) $5x - 6 = 8$, when $x = 3$

$LHS = 5x - 6$

$= 5(3) - 6$

$= 15 - 6 = 9 \neq 8$

$\therefore$ $LHS \neq RHS$, False

(c) $\frac{5x}{3} = 8$, when $x = 8$

$LHS = \frac{5x}{3} = \frac{5 \times 8}{3} = \frac{40}{3} \neq 8 = RHS$

$\therefore$ $LHS \neq RHS$; False

(d) $\frac{1}{9}x + 4 = 5$, when $x = 9$

$LHS = \frac{1}{9} \times 9 + 4$

$1 + 4 = 5 = RHS$

$\therefore$ $LHS = RHS$, True

WORKSHEET 2: SOLUTION OF SIMPLE EQUATIONS

1. (a) LHS = x + 5

When x = 1,

x + 5 = 1 + 5 = 6

but RHS = 19

∴ LHS ≠ RHS.

(b) LHS =6x + 5, when x = 3

6x + 5 = 6 (3) + 5 = 18 + 5

= 23 = RHS

LHS = RHS. Yes, it is a solution of the given equation.

(c) LHS = 7x + 5, when x = 2

7x + 5 = 7(2) + 5 = 14 + 5

= 19 = RHS.

∴ LHS = RHS. Yes, it is a solution of the given equation.

(d) LHS =4x – 3, when x = 4

4x – 3 = 4(4) – 3 = 16 – 3

= 13 = R.H.S

Yes, it is a solution of the given equation.

(e) LHS =4x – 3, when x = – 4

4x – 3 = 4(– 4) – 3

= –16 – 3 = –19

∴ LHS ≠ RHS So, it is not a solution.

(f) LHS = 5x – 8, when x = –5

= 5(–5) – 8

= –25 – 8 = – 33 ≠ 17 = RHS.

∴ LHS ≠ RHS; So, it is not a solution.

2. (a) x = –3; x – 5 = –8; 2x – 2 = –8

(b) x = 4; x + 6 = 10; x – 6 = –2

(c) x = –1; 2x + 4 = 2; 4x + 3 = 0

(d) $x = \frac{3}{2}$; 2x – 4 = –1; 4x + 3 = 9

(e) $x = \frac{-5}{9}$; 18x + 3 = –7; 9x + 9 = 4

3. (a) x – 5 = 8

x = 8 + 5 = 13

Check, LHS= x – 5 = 13 – 5 = 8

∴ LHS = RHS

(b) x + 10=19

⇒ x = 19 – 10 = 9

Check, LHS= x + 10

= 9 + 10 = 19 = LHS

∴ LHS = RHS

(c) $x - \frac{4}{7} = \frac{6}{7}$

$\Rightarrow x = \frac{6}{7} + \frac{4}{7}$

$= \frac{6+4}{7} = \frac{10}{7}$

Check, LHS $= x - \frac{4}{7} = \frac{10}{7} - \frac{4}{7} = \frac{10-4}{7} = \frac{6}{7}$ = RHS

(d) $x + \frac{3}{11} = \frac{5}{22}$

$\Rightarrow x = \frac{5}{22} - \frac{3}{11}$

$\Rightarrow x = \frac{5-6}{22} = \frac{-1}{22}$

Check, LHS $= x + \frac{3}{11}$

$= \frac{-1}{22} + \frac{3}{11} = \frac{-1+6}{22}$

$= \frac{5}{22}$ = RHS

∴ LHS = RHS

(e) $\frac{x}{40} = 35$

⇒ x = 35 × 40 = 1400

Check, LHS $= \frac{x}{40} = \frac{1400}{40}$ = 35 = RHS

(f) 2 + 11x=–20

⇒ 11x = –20 – 2 = –22

∴ $x = \frac{-22}{11}$ = –2

LHS = 2 + 11x

$= 2 + 11\ (-2)$

$= 2 - 22 = -20 = RHS$

(g) $\frac{x}{7} - 4 = 5$

$\therefore$ LHS = RHS

$\Rightarrow \frac{x}{7} = 5 + 4 = 9$

$\Rightarrow x = 9 \times 7 = 63$

Check, LHS $= \frac{x}{7} - 4 = \frac{63}{7} - 4$

$= 9 - 4 = 5 = RHS$

$\therefore$ LHS = RHS

(h) $\frac{5x+4}{2} = 27$

$\Rightarrow 5x + 4 = 27 \times 2 = 54$

$\Rightarrow 5x = 54 - 4 = 50$

$\Rightarrow x = \frac{50}{5} = 10$

Check, LHS $= \frac{5x+4}{2} = \frac{5(10)+4}{2} = \frac{54}{2}$

$= 27 = RHS$

$\therefore$ LHS = RHS

(i) $3x + \frac{x-5}{4} = 7$

$\frac{12x + x - 5}{4} = 7$

$\Rightarrow 13x - 5 = 4 \times 7$

$\Rightarrow 13x = 28 + 5 = 33$

$\therefore x = \frac{33}{13}$

Check LHS $= 3x + \frac{x-5}{4} = 3\left(\frac{33}{13}\right) + \frac{\frac{33}{13} - 5}{4}$

$= \frac{99}{13} + \frac{33 - 65}{52}$

$= \frac{99}{13} - \frac{32}{52} = \frac{396 - 32}{52}$

$= \frac{364}{52} = 7 = RHS$

$\therefore$ LHS = RHS

(j) $3 + 5\ (4m - 6) = 24$

$\Rightarrow 3 + 20m - 30 = 24$

$\Rightarrow 20m - 27 = 24$

$\Rightarrow 20m = 24 + 27 = 51$

$\therefore x = \frac{51}{20}$

Check, LHS $= 3 + 5\ (4m - 6)$

$= 3 + 5\ (4 \times \frac{51}{20} - 6)$

$= 3 + 5\ (\frac{51}{5} - 6)$

$= 3 + 51 - 30$

$= 54 - 30 = 24 = RHS$

(k) $5\ (3 - 8x) - 20\ (2x - 9) = 45$

$\Rightarrow 15 - 40x - 40x + 180 = 45$

$\Rightarrow -80x + 195 = 45$

$\Rightarrow -80x = 45 - 195 = -150$

$\Rightarrow x = \frac{150}{80} = \frac{15}{8}$

Check, LHS $= 5(3 - 8x) - 20\ (2x - 9)$

$= 5\left[3 - 8 \times \frac{15}{8}\right] - 20\left[2 \times \frac{15}{8} - 9\right]$

$= 5\left[3 - 15\right] - 20\left[\frac{15 - 36}{4}\right]$

$= 5\ (-12) - 5(-21)$

$= -60 + 105 = 45 = RHS$

(l) $15(x - 3) - 3(x - 5) + 5(x + 6) = 0$

$\Rightarrow 15x - 45 - 3x + 15 + 5x + 30 = 0$

$\Rightarrow 20x - 3x - 45 + 45 = 0$

$\Rightarrow 17x = 0, x = 0$

Check, LHS $= 15(x - 3) - 3(x - 5) + 5(x + 6)$

$= 15(0 - 3) - 3(0 - 5) + 5(0 + 6)$

$= -45 + 15 + 30$

$= -45 + 45 = 0 = RHS$

$\therefore$ LHS = RHS

WORKSHEET 3: APPLICATIONS OF SIMPLE EQUATIONS

1. (a) $x - 3 = 15$

$\Rightarrow x = 15 + 3 = 18$

(b) $\frac{y}{5} = 6$

$\Rightarrow$ $y = 6 \times 5 = 30$

(c) Let the number = x

Five times number = 5x

A.T.Q.

$5x - 9 = 65$ (Transposing 9 to RHS)

$\Rightarrow 5x = 65 + 9 = 74$ (Divide by 5 both sides)

$\Rightarrow$ $x = \frac{74}{5}$

(d) Let the number = x

A.T.Q.

$x + x^2 = 30$

$\Rightarrow$ $x^2 + x = 30$

$\therefore$ $x(x + 1) = 5(6) = 5(5 + 1)$

$\therefore$ $x = 5$

(e) Let the number = x

Four times a number = 4x

A.T.Q.

$4x + 12 = 34$ (Transposing 12 to RHS)

$\Rightarrow$ $4x = 34 - 12 = 22$

Dividing by 4 both sides

$\frac{4x}{4} = \frac{22}{4}$

$\Rightarrow$ $x = \frac{11}{2}$

(f) Let the number = x

One fourth of the number = $\frac{1}{4}x$

A.T.Q.

$\frac{1}{4}x - 3 = 7$ (Transposing 3 to RHS)

$\Rightarrow$ $\frac{1}{4}x = 7 + 3 = 10$ (Cross multiply)

$\Rightarrow$ $x = 10 \times 4$

$\Rightarrow$ $x = 40$

(g) Let the number = x

When multiplied by 7, then = 7x

A.T.Q.

$7x - 3 = 53$ (Transposing 3 to RHS)

$\Rightarrow$ $7x = 53 + 3 = 56$ (Divide 7 both sides)

$\Rightarrow$ $\frac{7x}{7} = \frac{56}{7} \Rightarrow x = 8.$

Hence, $x = 8$

2. Let the number = x

Second number = x + 3

Sum of two numbers = 95 (given)

A.T.Q.

$x + x + 3 = 95$

$\Rightarrow$ $2x + 3 = 95$ (Transposing 3 to RHS)

$\Rightarrow$ $2x = 95 - 3 = 92$

$\Rightarrow$ $\frac{2x}{2} = \frac{92}{2}$ (Divide 2 both sides)

$\Rightarrow$ $x = 46$

$\therefore$ Numbers $= x, x + 3$

$= 46, 46 + 3 = 49.$

3. Let Sania's age = x

Sania's father age = 3x

After five years, Sania's age $= x + 5$

Sania's father age $= 3x + 5$

A.T.Q.

$\Rightarrow$ $(x + 5) + (3x + 5) = 70$

$\Rightarrow$ $4x + 10 = 70$ (Transposing 10 to RHS)

$\Rightarrow$ $4x = 70 - 10 = 60$

Divide 4 both sides

$\Rightarrow$ $\frac{4x}{4} = \frac{60}{4} \Rightarrow x = 15$

Hence, Sania present age = 15 years

Sania's father present age = $3x = 3 \times 15 = 45$ years

4. Let the breadth of plot = x m

Length = x + 8 m

Perimeter = 716 m (given)

A.T.Q.

Perimeter of rectangular plot = 2 (l + b)

$\Rightarrow$ $716 = 2(x + x + 8)$

$\Rightarrow$ $\frac{716}{2} = 2x + 8$

$\Rightarrow$ $2x + 8 = 358$ (Transposing 8 to RHS)

$\Rightarrow$ $2x = 358 - 8 = 350$

(Divide 2 both sides)

$\Rightarrow$ $\frac{2x}{2} = \frac{350}{2} \Rightarrow x = 175$ m

$\therefore$ Breadth = 175 m

Length = (175 + 8) m = 183 m.

5. Let Numerator = x

Let Denominator = x + 8

Fraction = $\frac{N}{D} = \frac{x}{x+8}$

A.T.Q.

$$\frac{x+1}{x+8-4} = \frac{4}{7}$$

$\Rightarrow \quad \frac{x+1}{x+4} = \frac{4}{7}$ (Cross multiply)

$\Rightarrow \quad 7(x + 1) = 4(x + 4)$

$\Rightarrow \quad 7x + 7 = 4x + 16$

$\Rightarrow \quad 7x - 4x = 16 - 7$

$\Rightarrow \quad 3x = 9$

$\therefore \quad x = \frac{9}{3} = 3$

$\therefore$ Numerator = 3

Denominator = 3 + 8 = 11

Fraction = $\frac{N}{D} = \frac{3}{11}$

6. Let the number of 50 rupee notes = x

Let the number of 10 rupee notes = x + 1

A.T. Q.

$50x + 10(x + 1) = 250$

$\Rightarrow \quad 50x + 10x + 10 = 250$

$\Rightarrow \quad 60x = 250 - 10 = 240$

$\Rightarrow \quad x = \frac{240}{60} = 4$

$\therefore$ 50 rupees notes = 4

10 rupees notes = 4 + 1 = 5

7. Let the number of girls = x

Boys = $\frac{7}{9}x$

Total number of student in class = 48

$\therefore \quad x + \frac{7}{9}x = 48$

$\therefore \quad 9x + 7x = 48 \times 9$

$\therefore \quad 16x = 432$

$\therefore \quad x = \frac{432}{16} = 27$

$\therefore$ Number of girls in class is 27.

8. Let Reema has travel = x km,

She has travel by train = $\frac{3}{4}x$ km

She has travel by car = $\frac{x}{8}$ km

She has travel by cart = $\frac{x}{12}$ km

and she has travel on foot, 4 km

A.T.O.

$$x = \left(\frac{3x}{4}\right) + \left(\frac{x}{8}\right) + \left(\frac{x}{12}\right) + 4$$

L.C.M of 4, 8, 12 = 24

$$x = \frac{6(3x) + 3(x) + 2(x) + 96}{24}$$

$= 24x = 18x + 3x + 2x + 96$

$= 24x = 23x + 96$

$= 24x - 23x = 96 = x$

Reema has travel the village from the town = 96 km.

9. Let the breadth of rectangle = x

Length of a rectangle = 2x + 2

Perimeter = 28 cm (given)

$\Rightarrow \quad 2(l + b) = 28$

$\Rightarrow \quad 2(2x + 2 + x) = 28$

$\Rightarrow \quad 3x + 2 = \frac{28}{2} = 14$

$\Rightarrow \quad 3x = 14 - 2 = 12$

$\therefore \quad x = \frac{12}{3} = 4$

Breadth = 4 cm

Length = 2(4) + 2 cm = 10 cm

10. Let the number of 50 paise coins = x

Let the number of 25 paise coins = 3x

A.T.Q.

$\Rightarrow (0.50)x + (0.25)\,3x = 80$

$\Rightarrow \quad \frac{50x}{100} + \frac{75x}{100} = 80$

$\Rightarrow \quad (50x + 75x) = 80 \times 100$

$\Rightarrow \quad 125x = 8000$

$\Rightarrow \quad x = \frac{8000}{125} = 64$

$\therefore$ 50 paise coins = 64

25 paise coins = 3 × 64 = 192.

11. Let the property be = x

Wife's property = $\frac{1}{2}x$

One son's property = $\frac{1}{2}\times\frac{1}{2}x=\frac{1}{4}x$

Another son's property = $\frac{1}{4}x$

Son's gets = ₹50,000

$\Rightarrow \left(\frac{1}{4}x\right) = 50{,}000$

$\Rightarrow \frac{x}{4} = 50{,}000$

$\therefore$ x = 50,000 × 4 = 2,00,000

Wife's property= $\frac{1}{2}\times 2{,}00{,}000$

= 1,00,000

WORKSHEET (BASED ON COMPLETE CHAPTER)

1. (a) (iii)

(b) (iii) $35 = 8x - x \Rightarrow 35 = x$

$\therefore \quad x = \frac{35}{7} = 5$

(c) (ii) 3x + 5 = 3(3) + 5 = 9 + 5 = 14

(d) (i)

(e) (ii) $\frac{x}{6} = 12$

$\therefore$ x = 6 × 12 = 72

2. (a) When 8 is added to x, it gives 12.

(b) When 4 is subtracted from 2 times a number x, it gives 16.

(c) When 3 is subtracted from 4 times a number p, it gives 17.

3. (a) 4x + 3 = 19

Putting x = 1 in LHS $\Rightarrow$ 4(1) + 3 = 4 + 3 = 7 $\neq$ RHS.

x = 2 in LHS $\Rightarrow$ 4(2) + 3 = 8 + 3 = 11 $\neq$ RHS.

x = 3 in LHS $\Rightarrow$ 4(3) + 3 = 12 + 3 = 15 $\neq$ RHS.

x = 4 in LHS $\Rightarrow$ 4(4) + 3 = 16 + 3 = 19 = RHS.

Hence, x = 4 is a solution of the given equation.

(b) 3x – 12 = 3

Putting x = 1 in LHS $\Rightarrow$ 3(1) – 12 = 3 – 12 = –9 $\neq$ RHS.

x = 2 in LHS $\Rightarrow$ 3(2) – 12 = 6 – 12 = –6 $\neq$ RHS.

x = 3 in LHS $\Rightarrow$ 3(3) – 12 = 9 – 12 = –3 $\neq$ RHS.

x = 4 in LHS $\Rightarrow$ 3(4) – 12 = 12 – 12 = 0 $\neq$ RHS.

x = 5 in LHS $\Rightarrow$ 3(5) – 12 = 15 – 12 = 3 = RHS.

Hence, x = 5 is a solution of the given equation.

4. (a) 8(3x – 5) – 7 (2x – 8) = 36

$\Rightarrow$ 24x – 40 – 14x + 56 = 36

$\Rightarrow$ 24x – 14x + 16 = 36

$\Rightarrow$ 10x = 36 – 16 = 20

$\therefore \quad x = \frac{20}{10} = 2$

Hence, x = 2.

(b) 5(1 – 3x) + 8(3 + 4x) = 63

$\Rightarrow$ 5 – 15x + 24 + 32x = 63

$\Rightarrow$ –15x + 32x + 5 + 24 = 63

$\Rightarrow$ 17x + 29 = 63

$\Rightarrow$ 17x = 63 – 29 = 34

$\Rightarrow x = \frac{34}{17} = 2$

$\therefore$ x = 2.

(c) $\frac{8y-5}{4}-\frac{5}{8}\left(9y-\frac{2-y}{2}\right)=\frac{21}{4}$

$\Rightarrow \frac{8y-5}{4}-\frac{5}{8}\left(\frac{18y-(2-y)}{2}\right)=\frac{21}{4}$

$\Rightarrow \frac{8y-5}{4}-\frac{5}{8}\left(\frac{18y-2+y}{2}\right)=\frac{21}{4}$

$\Rightarrow \frac{8y-5}{4}-\frac{5}{8}\left(\frac{19y-2}{2}\right)=\frac{21}{4}$

$\Rightarrow \frac{8y-5}{4}-\frac{5(19y-2)}{16}=\frac{21}{4}$

$\Rightarrow \frac{4(8y-5)-5(19y-2)}{16}=\frac{21}{4}$

$\Rightarrow \frac{32y-20-95y+10}{16}=\frac{21}{4}$

$\Rightarrow \frac{32y-95y-20+10}{16}=\frac{21}{4}$

$\Rightarrow \frac{-63y-10}{16}=\frac{21}{4}$

$\Rightarrow$ 4 (–63y – 10) = 21 × 16

$\Rightarrow$ $-252y - 40 = 336$

$\Rightarrow$ $-252y = 336 + 40 = 376$

$\Rightarrow$ $y = \frac{-376}{252} = -\frac{94}{63}$

(d) $0.5(x - 5) - 0.2(9x - 4) = 0.8$

$\Rightarrow$ $0.5x - 2.5 - 1.8x + 0.8 = 0.8$

$\Rightarrow$ $0.5x - 1.8x - 2.5 + 0.8 = 0.8$

$\Rightarrow$ $-1.3x = 0.8 + 2.5 - 0.8$

$\Rightarrow$ $-1.3x = 2.5$

$\Rightarrow$ $x = -\frac{2.5}{1.3} = -\frac{25}{13}$

5. Let the number be x.

Number Multiplied by 6 = 6x

A.T.Q.

$\Rightarrow$ $6x = x + 95$

$6x - x = 95$

$5x = 95$

$x = 19$

6. Let Mahima's age be x.

Mahima's father age = 3x

After 12 years, Mahima's age = x + 12

After 12 years, father's age = 3x + 12

A.T.Q.

$\Rightarrow$ $3x + 12 = 2(x + 12)$

$\Rightarrow$ $3x + 12 = 2x + 24$

$\Rightarrow$ $3x - 2x = 24 - 12$

$\Rightarrow$ $x = 12$

Mahima's present age = x = 12 years

Father's present age = 3x = 3 × 12 years

= 36 years

7. Let breadth of rectangular field = x

Length = 2x

Perimeter = 228 m

$2(l + b) = 228$ m

$\Rightarrow$ $2(2x + x) = 228$

$\Rightarrow$ $3x = \frac{228}{2} = 114$

$\Rightarrow$ $x = \frac{114}{3} = 38$

Hence, Breadth = 38 m

Length = 2 × 38 m = 76 m

8. Let the number of students be x

Then, given that hostal mess consumption of rice everyday = 80 kg

We know that, 1 kg = 1000 gms

78 kg = 78,000 gms

Then, according to question

$600 \times x = 78{,}000$

$x = \frac{78{,}000}{600} = \frac{780}{6} = 130$

Number of students = 130

Chapter
05 Lines and Angles

WORKSHEET 1: INTRODUCTION TO LINES AND ANGLES

1. (a) line segment
   (b) line
   (c) ray
   (d) one
   (e) angle
   (f) 90°
   (g) acute
   (h) 90°
2. (a) Acute angle
   (b) Obtuse angle
   (c) Right angle
3. (a) Acute angle
   (b) Acute angle
   (c) Right angle
   (d) Obtuse angle
   (e) Acute angle
   (f) Right angle
4. Ray → One end point
   Line → No end point
   Acute angle → 0° to 90°
   Line segment → Two end points
   Right angle → 90°
   Obtuse angle → 90° to 180°

WORKSHEET: 2 PAIRS OF ANGLES

1. (a) Complementary
   (b) Supplement
   (c) Supplementary
   (d) Complementary
   (e) Adjacent
   (f) adjacent, opposite rays
   (g) vertically opposite
2. (a) Sum of the measure of the angles = 63° + 27° = 90°
   ∴ The angles are complementary.
   (b) Sum of the measure of the angles = 55° + 35° = 90°
   ∴ The angles are complementary.
   (c) Sum of the angles are 45° + 135° = 180°
   ∴ The angles are supplementary.
   (d) Sum of the angles are 40° + 50° = 90°
   ∴ The angles are complementary.
   (e) Sum of the angles are 120° + 60° = 180°
   ∴ The angles are supplementary.
   (f) Sum of the angles = 90° + 90° = 180°
   ∴ The angles are supplementary.
3. (a) Complement of 35° = 90° – 35° = 55°
   (b) Complement of 45° = 90° – 45° = 45°
   (c) Complement of 68° = 90° – 68° = 22°
   (d) Complement of 70° = 90° – 70° = 20°
   (e) Complement of 55° = 90° – 55° = 35°
   (f) Complement of 22° = 90° – 22° = 68°
4. (a) Let the required angle be x
   ∴ $x + 108° = 180°$
   ⇒ $x = 180° – 108° = 72°$
   (b) Let the required angle be x
   ∴ $x + 180° = 180°$
   ⇒ $x = 180° – 180° = 0°$
   (c) Let the required angle be x
   ∴ $x + 135° = 180°$
   ⇒ $x = 180° – 135° = 45°$
   (d) Let the required angle be x
   ∴ $x + 65° = 180°$
   ⇒ $x = 180° – 65° = 115°$
   (e) Let the required angle be x
   ∴ $x + 42° = 180°$
   ⇒ $x = 180° – 42° = 138°$

(f) Let the required angle be x

$\therefore \quad x + 77° = 180°$

$\Rightarrow \quad x = 180° - 77° = 103°$

5. (a) F
   (b) F
   (c) F
   (d) F
   (e) F
   (f) F
   (g) T

6. (a) $\angle 1$ and $\angle 2$, $\angle 2$ and $\angle 3$, $\angle 3$ and $\angle 4$, $\angle 4$ and $\angle 5$, $\angle 5$ and $\angle 1$
   (b) $\angle 4$ and $\angle 5$, $\angle 3$ and $\angle 4$
   (c) $\angle 1 + \angle 2$ and $\angle 4$, $\angle 3$ and $\angle 5$
   (d) $\angle 3$ and $\angle 4$, $\angle 1$, $\angle 2$ and $\angle 5$, $\angle 4$ and $\angle 5$, $\angle 1$, $\angle 2$ and $\angle 3$

7. (a) $x + 45° = 90°$

   $\Rightarrow \quad x = 90° - 45° = 45°$

   (b) $x + 115° = 180°$ (linear pair)

   $\Rightarrow \quad x = 180° - 115° = 45°$

   (c) $65° + x + 60° = 180°$ (linear pair)

   $\Rightarrow \quad 125° + x = 180°$

   $\Rightarrow \quad x = 180° - 125° = 65°$

   Hence, $x = 65°$

   (d) Since $\angle x$ and $\angle 100°$ are vertically opposite angles

   $\therefore \quad x = 100°$

   (e) $x + 100° = 180°$ (linear pair)

   $\Rightarrow \quad x = 180° - 100°$

   $x = 80°$

   (f) $3x + 2x = 180°$ (linear pair)

   $\Rightarrow \quad 5x = 180°$

   $\Rightarrow \quad x =$

   $\therefore$ Angles: $3 \times 36°$ and $2 \times 36°$

   $= 108°$ and $72°$

   (g) $2x + 3x + x = 180°$ (linear pair)

   $\Rightarrow \quad 6x = 180°$

   $\Rightarrow$

   (h) $x + (x + 15°) + (2x - 35°) = 180°$

   $\Rightarrow \quad x + x + 2x + 15° - 35° = 180°$

   $\Rightarrow \quad 4x - 20° = 180°$

   $\Rightarrow \quad 4x = 180° + 20° = 200°$

   $\therefore \quad x = 180°$

   (i) $(2x + 20°) + 3x = 180°$ (linear pair)

   $\Rightarrow \quad 2x + 20° + 3x = 180°$

   $\Rightarrow \quad 5x = 180° - 20° = 160°$

   $\Rightarrow \quad x = \frac{160°}{5}$

   $\therefore \quad x = 32°$

   (j) $(3x - 25°) + (2x - 15°) = 180°$

   $\Rightarrow \quad 3x - 25° + 2x - 15° = 180°$

   $\Rightarrow \quad 5x - 40° = 180°$

   $\Rightarrow \quad 5x = 180° + 40° = 220°$

   $\therefore \quad x = \frac{220°}{5} = 44°$

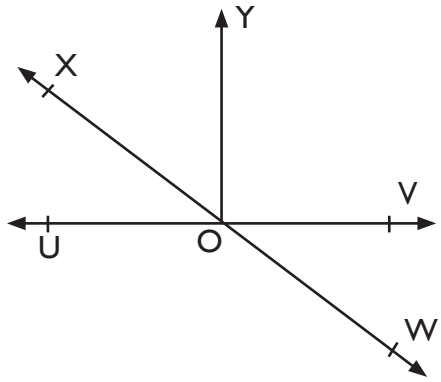
8. (a) Yes, since they have a common vertex O and also a common arm OC. Also their non-common arms OA and OE are on either side of the common arm.
   (b) No, they have a common vertex O and also a common arm OA. However their non-common arms, OC and OE, are on the same side of the common arm.

   $\therefore$ These are not adjacent to each other.

   (c) Yes, since they have a common vertex O and a common arm OE. Also, their non-common arms OC and OD are opposite rays.
   (d) Yes, since $\angle BOD$ and $\angle DOA$ have a common vertex O and their non-common arms are opposite to each other.
   (e) Yes, since these are formed due to the intersection of the straight lines (AB and CD).
   (f) $\angle COB$ is the vertically opposite angle of $\angle 5$ as these are formed due to the intersection of two straight lines AB and CD.

9. (a) $\angle XOV$, $\angle UOW$
   (b) $\angle YOX$, $\angle XOU$
   (c) $\angle YOU$, $\angle YOV$
   (d) $\angle YOX$, $\angle YOW$ and $\angle XOU$, $\angle XOV$
   (e) $\angle XOY$ and $\angle XOY$; $\angle XOY$ and $\angle YOV$, $\angle YOV$

and $\angle WOV$



10. (a) Since $\angle x$ and $55°$ are vertically opposite angles

$\Rightarrow x = 55°$

$\angle x + \angle y = 180°$ (linear pair)

$\Rightarrow 55° + \angle y = 180°$

$\Rightarrow \angle y = 180° - 55° = 125°$

$\angle y = \angle z$ (vertically opposite angles)

$\Rightarrow z = 125°$

(b) $\angle z = 40°$ (vertically opposite angles)

$\angle y + \angle z = 180°$ (linear pair)

$\Rightarrow \angle y + 40° = 180°$

$\Rightarrow \angle y + 180° - 40° = 140°$

$\Rightarrow 40° + \angle x + 25° = 180°$

(Angle on a straight line)

$\Rightarrow 65° + x = 180°$

$\Rightarrow \angle x = 180° - 65° = 115°$

Hence, $x = 115°, y = 140°, z = 40°$

11. Let the required angle be x.

Then, its supplement will be $180° - x$

A.T.Q $x = \frac{4}{5}(180° - x)$

$\Rightarrow 5x = 720° - 4x$

$\Rightarrow 5x + 4x = 720°$

$\Rightarrow 9x = 720°$

$\therefore x = \frac{720°}{9} = 80°$

Hence, the required angle is 80°.

12. Let the required angle be x

Then, its supplement will be $(180° - x)$

A.T.Q. $x = (180° - x)$

$\Rightarrow x + x = 180°$

$\Rightarrow 2x = 180° \therefore x = \frac{180°}{2} = 90°$

13. Let the required angle be x

Then, its complement will be $90° - x$

A.T.Q. $x = \frac{1}{2}(90° - x)$

$\Rightarrow 2x = 90° - x$

$\Rightarrow 2x + x = 90° \Rightarrow 3x = 90°$

$\Rightarrow x = \frac{90°}{3} = 30°$

Hence, the required angle is 30°

WORKSHEET 3: PAIRS OF LINES

1. (a) intersect, coplanar
   (b) same
   (c) same
   (d) adjacent
   (e) supplementary angles
2. (a) $\angle p + \angle q = 180°$
   (b) $\angle r + \angle s = 180°$

   $\Rightarrow 45 + \angle s = 180°$

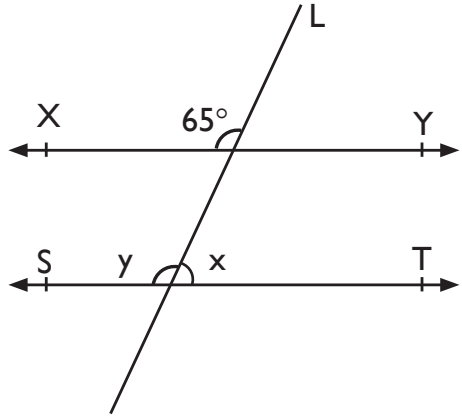
   $\Rightarrow \angle s = 180° - 45° = 135°$
3. (a) $\angle y = 65°$ (corresponding angle)

   $\Rightarrow \angle x + \angle y = 180°$

   $\Rightarrow \angle x + 65° = 180°$

   $\Rightarrow \angle x = 180° - 65° = 115°$

   Hence $\angle x = 115°$



4. AB || CD

   $\therefore \angle x = 75°$ (vertically opposite angle)

$\therefore$ $\angle x = \angle z$ (alternate interior angle)

$\therefore$ $\angle z = 75°$

$\angle y = 180° - \angle z$

$\angle y = 180° - 75°$

$\angle y = 105°$

5. (a) Consider that AB || DG and a transversal line BC is intersecting then

$\angle DGC = \angle ABC$ (corresponding angle)

$\Rightarrow$ $\angle DGC = 80°$

(b) Consider that BC || EF and a transversal line DE is intersecting then

$\angle DEF = \angle DGC$ (corresponding angle)

$\therefore$ $\angle DEF = 80°$

6. (a) $\angle 1 + \angle x + 5° = 180°$ (linear pair)

$\angle 2 + \angle 3x + 15° = 180°$

As p || q $\therefore$ Angles are equal

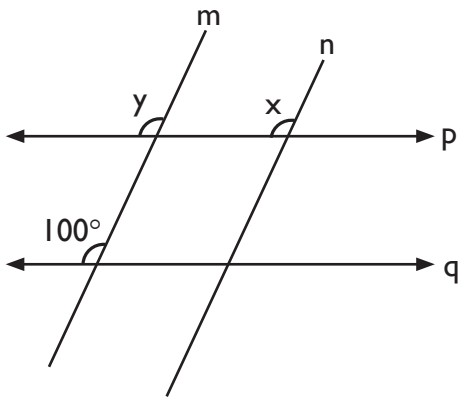
$\angle 1 = 3x + 15°$

$\Rightarrow$ $3x + 15° + x + 5° = 180°$

$\Rightarrow$ $4x + 20° = 180°$

$\therefore$ $x = \frac{160°}{4} = 40°$

(b) As m and n are parallel lines corresponding angles are equal



$\therefore$ $\angle x = \angle y$ (corresponding angle)

$\angle y = 100°$ (corresponding angle)

$\therefore$ $\angle x = 100°$

7. AB || CD $\angle AEC = 45°$ and $\angle BED = 60°$

$x = 45°$ ($\because$ alternate angle are angles)

and $y = 60°$ ($\because$ alternate angle are angles)

8. $\angle y = 60°$ ($\because$ alternate angle are angles)

$\angle x = 50°$ ($\because$ alternate angle are angles)

9. $x + 75° = 180°$ (linear pair)

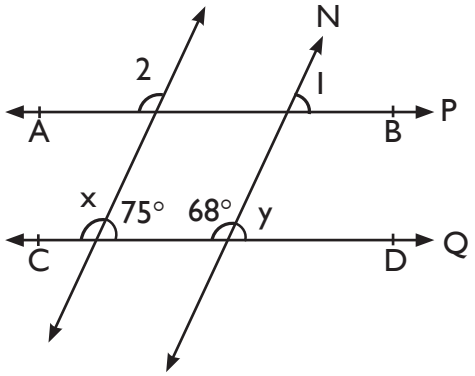
$\Rightarrow$ $x = 180° - 75° = 105°$

$\therefore$ $x = 105°$ (alternative angle)

and $y + 68° = 180°$ (linear pair)

$\Rightarrow$ $y = 180 - 68° = 112°$

$\therefore$ $\angle 1 = 112°$ (corresponding angle)



10. $2x+7 = 63°$ (vertically opposite angle)

$2x = 63° - 7°$

$2x = 56°$

$x = 28°$

$\angle 3 = 2x+7°$

$\angle 3 = 2 \times 28° + 7°$

$\angle 3 = 56° + 7°$

$\angle 3 = 63°$

$\angle 1 + 2x+7° = 180°$ (linear pair)

$\angle 1 + 63° = 180°$

$\angle 1 = 180° - 63°$

$\angle 1 = 117°$

$\angle 2 = 3x+5°$

$\angle 2 = 3 \times 28 + 5°$

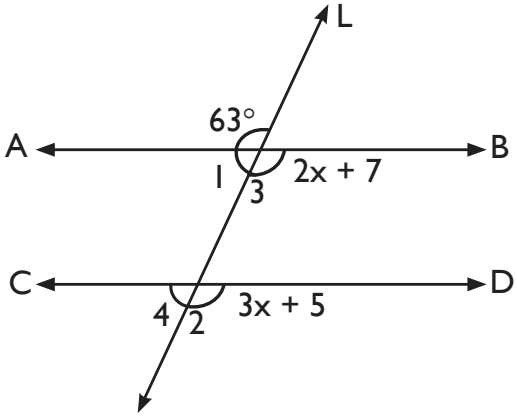
$\angle 2 = 89°$

$\angle 4 + 3x + 5° = 180°$ (linear pair)

$\angle 4 + 89° = 180°$

$\angle 4 = 180° - 89°$

$\angle 4 = 91°$



11. $2x + 15° = 125°$ (vertically opposite)

$\Rightarrow 2x = 125° - 15° = 110°$

$\Rightarrow x = \frac{110°}{2} = 55°$

Hence, $x = 55°$

WORKSHEET (BASED ON COMPLETE CHAPTER)

1. Infinitely
2. Yes
3. No
4. 180°
5. (i) AD || BC, GH || EF, AH || BE, HE || AB, CD || AB || and GB || CD.
6. (i) $\angle 3 + 130° = 180°$

$\Rightarrow \angle 3 = 180° - 130° = 50°$

$\therefore \angle 3° = 50°$

$\angle 1 = 80°$ (alternate interior angles)

and $\angle 1 = 80°$ (alternate interior angles)

(ii) $\angle 6 = 84°$ (vertically opposite angle)

$\angle 5 = 125°$ (vertically opposite angle)

$\angle 4 = \angle 6 = 84$ (corresponding angle)

7. (a) (i)

(b) (ii)

(c) (iii)

(d) (ii)

(e) (ii)

8. $\angle ABO = 50°$ and $\angle CDO = 40°$

$\angle BOD = \angle ABO + \angle CDO$

$= 50° + 40° = 90°$

9. Given, $\angle B = 65°, \angle C = 40°$

$\angle DAB = x°, \angle EAC = y°$

$\Rightarrow \angle B = \angle DAB = 65°$ (Alternate angle)

$x = 65°$

$\Rightarrow \angle C = \angle EAC = 40°$ (Alternate angle)

$y = 40°$

10. When two interior angles are on the same side of transversal, their sum of angles is supplementary.

$(x - 7)° + (5x - 5)° = 180°$

$6x - 12° = 180°$

$6x = 192°$

$x = \frac{192°}{6} = 32°$

Angles are $(32 - 7)°$ and $[5 (32) - 5]°$

Angles are 25° and 155°

11. (a) $\angle a = 50°$ (Vertically opposite angle)

$\Rightarrow 50° + \angle b = 180°$ (linear pair)

$\angle b = 130°$

$\Rightarrow 50° + \angle 3 = 180°$ (linear pair)

$\angle 3 = 130°$

$\Rightarrow \angle b = \angle d$ (corresponding angle)

$\angle d = 130°$

$\Rightarrow \angle c + \angle d = 180°$ (linear pair)

$\angle c + 130° = 180°$

$\angle c = 50°$

$\Rightarrow \angle d + \angle e = 180°$ (linear pair)

$130° + \angle e = 180°$

$\angle e = 50°$

$\Rightarrow \angle e + \angle f = 180°$ (linear pair)

$50° + \angle f = 180°$

$\angle f = 130°$

$\Rightarrow \angle b = \angle h$ (corresponding angle)

$\angle h = 130°$

$\Rightarrow \angle g + \angle h = 180°$ (linear pair)

$\angle g + 130° = 180°$

$\angle g = 50°$

$\Rightarrow \angle g + \angle j = 180°$ (linear pair)

$50° + \angle j = 180°$

$\angle j = 130°$

$\Rightarrow \angle j + \angle i = 180°$ (linear pair)

$130° + \angle i = 180°$

$\angle i = 50°$

$\Rightarrow \angle k + 115° = 180°$ (linear pair)

$\angle k = 65°$

$\Rightarrow \angle k + \angle l = 180°$ (linear pair)

$65° + \angle l = 180°$

$\angle l = 115°$

$\Rightarrow \angle l + \angle m = 180°$ (linear pair)

$115° + \angle m = 180°$

$\angle m = 65°$

(b) $\angle a = 115°$ (vertically opposite)

$\Rightarrow \angle 1 = \angle d$ (corresponding angle)

$\Rightarrow \angle d = 115°$

$\Rightarrow \angle b = 7°$ (vertically opposite)

$\Rightarrow \angle b = \angle c$ (corresponding angle)

$\angle c = 7°$

12. When two lines are intersected by a transversal, the lines can be parallel on the given three conditions.
    (i) If $\angle 1 = \angle 2$ (alternate angle)
    (ii) If $\angle 1 = \angle 2$ (corresponding angle)
    (iii) If $\angle 1 + \angle 2 = 180°$
    But these three conditions are not followed in the given question.
    $\therefore$ p cannot be parallel to q.

13. Let the complement of 32° be x
    So, $90 - 32 = x$
    $x = 58°$
    $\therefore$ The supplement of 58° is:
    $180° - 58° = 122°$

14. Let the supplement of 115° be x
    So, $180° - 115° = x$
    $x = 65°$
    $\therefore$ The complement of 65° is:
    $90 - 65 = 25°$

15. (a) The two angles can never be supplementary if both the angles are obtuse as the obtuse angle has the measure greater than 90°. Thus, if both the angles are obtuse their sum will exceed 180°.
    $\therefore$ Two angles being obtuse can never be supplementary
    (b) Yes, two right angles can form a supplementary angle. As the measure of right angle is 90°, two right angles will form an angle of 180°.
    $\therefore$ Two right angles can be supplementary,.
    (c) The two angles can never be supplementary if both the angles are acute as the acute angle has the measure less than 90°. Thus, if both the angles are acute their sum can never exceed 180°.
    $\therefore$ Two angles being acute can never be supplementary.

16. $\frac{2}{3}$ of $90° = \frac{2}{3} \times 90°$
    $= 2 \times 30°$
    $= 60°$

17. $\frac{4}{5}$ of $180° = \frac{4}{5} \times 180°$
    $= 4 \times 36°$
    $= 144°$

18. Let the angles be 3x and 5x
    A.T.Q.
    $3x + 5x = 180°$
    $8x = 180°$
    $x = 22.5°$
    Angles are $3 \times 22.5°$ are $5 \times 22.5°$
    Angles are 67.5° and 112.5°.

Chapter 06

The triangles and its properties

WORKSHEET 1 INTRODUCTION, MEDIANS AND ALTITUDES OF A TRIANGLE

1. (a) Three sides, AB, BC and AC.
   Angle = $\angle A$, $\angle B$ and $\angle C$
   Vertices = A, B and C
   Side AB is opposite to vertex C.
2. (a) ΔABC, ΔBDC
   (b) ΔPOQ, ΔROS, ΔOSQ, ΔOPR, ΔPRS, ΔQPS, ΔPQR, ΔQRS
3. (a) Isosceles triangle
   (b) Equilateral triangle
   (c) Scalene triangle
4. (a) D, E, H
   (b) G and F
   (c) L, A, B and M
5. (a) Right angled triangle
   (b) Obtuse angled triangle
   (c) Acute angled triangle
   (d) Acute angled triangle
6. (a) three (b) 3, 3
   (c) 3, 3 (d) line segment
   (e) triangular
7. (a) True (b) False
   (c) False (d) True
   (e) False (f) False
8. (a) Altitude (b) Median
   (c) No
9. (a) AF (b) CD
   (c) BE
10. (a) Altitude (b) orthocentre
    (c) centroid (d) equilateral
    (e) 90°

WORKSHEET 2 EXTERIOR ANGLE PROPERTY OF A TRIANGLE

1. (a) $p = 65° + 40°$ (by Exterior angle Theorem)
   $\Rightarrow p = 105°$
   (b) $p = 70° + 45°$ (by Exterior angle Theorem)
   $\Rightarrow P = 115°$
   (c) $p = 30° + 45°$ (by Exterior angle Theorem)
   $\Rightarrow 75°$
2. (a) $\angle y + 120° = 180°$ (linear pair)
   $\Rightarrow \angle y = 180° - 120° = 60°$
   $\Rightarrow \angle x + \angle y = 120°$
   (by Exterior angle Theorem)
   $\Rightarrow \angle x + 60° = 120°$
   $\Rightarrow \angle x = 120° - 60° = 60°$

   (b) $x + x + 90° = 180°$
   (The three angles of a triangle is 180°)
   $2x = 180° - 90° = 90°$
   $\Rightarrow x = \frac{90°}{2} = 45°$
   [The exterior angle of a triangle is equal to sum of its interior opp. angles]
   $y = 45° + 90° \Rightarrow y = 135°$

   (c) Base angles x and y
   Now 45° and y from a linear pair
   $45° + y = 180°$
   $\Rightarrow y = 180° - 45° = 135°$
   $x + 45° + 92° = 180$ (Angle sum property)
   $\Rightarrow x + 137° = 180°$
   $\Rightarrow x = 180° - 137° = 43°$

   (d) $x + 45° = 100°$
   (By Exterior angle Theorem)
   $\Rightarrow x = 100° - 45° = 55°$
   Now, $30° + 100° + y = 180°$

(Angle sum property)

$\Rightarrow 130° + y = 180°$

$\Rightarrow y = 180° - 130° = 50°$

Hence, $x = 55°, y = 50°$

(e) $x = 50° + 30°$ (By Exterior Theorem)

$\Rightarrow x = 80°$

$\Rightarrow y = x + 30°$

$\Rightarrow y = 80° + 30°$

$y = 110°$

Hence, $y = 110°, x = 80°$

(f) In ΔABC, exterior $\angle CBP$ at B and adjacent interior $\angle CBA$ form a linear pair.

$\therefore \angle CBP + \angle CBA = 180°$

$\Rightarrow 70° + y = 180°$

$\Rightarrow y = 180° - 70° = 110°$

Again $\angle BCQ$ is exterior of ΔABC at C and $\angle CAB$ and $\angle CBA$ are interior opposite angles.

$\angle BCQ = \angle CAB + \angle CBA$

$\Rightarrow x = 40° + y = 40° + 110°$

$\Rightarrow x = 150°$

Hence, $x = 150°, y = 110°$

3. We know that the exterior of a triangle is eqsual to the sum of its interior opposite angles

But $60° \neq 60° + 60°$

4. Given exterior angle = 105°

Ratio of interior opposite angles = 2 : 5

Let the angle = x

$\therefore$ Interior angles = 2x and 5x

We know that the exterior of a triangle is equal to the sum of its interior opposite angles

$\Rightarrow 2x + 5x = 105°$

$\Rightarrow 7x = 105°$

$\Rightarrow x = \frac{105°}{7} = 15°$

Hence, angles are $2 \times 15°$ and $5 \times 15°$

$= 30°$ and $75°$

WORKSHEET 3 ANGLE SUM PROPERTY OF A TRIANGLE

1. Let angles of an equilateral triangle = x

A.T. Q

$x + x + x = 180°$ (Angle sum property)

$\Rightarrow 3x = 180° \Rightarrow x = \frac{180°}{3} = 60°$

$\therefore$ All angles of an equilateral triangle = 60°, 60°, 60°

2. In an isosceles triangle, base angles are equal.

So, $75° + x + x = 180°$

$\Rightarrow 75° + 2x = 180°$

$\Rightarrow 2x = 180° - 75° = 105°$

$\therefore x = \frac{105°}{2} = 52.5°$

$\therefore$ Base angles are 52.5°

3. Let $\angle A = x$

$\therefore \angle A = \angle B = x$

and $\angle C = 3\angle B = 3x$

A.T.Q $\angle A + \angle B + \angle C = 180°$ (Angle sum property)

$\Rightarrow x + x + 3x = 180°$

$\Rightarrow 5x = 180° \Rightarrow x = \frac{180°}{5} = 36°$

$\therefore \angle A = \angle B = 36°$

and $\angle C = 3x = 3 \times 36° = 108°$

4. Let the angles of triangles are 2x, 3x and 4x

By Angle sum property

$2x + 3x + 4x = 180°$

$\Rightarrow 9x = 180°$

$\Rightarrow x = \frac{180°}{9} = 20°,$

$2x = 2\ (20°) = 40°, 3x = 3\ (20°) = 60°, 4x = 4\ (20°) = 80°$

Angles of the triangle = 20° x 2, 20° x 3, 20° x 4

Angles of the triangle = 40°, 60°, 80°

5. In ΔABC,

$\angle ACD = 110°$ (exterior angle)

$\angle ABC = 65°$ (given)

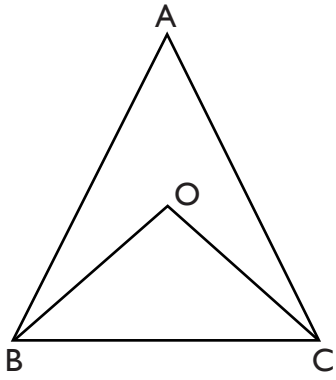
$\angle ACD = \angle ABC + \angle BAC$

$\therefore 110° = 65° + \angle BAC$

$\therefore 110° - 65° = \angle BAC = 45°$

6. Let third angle be x.
Two angles are 40° and 80° (given)
We know that, sum of angles of triangle = 180°
$\Rightarrow$ x + 40° + 80° = 180°
$\Rightarrow$ x + 120° = 180°
$\Rightarrow$ x = 180° – 120° = 60°

7. $\angle A = 50°$ (given)
$\angle B + \angle C = 180° - 50° = 130°$
B = 65° and C = 65°. (AB = AC)
As OB and OC are angle bisectors,
$\angle OBC = 65°/2 = 32.5°$
$\angle OCB = 65°/2 = 32.5°$
$\angle BOC = 180° - (\angle OBC + \angle OCB)$
$\angle BOC = 180° - (32.5° + 32.5°)$
$\angle BOC = 180° - 65°$
$\angle BOC = 115°$



8. a. Let interior opposite angle = x°
$\therefore$ 120° + x° + 45°
$\therefore$ 120° – 45° = x° = 75°, and third angle = 60°
b. Let interior opposite angle = x°
$\therefore$ 90° = x° + 45°
$\therefore$ 90° – 45° = x° = 45°, and thir angle = 90°
c. Let interior opposite angle = x°
$\therefore$ 58° = x° + 20°
$\therefore$ 58° – 20° = x° = 38° and thir angle = 122°
d. Let interior opposite angle = x°
$\therefore$ 130° = x° + 60°
$\therefore$ 130° – 60° = x° = 70° and third angle = 50°

9. Given, it $\angle A = \angle B + \angle C$ given
$\therefore$ In ΔABC,.
$\therefore$ $\angle A + \angle B + \angle C = 180°$
$\therefore$ $\angle A + \angle A = 180°$
$\therefore$ $2\angle A = 180°$
$\therefore$ $\angle C = 180°/2 = 90°$ Right angle.

10. Let $\angle A = 48°$, $\angle B = x°$, $\angle C = 90°$
$\angle A + \angle B + \angle C = 180°$ (Sum of the angles of Δ)
$\Rightarrow$ 48° + x + 90° = 180°
$\Rightarrow$ x + 138° = 180° $\Rightarrow$ x = 180° – 138 = 42°
$\therefore$ Other acute angle = 42°

11. Let the angles are in the ratio = 4x and 2x
$\Rightarrow$ 4x + 2x = 120° (exterior angle of triangle)
$\Rightarrow$ 6x = 120°
$\Rightarrow$ $x = \frac{120°}{6} = 20°$
$\therefore$ Angles = 4 × 20° and 2 × 20°
= 80° and 40°

12. Let the angles are in ratio = 3x and 7x
$\therefore$ 3x + 7x = 110° (exterior angles of triangle)
$\Rightarrow$ 10x = 110°
$\Rightarrow$ $x = \frac{110°}{10} = 11°$
$\therefore$ The angles = 3 × 11°, 7 × 11° $\Rightarrow$ 33° and 77°

WORKSHEET 4 EQUILATERAL & ISOSCELES TRIANGLE AND SUM OF THE LENGTHS OF TWO SIDES OF A TRIANGLE

1. (a) $\angle A = \angle C = 40°$ (given)
AB = BC

2. $\angle C = 180° - (\angle A + \angle B)$
$= 180° - (50° + 80°)$
$\angle C = 180° - 130° = 50°$
$\therefore$ $\angle A = \angle C = 50°$
$\therefore$ BC = AB = 5 cm
$\therefore$ BC = 5 cm

3. Let $\angle Q = x$ $\therefore$ $\angle P = 2x$
ΔPQR is isosceles triangle.
$\therefore$ $\angle P + \angle Q + \angle R = 180°$
$\Rightarrow$ 2x + x + x = 180°
$\Rightarrow$ $4x = 180° \Rightarrow x = \frac{180°}{4} = 45°$

$\therefore$ $\angle P = 2x = 2 \times 45° = 90°, \angle Q = \angle R = 45°$

4. ΔABC is isosceles.

BC = AC (given)

$\angle A = 70°$

$\therefore$ $\angle B = x$

BC = AC

$\therefore$ $\angle A = \angle B = x = 70°$

$\therefore$ $\angle A + \angle B + \angle C = 180°$

$70° + 70° + \angle C = 180°$

$\angle C = 180° - 140° = 40°$

5. $\angle B = 30°$, $\angle A = 50°$] given

$\therefore$ $\angle y = \angle B = 30°$ [$\because$ DE || BC]

$\therefore$ $\angle A + \angle B + \angle C = 180°$

$\Rightarrow$ $50° + 30° + \angle C = 180°$

$\Rightarrow$ $z = \angle C = 180° - 80° = 100°$

$\therefore$ $\angle x = z = 100°$

6. In ΔDFB, $\angle D + \angle F + \angle B = 180°$ ...(i)

Same, ΔAEC, $\angle A + \angle E + \angle C = 180°$ ...(ii)

From (i) and (ii)

$\angle D + \angle F + \angle B + \angle A + \angle E + \angle C = 180° + 180° = 360° = 4$ (right angle)

7. (a) $\angle ACD = 180° - 110° = 70°$

(b) ΔADC, $\angle A + \angle C + \angle D = 180°$

$\Rightarrow$ $50° + 70° + x = 180°$

$\Rightarrow$ $x = 180° - 120° = 60°$

(c) $\angle DAE$,

$50 + \angle DAE = 40° + 110°$

$\Rightarrow$ $\angle DAE = 150° - 50° = 100°$

$\therefore$ $\angle DAE = 100°$

8. (a) $83° = 53° + 73° = 126°$ (Not possible)

(b) $120° + 30° + 30° = 180°$ (Possible)

(c) $90° + 45° + 45° = 180°$ (Possible)

9. The sum of the lengths of any two sides of a triangle is greater than the third scale.

(a) AB = 3.5 cm, BC = 1.5 cm, AC = 6 cm

AB + BC = 3.5 + 1.8 = 5.3 cm > 6 cm

$\therefore$ AB + BC > AC

Triangle is not possible.

(b) AB = 5 cm, BC = 7 cm, AC = 12 cm

AB + BC = 5 + 7 = 12 cm > 12 cm

AB + BC = AC

Triangle is not possible

(c) AB = 3.4 cm, BC = 2.1 cm and AC = 5.3 cm

AB + BC = 3.4 + 2.1 = 5.5 cm > 5.3 cm

AB + BC > AC

Triangle is possible.

10. (a) Yes, (b) No (c) No

11. (a) < (b) > (c) <

12. As 3+2 is not greater than 6, the given sides cannot form a triangle.

13. In quadrilateral ABCD, ΔACB and ΔABD

AC and BD are diagonals

$\therefore$ In ΔACB, AB + BC > AC ...(i)

Some ΔAB + AD > BD ...(ii)

added (i) and (ii)

AB + BC + AB + AD > AC + BD

$\therefore$ AB + BC + CD + DA > AC + BD

($\because$ AB = CD)

WORKSHEET 5 RIGHT ANGLED TRIANGLES AND PYTHAGORAS PROPERTY

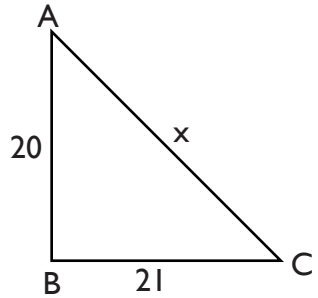
1. (a) Let ABC be triangle

$AC^2 = AB^2 + BC^2$

$\Rightarrow$ $x^2 = (20)^2 + (21)^2$

$= 400 + 441 = 841$

$\therefore$ $x = \sqrt{841} = 29$ cm

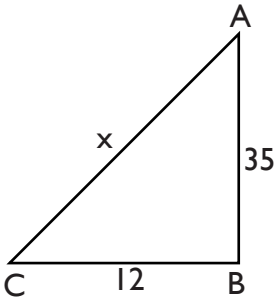


(b) $AC^2 = AB^2 + BC^2$

$\Rightarrow$ $x^2 = (35)^2 + (12)^2$

$\Rightarrow$ $x^2 = 1225 + 144 = 1369$

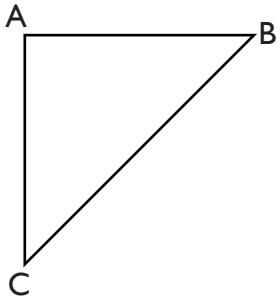
$\therefore$ $x = \sqrt{1369} = 37$ cm



(c) $BC^2 = AB^2 + AC^2$

$x^2 = (7)^2 + (24)^2 = 49 + 576 = 625$

$\therefore \quad x = \sqrt{625} = 25$ cm.



(d) In isosceles triangle's medium attitude are same.

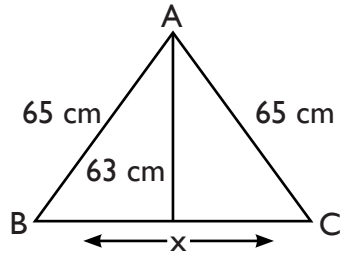
$\therefore \quad AB^2 = AD^2 + BD^2$

$\therefore \quad (65)^2 = (63)^2 + BD^2$

$\therefore \quad BD^2 = (65)^2 - (63)^2 = 256 = (16)^2$

$\therefore \quad BD = 16$

$\therefore \quad BC = 2\,(BD) = 2(16) = 32$ cm



(e) In isosceles triangle's median and attitude are same.

$AB^2 = AD^2 + BD^2$

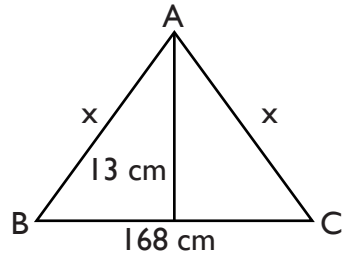
$(x)^2 = (13)^2 + (84)^2 = 169 + 7056$

$= 7225$

$= (85)^2$

$\therefore \quad x = 85$ cm,

$\therefore \quad AB = AC = 85$ cm



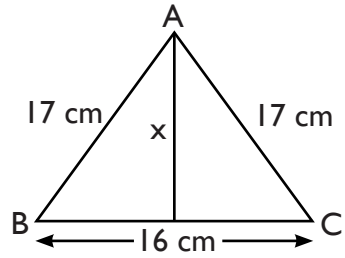
(f) In isoscles triangles medium and attitude are same.

$AB^2 = AD^2 + BD^2$

$\therefore \quad (17)^2 = (x)^2 + (8)^2$

$\therefore \quad x^2 = (17)^2 - (8)^2 = 289 - 64 = 225$

$\therefore \quad x = 15$ cm



2. (a) 27, 36, 45

Given the sides of the triangle are

27, 36, 45

$\therefore \quad c^2 = a^2 + b^2$

$\Rightarrow \quad (45)^2 = (27)^2 + (36)^2$

$\Rightarrow \quad 2025 = 729 + 1296$

$\Rightarrow \quad 2025 = 2025$

Yes, these are sides right angled triangle.

(b) Given the sides of the triangles are 16, 63, 65

$\therefore \; c^2 = a^2 + b^2$

$\Rightarrow (65)^2 = (16)^2 + (63)^2$

$\Rightarrow 4225 = 256 + 3969 = 4225$

$\Rightarrow$ Yes, these are sides right angled triangle.

(c) Given, the sides of the triangles are 0.8, 2.4, 3.5

$\therefore \; c^2 = a^2 + b^2$

$\Rightarrow (3.5)^2 = (0.8)^2 + (2.4)^2$

$\Rightarrow 12.25 = 0.64 + 5.76$

$\Rightarrow 12.25 \neq 6.4$

No, these sides cannot form a right angled triangle.

3. By Pythagoras Theorem

$AB^2 + AC^2 = BC^2$

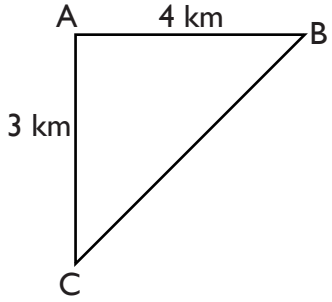
$\Rightarrow (4)^2 + (3)^2 = BC^2$

$\Rightarrow 16 + 9 = BC^2$

$\Rightarrow 25 = BC^2$

$\therefore$ BC = 5 km.

So, he is 5 km away from the initial point.



4. Let the length of each side = x cm

Square of hypotenuse = 128 cm^2

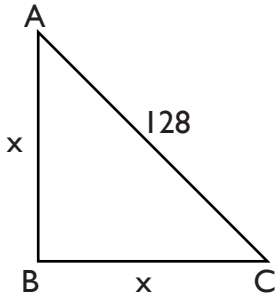
$\Rightarrow AC^2 = AB^2 + BC^2$ (By Pythagoras Theorem)

$\Rightarrow 128 = x^2 + x^2$

$\Rightarrow 2x^2 = 128 \Rightarrow x^2 = \frac{128}{2} = 64$

$\Rightarrow x = \sqrt{64} = 8$ cm.

Hence, length of each side = 8 cm.



5. If ABCD is a rectangle.

AB = 36 m and BC = 27 m

$\therefore AC^2 = AB^2 + BC^2$

$= (36)^2 + (27)^2$

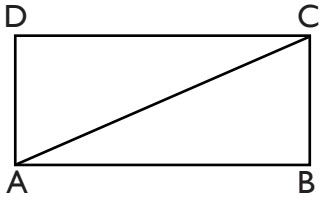
$= 1296 + 729$

$= 2025$

$= (45)^2$

$\therefore$ AC = 45 m

AC = BD = 45 m ($\because$ Diagonals)



6. According to question,

$H^2 = p^2 + B^2$

$= (63)^2 + (16)^2 = 3969 + 256$

$= \sqrt{4225}$

$\therefore$ H = 65 m

So, ladder is 65 m long.

7. BE = 10 m, AD = 58 then AC = 58 – 10 = 45 m

BC = ED = 14 m, In ΔACB, $\angle C = 90°$

By pythagoras theorem, $AB^2 = AC^2 + AB^2$

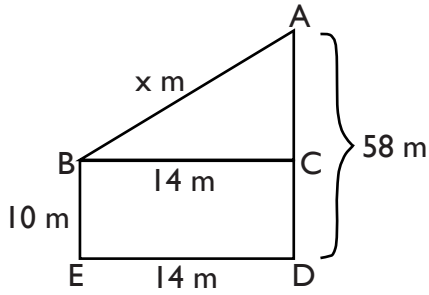
$= (48)^2 + (14)^2$

$= 2304 + 196 = 2500$

$\therefore AB^2 = (50)^2$

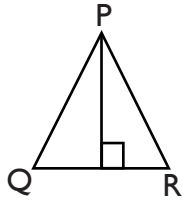
AB = 50 m

Length of wire = 50 m



WORKSHEET (BASED ON COMPLETE CHAPTER)

1. (a) (ii) (b) (ii)
   (c) (iii) (d) (iii)
2. (a) obtuse angled (b) 90°
   (c) $PR^2 = PQ^2 + QR^2$
   (d) equilateral



3. (a) T (b) T
   (c) F

4. By Pythagoras Theorem,

$AC^2 = AB^2 + BC^2$

$\Rightarrow AC^2 = (15)^2 + (9)^2$

$\Rightarrow AC^2 = 225 + 81 = 306$

$\therefore AC = \sqrt{306} = 17.4$ m.

5. In ΔADC

$\therefore \angle A + \angle ACD + \angle ADC = 180°$

$\Rightarrow 43° + \angle ACD + 90° = 180°$

$\Rightarrow \angle ACD = 180° - 43° - 90° = 180° - 133° = 47°$

$\angle BCD = 90° - \angle ACD$

$= 90° - 47°$

$\therefore \angle BCD = 43°$

6. (a) $x + 52° + 61° = 180°$

(Angle sum property)

$\Rightarrow x + 113° = 180°$

$\Rightarrow x = 180° - 113° = 67°$

(b) $x + 50° = 80°$ (By Exterior angle Therem)

$\Rightarrow x = 80° - 50° = 30°$

7. (a) In ΔABC

$\angle A + \angle B + \angle C = 180°$

(Angle sum property)

$\Rightarrow y + 25° + 90° = 180°$

$\Rightarrow y + 115° = 180°$

$\therefore y = 180° - 115° = 65°$

(b) $\angle ADB + \angle ADC = 180°$

$\therefore 80° + \angle ADC = 180°$

$\therefore \angle ADC = 180° - 80° = 100°$

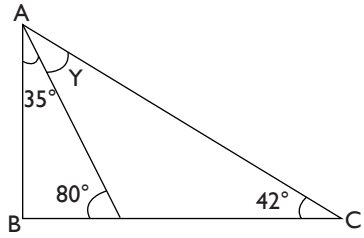
Put in ΔADC,

$\therefore \angle A + \angle D + \angle C = 180°$

$\therefore \angle DAC + 100 + 42° = 180°$

$\angle DAC = 180° - 142°$

$= 38° = y$



8. Sides are 8, 6 and 10

$\Rightarrow (10)^2 = (8)^2 + (6)^2$

$\Rightarrow 100 = 64 + 36$

$100 = 100.$

Right angled triangle.

9. No, because sum of the angles of triangle is not equal to 180°

10. The right triangle has one 90° angle and two acute angles. Since, the sum of the angles of a triangle is always 180°.

11. In an isosceles triangle, the two angles opposite to the equal sides are equal.

12. (c) $CA^2 + BC^2 = AB^2$ [$\therefore$ C is right angle]

Chapter

07 Comparing Quantities

WORKSHEET 1: COMPARING QUANTITIES USING RATIO AND PROPORTION

1. (a) $\frac{2}{8}m = \frac{1}{4}m = 1:4$

(b) $\frac{9000}{180} = \frac{900}{18} = \frac{50}{1}$

$= 50:1$ [$\because$ 1Km = 1000m]

(c) 3 days = 3 × 24 hrs = 72 hrs

$\therefore$ 28 hrs : 72 hrs = $\frac{28}{72} = \frac{7 \times 4}{18 \times 4} = 7:18$

(d) 140cm to 1m = 140 : 100 [$\because$ 1m = 100cm]

$= 14:10 = 7:5$

(e) 1,00,000,00 : 1,00,00,00 = 1 : 10

(f) 1.5l to 2.7ml = 1500ml : 2.7ml

$= \frac{1500ml}{2.7ml} = \frac{1500 \times 10}{27}$

$= \frac{5000 \times 3}{9 \times 3} = \frac{500}{9}$

$= 5000:9$

2. (a) $\frac{2}{5}$ or $\frac{3}{7}$

$\frac{2}{5} = \frac{2 \times 7}{5 \times 7} = \frac{14}{35}$

or $\frac{3}{7} = \frac{3 \times 5}{7 \times 5} = \frac{15}{35}$

$\therefore$ 15 > 14

$\therefore$ $\frac{3}{7} > \frac{2}{5}$

$\therefore$ 3 : 7 > 2.5

(b) $\frac{6}{11}$ or $\frac{9}{14}$

$\therefore$ $\frac{6}{11} = \frac{6 \times 14}{11 \times 14} = \frac{84}{154}$

$\frac{9}{14} = \frac{9 \times 11}{14 \times 11} = \frac{99}{154}$

99 > 84

$\therefore$ 9 : 14 > 6 : 11

(c) $\frac{1}{4}$ or $\frac{6}{30}$

$\therefore$ $\frac{1 \times 30}{4 \times 30} = \frac{30}{120}$

$\frac{6}{30} = \frac{6 \times 4}{30 \times 4} = \frac{24}{120}$

$\therefore$ 30 > 24

$\therefore$ 1 : 4 > 6 : 30

(d) $\frac{4}{5}$ or $\frac{5}{6}$

$\therefore$ $\frac{4}{5} = \frac{4 \times 6}{5 \times 6} = \frac{24}{30}$

$\frac{5}{6} = \frac{5 \times 5}{6 \times 5} = \frac{25}{30}$

$\therefore$ 25 > 24

$\therefore$ 5 : 6 > 4 : 5

3. (a) $\frac{9}{p} = \frac{27}{45}$

$\therefore$ $\frac{9}{p} = \frac{3}{5}$

$\therefore$ 45 = 3p

$\therefore$ $p = \frac{45}{3} = 15$

(b) $\frac{p}{19} = \frac{142}{71}$

$\therefore$ 71 × p = 142 × 19

$\therefore$ $p = \frac{142 \times 19}{71} = 38$

(c) $\frac{196}{p} = \frac{P}{1}$

$\therefore \quad p^2 = 196$

$\therefore \quad p = \sqrt{196} = 14$

(d) $\frac{28}{35} = \frac{42}{p}$

$\therefore \quad 28\,p = 42 \times 35$

$\therefore \quad p = \frac{42 \times 35}{28}$

$\therefore \quad p = \frac{3 \times 35}{2} = 52.5$

4. Total sum = 32,000

Ratio = 6 : 2

Sum of ratio = 6 + 2 = 8

$\therefore$ Each son gets = $\frac{6}{8} \times 32{,}000$

$= 6 \times 4000 = 24{,}000$

$= \frac{2}{8} \times 32{,}000 = 2 \times 4000 = 8{,}000$

5. Let the length of rectangle = 3x

width of rectangle = 5x

Perimeter = 2(l + b)

$\therefore \quad 48 = 2(3x + 5x)$

$\therefore \quad 24 = 8x$

$\therefore \quad x = \frac{24}{8} = 3$

$\therefore$ length = 3x = 3 × 3 = 9cm

6. In 45 minutes, jet plane requires fuel = 600kg

In 1 min, jetplane requires fuel = $\frac{600}{45}$ kg

In 180 min, jetplane requires fuel

$= \frac{600}{45} \times 180\text{kg}$ [$\because$ 3hrs = 3 × 60 = 180min]

= 2400kg

7. Quantity of sweets distributed among 240 people = 80kg

Quantity of sweets given to 1 person

$= \frac{80}{240}$ kg

Quantity of sweets distributed to 600 people =

$\frac{80}{240} \times 600\text{kg} = 200\text{kg}$

8. Given, ratio of copper and zinc = 3 : 4

sum of ratio = 3 + 4 = 7

Weight of the copper = $\frac{3}{7} \times 4.50\text{g} = 1.43\text{g}$

weight of the zinc = $\frac{4}{7} \times 4.50\text{g} = 2.57\text{g}$

9. Let the number = x

Two numbers are in the ratio = 8x and 9x

When 6 is then numbers = 8x – 6 and 9x – 6

A.T.Q $\frac{8x-6}{9x-6} = \frac{5}{6}$

$\therefore \quad 6(8x - 6) = 5(9x - 6)$

$\therefore \quad 48x - 36 = 45x - 30$

$\therefore \quad 3x = -30 + 36 = 6$

$\therefore \quad x = 2$

hence, numbers = 8 × 2 and 9 × 2 = 16 and 18

10. Ratio of the Price of Coffee : Tea

The cost of coffee is ₹240 per kg = ₹240

The cost of tea is ₹80 × 4 per kg = ₹320

($\therefore$ 250 g × 4 = 1 kg)

$\therefore$ Ratio of the price of coffee : tea

$= \frac{₹240}{₹320} = \frac{3}{4}$

11. $\frac{289}{17} = \frac{17}{1} = \frac{4913}{219}$

12. Let the men proportion = x

$\therefore \quad 0.4 : x :: x : 0.625$

$\therefore \quad \frac{0.4}{x} = \frac{x}{0.625}$

$x^2 = 0.4 \times 0.625$

$x^2 = 0.25$

$\therefore \quad x = 0.5$

hence, Mean proportion = 0.5

13. 12 : 36 :: 27 : x

$\therefore \quad \frac{12}{36} = \frac{27}{x}$

$\therefore \quad 12x = 27 \times 36$

$\therefore \quad x = \frac{27 \times 36}{12} = 27 \times 3 = 81$

WORKSHEET 2: COMPARING QUANTITIES USING PERCENTAGE

1. (a) $\frac{1}{4} = 0.25$

   (b) $\frac{4}{8} = \frac{1}{2} = 0.5$

   (c) $\frac{3}{8} = 37.5\%$

   (d) $\frac{30}{72} = \frac{15}{36} = \frac{5}{12} = 0.4147 = 0.417 = 0.42$

2. $75\% = \frac{75}{100} = \frac{3}{4}$ and $125\% = \frac{125}{100} = \frac{5}{4}$

3. (a) $6.5\% = \frac{6.5}{100} = \frac{65}{1000} = \frac{13}{200} = 13 : 200$

   (b) $18\frac{1}{2}\%$

   $= \frac{37}{2}\% = \frac{37}{2} \times \frac{1}{100} = \frac{37}{200} = 37 : 200$

4. $0.05\% = \frac{0.05}{100} = 0.0005$

   and $15.8\% = \frac{15.8}{100} = 0.158$

5. $\frac{19}{200} = \frac{19}{2 \times 100} = \frac{19}{2}\%$

   and $\frac{9}{25} = \frac{9 \times 4}{25 \times 4} = \frac{36}{100} = 36\%$

6. (a) $0.31 \times 100 = 31\%$

   (b) $0.275 \times 100 = 2.75\%$

7. (a) $\frac{9}{20} = \frac{9 \times 5}{20 \times 5} = \frac{45}{100} = 45\%$

   (b) $\frac{23}{25} = \frac{23 \times 4}{25 \times 4} = \frac{92}{100} = 92\%$

8. $250 = \frac{100}{400} = 62.5\%$

9. $75 = \frac{100}{500} = 15\%$

10. Total children = 80

    children who like Playing cricket = 25%

    $= \frac{25}{100} \times 80 = 20$

    Children who do not like playing cricket

    $= 80 - 20 = 60.$

11. Motor consists of sand = 55% of 800

    $= \frac{55}{100} \times 800 = 440\text{kg}$

    Motor consists of cement

    $= \frac{33}{100} \times 800 = 264\text{kg}$

    $\therefore$ Mass of line in Motor = 800 –(400 + 264)

    = 800 – 664 = 136kg

12. School Team Won game this year = 8

    won game last year = 5

    Total won game = 13

    $\therefore$ Increased Percent = $\frac{8-5}{13} \times 100\%$

    $= \frac{300}{13}\%$

13. Cost of scooter = 20,500

    After 2 years decreased by 25% = 25% of 205003

    $= \frac{25}{100} \times 20500 = ₹5125$

    $\therefore$ value after 2 years = (20500 – 5125)

    = ₹15375

14. Aseem obtained Marks = $\frac{450}{600} \times 100\% = 75\%$

    Muskan obtained Marks = $\frac{560}{800} \times 100\% = 70\%$

    Aseem's performance is better.

15. Present salary = ₹36,355

    Increment salary = 10% of ₹36355

    $= \frac{10}{100} \times 36355 = 3635.5$

    His salary before increment = ₹(36355 – 3635.5)

    = ₹32719.5

16. Number of children = 15400

    Let the total population of the city be x

    so, 40% of x = 15400

    40 * x/100 = 15400

    x = 38500

    Total men and women = 38500 – 15400 = 23100

17. Percentage decrease in the excise duty

$$= \frac{830-580}{830} \times 100\%$$

$$= \frac{25}{83} \times 100\% = 30.12\%$$

WORKSHEET 3: COMPARING QUANTITIES USING PROFIT, LOSS AND SIMPLE INTEREST

1. (a) C.P = Purchaing price + overhand expense

850 + 80 = 930, Profit = 90

S.P = C.P + P = 930 + 90 = 1020

$$\text{Profit \%} = \frac{P}{C.P} \times 100\% = \frac{90}{930} \times 100$$

$$= \frac{900}{93}\% = 9.68\%$$

(b) C.P = 3100, Purchaing price = 4500

$\therefore$ overhand expenses = 4500 – 3100 = 1400

(c) C.P =16000 + 2000 = 18000

S.P =23000

$\therefore$ P = S.P – C.P = 23000 – 18000

= 5000

$$P\% = \frac{P}{C.P} \times 100 = \frac{5000}{18000} \times 100\%$$

= 27.78%

(d) Cost Price = 1400

Purchasing price = CP – Overhead expenses

= 1400 – 500

= 900

P% = 8%

$$S.P = \frac{100}{100} \times C.P$$

$$S.P = \frac{100+8}{100} \times 1400 = \frac{108}{100} \times 1400$$

S.P = 108 × 14 = 1512

(e) Cost Price = 180 + 20 = 200

Loss% = 5%

$$S.P = \frac{100-\text{Loss\%}}{100} \times C.P$$

$$= \frac{100-5}{100} \times 200 = \frac{95}{100} \times 200 = 95 \times 2$$

= 190

2. C.P = 45

P% = 25%

$$S.P = \frac{100+P\%}{100} \times C.P = \frac{100+25}{100} \times 45$$

$$= \frac{125}{100} \times 45 = 56.25$$

3. (12) 1 Dozen eggs = ₹60,

$$\text{Number of dozen eggs} = \frac{1500}{12} = 125$$

1 Dozen eggs = ₹60 = 60 × 125

125 Dozen eggs = C.P. = ₹7500 ...(i)

$$15\% \text{ profit per dozen} = \frac{1500 \times 900}{100}$$

= ₹9

Per dozen S.P. = C.P + Profit

= 60 + 9

= 69

or

$$SP = \frac{100+P\%}{100} = S.P = \frac{100+15}{100} \times 60$$

$$\frac{115 \times 10}{100} = ₹69$$

4. S.P = 550, P = 10%

C.P = ?

$$\therefore \quad S.P = \frac{100+P\%}{100} \times C.P$$

$$\therefore \quad 550 = \frac{110}{100} \times C.P$$

$$\therefore \quad C.P = 550 \times \frac{100}{110}$$

$\therefore$ C.P = 5 × 100 = 500

5. Let the C.P. of each book is ₹1

then C.P of 15 books = ₹15

S.P of 12 books = C.P of 15 books

here C.P > S.P

Loss = C.P – S.P = 15 – 12 = 3

$$\text{Now, Loss\%} = \left(\frac{L}{C.P} \times 100\right)\% = \frac{3}{15} \times 100$$

$$= \frac{1}{5} \times 100 = 20\%$$

6. C.P of bananas = 6 × 40 = ₹240

S.P of bananas = 6 × 38 = ₹228

C.P > S.P

Loss = C.P – S.P = ₹(240–228) = ₹12

$$\text{Loss\%} = \frac{L}{CP} \times 100\% = \frac{12}{240} \times 100 = 5\%$$

7. Let C.P. ₹9, S.P. = ₹(x + 3870), Profit 12%

$$\text{S.P.} = \frac{100 + P\%}{100} \times \text{C.P.} = \frac{100 + 12}{100} \times x$$

$$\therefore \quad x + 3870 = \frac{112x}{100}$$

$$\therefore \quad 100\,(x + 3870) = 112x$$

$$\therefore \quad \frac{3 \times 7000}{12} = 32,250$$

9% loss, C.P. = 32,250 – 2903

Cost of TV set (C.P.) = ₹29347

8. C.P. of Apples = 25 × 90 = ₹2250

C.P. of Apples = 30 × 95 = ₹2850

55 kg Apples = ₹5100

25% gain

$$\therefore \quad \text{S.P. of 55 kg} = \frac{125 \times 5100}{100}$$

$$= ₹6375$$

∴ 1 kg Apple's rate = ₹115.91

9. S.I = ₹25 T = 2 months = $\frac{2}{12}$ yrs

R = ? P = 150

$$SI = \frac{P \times R \times T}{100}$$

$$\therefore \quad 25 = \frac{150 \times R \times 2}{100 \times 12}$$

$$\therefore \quad \frac{25 \times 100 \times 12}{150 \times 2} = R$$

$$\therefore \quad R = 100\%$$

10. Given,

Amount (A) = ₹2178

Principal (p) = ₹1800

Rate (R) = 10%

We know,

$$A = P + I$$

$$2178 = 1800 + I$$

$$I = 2178 - 1800$$

$$= ₹3178.$$

$$I = \frac{P \times R \times T}{100}$$

$$3178 = \frac{1800 \times 10 \times T}{100}$$

$$T = \frac{3178}{180}$$

$$T = 17.6 \text{ years.}$$

11. R = ? P = 2500, I = 300,

T = 5 years

$$\therefore \quad \frac{PRN}{100} = \frac{2500 \times R \times 5}{100}$$

$$\therefore \quad 300 = 125 \times R$$

$$\therefore \quad \frac{320}{125} = R = 2.4\%.$$

12. I = ₹ 829.50, N = 3 years, R = 10%, P.

$$I = \frac{PRN}{100}$$

$$\therefore \quad 829.50 = \frac{P \times 10 \times 3}{100}$$

$$\therefore \quad 8295 = 3P$$

$$\therefore \quad \frac{8295}{3} = P = 2765$$

∴ Sum ₹ = 2765.

WORKSHEET (BASED ON COMPLETE CHAPTER)

1. (a) (iii) (b) (ii) (c) (i) (d) (i)

2. (a) 104 (b) $\frac{3\lg}{4}$ (c) ₹1575

(d) $\frac{7}{25}\times\frac{4}{4} = \frac{28}{100} = 28\%$

(e) Cost Price

3. (a) False (b) False (c) True
(d) False

4. Height of the tree = $\frac{17.5\times 2}{2.5} = 14\text{m}$

5. $\frac{45}{90} \times 100\% = \frac{450}{9} = 50\%$

6. 4% of y = 21

$\therefore \quad \frac{4}{100} \times y = 21$

$\therefore \quad y = \frac{21\times 100}{4} = \frac{2100}{4} = 525$

7. Cost Price of old house = ₹3,00,000
Spends on its repairs = ₹65,000
C.P = ₹3,65,000
S.P = ₹3,25,000
Loss = C.P – S.P = ₹(3,65,000 – 3,25,000)
= ₹40,000

$\text{Loss\%} = \frac{\text{Loss}}{\text{C.P}} \times 100 = \frac{40,000}{3,65,000} \times 100$

$= \frac{40,000}{3650} = 10.9\%$

8. S.P of table = ₹1360
Loss % = 15%

$\text{S.P} = \frac{100 - \text{Loss\%}}{100} \times \text{C.P}$

$1360 = \frac{100-15}{100} \times \text{C.P}$

$\frac{1360\times 100}{85} = \text{C.P}$

$\therefore \quad \text{C.P} = 1600$

9. P = 2500, T = 1year R = 6%

$\text{S.I} = \frac{2500\times 1\times 6}{100} = 150$

$\therefore$ Amount = P + S.I
= 2500 + 150 = ₹2650

Chapter
08 Rational Numbers

WORKSHEET 1: INTRODUCTION TO RATIONAL NUMBERS

1. (a) N = 3, D = – 29 (b) N = – 5, D = 99
(c) N = 9, D = 33 (d) N = – 115, D = – 387

2. (a) Negative (b) Negative
(c) Positive

3. (a) $\frac{5}{-13} = \frac{5\times3}{-13\times3} = \frac{15}{-39}$; $\frac{5}{-13} = \frac{5\times5}{-13\times5}$

$= \frac{25}{-65}$

$\Rightarrow \frac{5}{-13} = \frac{15}{\boxed{-39}} = \frac{\boxed{25}}{-65}$

(b) $\frac{-8}{12} = \frac{-8\times3}{12\times3} = \frac{-24}{36}$; $\frac{-8}{12} = \frac{-8\times12}{12\times12} = \frac{-96}{144}$

$\therefore \frac{-8}{12} = \frac{\boxed{-24}}{36} = \frac{-96}{\boxed{144}}$

(c) $\frac{-315}{1350} = \frac{-315\div5}{1350\div5} = \frac{-63}{270}$;

$\frac{-315}{1350} = \frac{-315\div9}{1350\div9} = \frac{-35}{150}$

$\Rightarrow \frac{-315}{1350} = \frac{-63}{\boxed{270}} = \frac{\boxed{-35}}{150}$

4. (a) $\frac{14}{29}$

(b) $\frac{9\times-1}{-21\times-1} = \frac{-9}{21}$

(c) $\frac{45\times-1}{-81\times-1} = \frac{-45}{81}$

5. (a) $\frac{-17}{39} = \frac{-17\times-1}{39\times-1} = \frac{17}{-39}$

(b) $\frac{-18x-1}{-54x-1} = \frac{18}{54}$

(c) $\frac{-47x-1}{-84x-1} = \frac{47}{84}$

6. (a) $\frac{-5}{9} = \frac{-5\times-5}{9\times-5} = \frac{25}{-45}$

(b) $\frac{-5}{9} = \frac{-5\times7}{9\times7} = \frac{-35}{63}$

7. (a) $\frac{420}{-720} = \frac{420\div-12}{-720\div-12} = \frac{-35}{60}$

(b) $\frac{420}{-720} = \frac{420\div(-4)}{-720\div(-4)} = \frac{-105}{180}$

(c) $\frac{420}{-720} = \frac{420\div(-6)}{-720\div(-6)} = \frac{-70}{120}$

8. (a) $\frac{-21}{8} = \frac{x}{56} \Rightarrow -21\times56 = 8\times x$

$\Rightarrow x = \frac{-21\times56}{8} = -21\times7 = -147$

(b) $\frac{13}{-17} = \frac{104}{x} \Rightarrow 13\times x = 104\times-17$

$\Rightarrow x = \frac{104\times-17}{13} = 8\times-17 = -136$

(c) $\frac{x}{95} = -6 \Rightarrow x\times1 = -6\times95 \Rightarrow x = -570$

(d) $\frac{-85}{x} = -17 \Rightarrow -85 = -17\times x \Rightarrow x = \frac{-85}{-17}$

$\therefore x = 5$

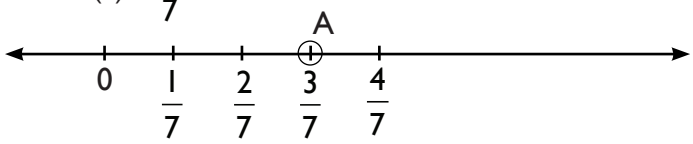
9. (a) $\frac{9}{36} = \frac{9\div9}{36\div9} = \frac{1}{4}$

(b) $\frac{118}{272} = \frac{118\div2}{272\div2} = \frac{59}{136}$

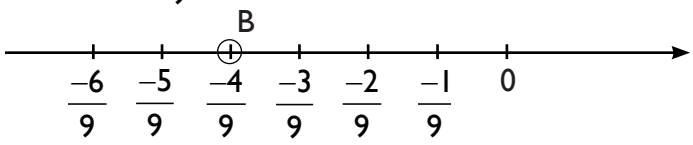
(c) $\frac{25}{625} = \frac{25 \div 25}{625 \div 25} = \frac{1}{25}$

WORKSHEET 2: RATIONAL NUMBERS ON NUMBER LINE AND COMPARISONS

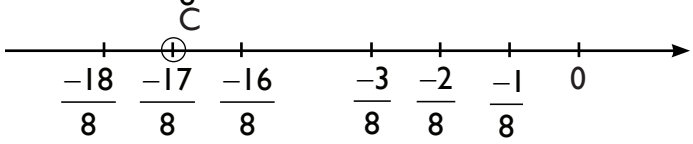
1. (a) $\frac{3}{7}$



(b) $\frac{-4}{9}$



(c) $\frac{-17}{8}$



2. (a) O > –5/6

(b) $\frac{4}{9} > \frac{-4}{9}$

(c) $\frac{5}{16}, \frac{8}{17}$

$\frac{8}{17} > \frac{-5}{16}$

3. (a) $\frac{-5}{16}, \frac{-7}{21}$

LCM of 16 and 21 = 336

$\Rightarrow \frac{-5}{16} = \frac{-5 \times 21}{16 \times 21} = \frac{-105}{336}$

$\frac{-7}{21} = \frac{-7 \times 16}{21 \times 16} = \frac{-112}{336}$

$\frac{-7}{21} < \frac{-5}{16}$

(b) $\frac{14}{13}, \frac{-3}{-26}$

LCM of 13 and 26 = 26

$\Rightarrow \frac{14}{13} = \frac{14 \times 2}{13 \times 2} = \frac{28}{26} \Rightarrow 28 > 3$

$\therefore \frac{14}{13} > \frac{3}{26}$

(c) $\frac{-ü}{27}, \frac{}{36}$

$\frac{-8}{27} < \frac{15}{36}$

4. (a) $\frac{-3 \times 2}{7 \times 2} = \frac{-6}{14}$

$\therefore \frac{-3}{7} < \frac{-4}{14}$

(b) $\frac{4}{9} = \frac{4 \times 8}{9 \times 8} = \frac{32}{72}$

$\frac{-3}{8} = \frac{-3 \times 9}{8 \times 9} = \frac{-27}{72}$

$\therefore \frac{32}{72} > \frac{-27}{72}$

$\Rightarrow \frac{4}{9} > \frac{-3}{8}$

(c) $\frac{-3}{8} = \frac{-3 \times 3}{8 \times 3} = \frac{-9}{24}$

$\therefore \frac{-9}{24} < \frac{6}{-24}$

5. (a) $\frac{-4}{9}, \frac{-3}{7}, \frac{8}{15}, \frac{13}{-21}$

LCM of 9, 7, 15, 21 = 315

$\frac{-4}{9} = \frac{-4 \times 35}{9 \times 35} = \frac{-140}{315}$; $\frac{-3}{7} = \frac{-3 \times 45}{7 \times 45} = \frac{-135}{315}$

$\frac{8}{15} = \frac{8 \times 21}{15 \times 21} = \frac{168}{315}$; $\frac{13}{-21} = \frac{13 \times 15}{-21 \times 15} = \frac{-195}{315}$

$\therefore \frac{-195}{315}, \frac{-140}{315}, \frac{-135}{315}, \frac{168}{315}$

$\Rightarrow \frac{-8}{11}, \frac{-4}{9}, \frac{-3}{7}, \frac{8}{15}$

(b) $\frac{-8}{11}, \frac{-15}{22}, \frac{104}{-154}, \frac{-120}{121}$

LCM of 11, 22, – 154, 121 = 1694

$\frac{-8 \times 154}{11 \times 154} =$

$\frac{-1232}{1694}; \frac{-15\times77}{22\times77}=\frac{-1155}{1694}; \frac{104}{-154}-\frac{104\times11}{-154\times11}=\frac{-1144}{1694}$

$\frac{-120}{121}=\frac{-120\times14}{121\times14}=\frac{-1680}{1694}$

$\frac{-1680}{1694}, \frac{-1232}{1694}, \frac{-1155}{1694}, \frac{-1144}{1694}$

$\Rightarrow \frac{-120}{121}, \frac{-8}{11}, \frac{-15}{22}, \frac{104}{-154}$

6. (a) $\frac{5}{8}, \frac{13}{-16}, \frac{-15}{12}, \frac{1}{6}$

LCM of 8, 16, 12, 6 = 48

$\frac{5\times6}{8\times6}$

$=\frac{30}{48}, \frac{13\times3}{-16\times3}=\frac{-39}{48}, \frac{-15\times4}{12\times4}=\frac{-60}{48}, \frac{1\times8}{6\times8}=\frac{8}{48}$

$\therefore \frac{30}{48}, \frac{8}{48}, \frac{-60}{48}, \frac{-39}{48}$ e.c.

$\frac{5}{8}, \frac{1}{6}, \frac{-15}{12}, \frac{13}{-16}$.

(b) $\frac{2}{-3}, \frac{-4}{9}, \frac{8}{27}, \frac{7}{-12}$

LCM of 3, 9, 27, 12 = 108

$\frac{2\times36}{-3\times36}=\frac{-75}{108}, \frac{-4\times12}{9\times12}=\frac{-48}{108}, \frac{8\times4}{27\times4}$

$=\frac{36}{108}, \frac{7\times9}{-12\times9}=\frac{63}{108}$

$\Rightarrow \frac{36}{108}, \frac{-48}{108}, \frac{-65}{108}, \frac{-72}{108}$

WORKSHEET 3: OPERATIONS ON RATIONAL NUMBERS

1. (a) $\frac{-3}{5}+\frac{2}{-5}=\frac{-3+(-2)}{5}=\frac{-3-2}{5}=\frac{-5}{5}=-1$

(b) $\frac{33}{18}+\frac{17}{26}=\frac{33\times26+17\times18}{468}=\frac{858\times306}{468}$

$=\frac{1164}{468}$

(c) $\frac{-7}{36}+\frac{5}{63}$ = LCM of 36 and 63 = 252

$\Rightarrow \frac{-7\times7+5\times4}{252}=\frac{-49+20}{252}=\frac{-29}{252}$

(d) $\frac{-4}{10}+\frac{21}{25}$

$\Rightarrow \frac{-4\times5+21+2}{50}=\frac{-20+42}{50}=\frac{22}{50}$

2. (a) $\frac{4}{7}-\frac{3}{8}=\frac{4\times8-3\times7}{56}=\frac{32-21}{56}=\frac{11}{56}$

(b) $\frac{-19}{21}-\left(\frac{3}{-7}\right)=\frac{-19}{21}+\frac{3}{7}=\frac{-19+3\times3}{21}$

$=\frac{-19+9}{21}=\frac{-10}{21}$

(c) $\frac{1}{3}-\left(\frac{-5}{6}\right)=\frac{1}{3}+\frac{5}{6}=\frac{2+5}{6}=\frac{7}{6}$

(d) $\frac{-3}{8}-(-5)=\frac{-3}{8}+5=\frac{-3+40}{8}=\frac{37}{8}$

3. (a) $\frac{-4}{3}+\frac{7}{18}+\frac{4}{21}$

LCM of 3, 18, 21 = 126

$\Rightarrow \frac{-4\times42+7\times7+4\times6}{126}$

$=\frac{-168+49+24}{126}$

$=\frac{-168+73}{126}=\frac{-95}{126}$

(b) $1+\frac{-8}{13}+15=\frac{13+(-8)+15\times13}{13}$

$=\frac{5+195}{13}=\frac{200}{13}$

(c) $\frac{-7}{20}+\frac{14}{-15}+\frac{1}{10}$

LCM of 10, 15, 10 = 60

$$\Rightarrow \frac{-7\times3-14\times4+1\times6}{60} = \frac{-21-56+6}{6}$$

$$= \frac{-77+6}{60}$$

$$= \frac{-71}{60}$$

4. (a) $\frac{-4}{5}$

(b) $\frac{5}{3}$

5. Sum of two rational numbers = $\frac{1}{2}$

one number = $\frac{-15}{9}$

Let the other number = x

Sum of two numbers = $\frac{-15}{9} + x$

$$\Rightarrow \frac{1}{2} = \frac{-15}{9} + x$$

$$\Rightarrow \frac{1}{2}+\frac{15}{9} = x \Rightarrow x = \frac{9+15\times2}{18} = \frac{9+30}{18}$$

$$\therefore \quad x = \frac{39}{18}$$

6. A.T.Q.

$$x + \left(\frac{-7}{8}\right) = \frac{3}{4} \Rightarrow \frac{6+7}{8} = \frac{13}{8}$$

$$\Rightarrow \quad x = \frac{3}{4}+\frac{7}{8} = \frac{3\times2+7}{8} = \frac{6+7}{8} = \frac{13}{8}$$

7. A.T. Q

$$\left[\frac{38}{5}+\left(\frac{-19}{6}\right)\right]-\left[\frac{-25}{12}+\frac{18}{8}\right]$$

$$\Rightarrow \quad \left[\frac{38\times6+(-19)\times5}{30}\right]-\left[\frac{-25\times2+18\times3}{24}\right]$$

$$\Rightarrow \quad \left[\frac{228-95}{30}\right]-\left[\frac{-50+54}{24}\right]$$

$$= \frac{133}{30}-\frac{4}{24} \Rightarrow \frac{133}{30}-\frac{1}{6}$$

$$= \frac{133-5}{30} = \frac{128}{30} = \frac{64}{15}$$

8. (a) $\frac{21}{5}$

(b) $\frac{19}{-27}$

9. (a) $\frac{-13}{19}\times\frac{19}{-13}$ = Multiplicative Identity

(b) Multiplication of Associative properly

(c) Multiplication of Commutative properly

10. (a) LHS = $\left(\frac{9}{11}\times\frac{12}{15}\right)\times\frac{8}{22}$

$$\Rightarrow \quad \left(\frac{9}{11}\times\frac{12}{15}\right)\times\frac{8}{22} = \left(\frac{3}{11}\times\frac{12}{5}\right)\times\frac{8}{22}$$

$$\Rightarrow \quad \frac{36}{55}\times\frac{8}{22} = \frac{18\times8}{55\times11} = \frac{144}{605}$$

$$\text{RHS} = \frac{9}{11}\times\left(\frac{12}{15}\times\frac{8}{22}\right) = \frac{9}{11}\times\left(\frac{6}{15}\times\frac{8}{11}\right)$$

$$= \frac{9}{11}\times\frac{48}{15\times11} = \frac{3\times48}{11\times5\times11} = \frac{144}{605}$$

$\therefore$ LHS = RHS

(b) LHS = $\frac{-13}{4}\times\left[\frac{3}{8}+\frac{-12}{15}\right]$

$$= \frac{-13}{4}\times\left[\frac{45-96}{120}\right] = \frac{-13}{4}\times\frac{-51}{120} = \frac{663}{480}$$

$$\text{RHS} = \left[\frac{-13}{4}\times\frac{3}{8}\right]+\left[\left(\frac{-13}{4}\right)\times\left(\frac{-12}{15}\right)\right]$$

$$= \frac{-39}{32}+\frac{156}{60}$$

$$= \frac{-39\times15+156\times8}{480} = \frac{-585+1248}{480} = \frac{663}{480}$$

$\therefore$ LHS = RHS.

11. $-4\times\frac{-11}{8}\times\frac{-16}{11}\times\frac{1}{-7}$

$$\Rightarrow \quad \frac{-4\times11\times-16\times-1}{8\times11\times-7} = \frac{-4\times-16\times-1}{8\times-7}$$

$$= \frac{-8}{-7} = \frac{8}{7}$$

12. (a) LHS = $\frac{-3}{4}\div\left(\frac{27}{16}\div\frac{9}{-32}\right)$

$$= \frac{-3}{4} \div \left(\frac{27}{16} \div \frac{-32}{9}\right) = \frac{-3}{4} \div \left(\frac{3}{1} \times \frac{-2}{1}\right)$$

$$= \frac{-3}{4} \div \frac{(-6)}{1} \Rightarrow \frac{-3}{4} \times \frac{1}{-6} = \frac{1}{4 \times 2} = \frac{1}{8}$$

$$\text{RHS} = \left(\frac{-3}{4} \div \frac{27}{16}\right) \div \frac{9}{-32} \Rightarrow \left(\frac{-1 \times 4}{1 \times 9}\right) \div \frac{-9}{32}$$

$$\frac{-4}{9} \times \frac{32}{9} = \frac{-128}{81}$$

LHS ≠ RHS Thus, it is not true.

(b) $\text{LHS} = \frac{-85}{18} \div \frac{-34}{3}$

$$= \frac{-85}{18} \times \frac{3}{34}$$

$$= \frac{-5}{6} \times \frac{1}{2}$$

$$= \frac{-5}{12}$$

$$\text{RHS} = \frac{-34}{3} \div \frac{85}{18}$$

$$= \frac{-34}{3} \times \frac{18}{85}$$

$$= -2 \times \frac{-6}{5}$$

$$= \frac{12}{5}$$

LHS ≠ RHS

Thus, it is not true.

13. Product of two rational numbers = –15

one number = – 25

Let the other number = x

A.T.Q x × (–25) = –15

$$\Rightarrow \quad x = \frac{-15}{-25} = \frac{3}{5}$$

14. Product of two numbers = $\frac{-15}{28}$

One number = $\frac{-11}{27}$

$$\therefore \quad \text{The other number} = \frac{-15}{28} \div \frac{-11}{27}$$

$$= \frac{-15}{28} \times \frac{27}{-11} = \frac{-15 \times 27}{28 \times -11} = \frac{405}{308}$$

15. Cost of $5\frac{1}{2}$ of cloth = $₹525\frac{1}{2} = ₹\frac{1051}{2}$

Cost of 1m. cloth = $₹\frac{1051}{2} \div 5\frac{1}{2}$

$$= ₹\frac{1051}{2} \times \frac{2}{11} = ₹\frac{1051}{11}$$

$$= ₹95\frac{6}{11}$$

16. $\left(\frac{35}{16} + \frac{8}{21}\right) \div \left(\frac{35}{16} - \frac{8}{21}\right)$

$$\Rightarrow \quad \frac{35 \times 21 + 8 \times 16}{336} \div \left(\frac{35 \times 21 - 8 \times 16}{336}\right)$$

$$= \left(\frac{735 + 128}{336}\right) \div \left(\frac{735 - 128}{336}\right)$$

$$\Rightarrow \quad \frac{863}{336} \div \frac{607}{336}$$

$$\Rightarrow \quad \frac{863}{336} \times \frac{336}{607} = \frac{863}{607}$$

17. $|x + y| = \left|\frac{-3}{4} + \frac{4}{7}\right| = \left|\frac{-21 + 16}{28}\right| = \left|\frac{-5}{28}\right| = \frac{5}{28}$

$$|x| + |y| = \left|\frac{-3}{4}\right| + \left|\frac{4}{7}\right| = \frac{3}{4} + \frac{4}{7} = \frac{21 + 16}{28} = \frac{37}{28}$$

$|x + y| \leq |x| + |y|$

18. (a) $|a-b| = \left|\frac{-7}{15} - \left(\frac{-3}{-5}\right)\right|$

$$= \left|\frac{-7}{15} - \frac{3}{5}\right| = \left|\frac{-7 - 9}{15}\right| = \frac{16}{15}$$

$$= 1\frac{1}{15}$$

(b) $|a| - |b| = \left|\frac{-7}{15}\right| - \left|\frac{-3}{-5}\right| = \frac{7}{15} - \frac{3}{5} = \frac{7 - 9}{15} = \frac{-2}{15}$

WORKSHEET (BASED ON COMPLETE CHAPTER)

1. (a) (i) (b) (i) (c) (iii)

(d) (ii) $\frac{2}{7} \times \frac{-7}{4} = \frac{-1}{2}$

(e) (i) $\frac{4}{37} \times \frac{37}{2} = 2$

2. (a) rational number
(b) rational number
(c) rational number

(d) rational number

(e) 0

3. (a) F (b) T (c) T

(d) F

4. (a) $\left(\frac{-2}{5}\times\frac{3}{6}\right)+\left(\frac{3}{7}+\frac{12}{6}\right)$

$\Rightarrow \frac{-1\times3}{5\times3}+\left(\frac{3}{7}+2\right)=\frac{-1}{5}+\left(\frac{3+14}{7}\right)$

$=\frac{-1}{5}+\frac{17}{7}$

$\Rightarrow \frac{-7+85}{35}=\frac{68}{35}$

(b) $\left(\frac{2}{9}\times\frac{18}{16}\right)-\left(\frac{-5}{4}\times\frac{1}{3}\right)$

$=\left(\frac{1\times2}{1\times8}\right)-\left(\frac{-5}{12}\right)=\frac{1}{4}+\frac{5}{12}=\frac{3+5}{12}=\frac{8}{12}=\frac{2}{3}$

(c) $\left(\frac{7}{12}\times\frac{14}{15}\times\frac{1}{7}\right)-\left(\frac{6}{4}\times\frac{13}{17}\right)$

$\Rightarrow \left(\frac{14}{12\times15}\right)-\left(\frac{3}{2}\times\frac{13}{17}\right)$

$\Rightarrow \frac{7}{90}-\frac{39}{34}=\frac{119-1755}{1530}=\frac{-1636}{1530}$

5. (a) LHS $=\frac{-7}{8}+\frac{8}{16}=\frac{-14+8}{16}=\frac{-6}{16}=\frac{-3}{8}$

RHS $=\frac{8}{16}-\frac{7}{8}=\frac{1}{2}-\frac{7}{8}=\frac{4-7}{8}=\frac{-3}{8}$

$\therefore$ LHS = RHS

(b) LHS $=\frac{-8}{15}\times\frac{5}{16}=\frac{-1}{3}\times\frac{1}{2}=\frac{-1}{6}$

RHS $=\frac{5}{16}\times\frac{-8}{15}=\frac{1\times(-1)}{2\times3}=\frac{-1}{6}$

LHS = RHS

(c) LHS $=\frac{2}{3}\times\left(\frac{5}{6}-\frac{7}{3}\right)$

$=\frac{2}{3}\times\left(\frac{5-14}{6}\right)=\frac{2}{3}\times\frac{-9}{6}=\frac{1\times-3}{1\times3}=-1$

RHS $=\left(\frac{2}{3}\times\frac{5}{6}\right)-\left(\frac{2}{3}\times\frac{7}{3}\right)$

$=\left(\frac{10}{18}\right)-\left(\frac{14}{9}\right)=\frac{5-14}{9}=\frac{-9}{9}=-1$

LHS = RHS

6. $\left(\frac{-1}{8}\right)\times\left(\frac{-16}{1}\right)=\left(\frac{-16}{-8}\right)=2$

7. $\frac{-7}{10}+\frac{14}{30}=\frac{-21+14}{30}=\frac{-7}{30}$

8. $\frac{4}{7}-\frac{4}{7}\times\frac{1}{3}=\frac{4}{7}-\frac{4}{21}=\frac{12-4}{21}=\frac{8}{21}$

9. (a) $2|x|-5=0\Rightarrow 2x-5=0$

$\Rightarrow 2x=5 \quad \therefore x=5/2$

(b) $7x-4-7=0\Rightarrow 7x-11=0$

$\Rightarrow 7x=11 \quad \therefore x=\frac{11}{7}$

10. (a) $\frac{n}{d}=\frac{-8\times(-9)}{-15+4}=\frac{72}{-11}$

(b) $\frac{n}{d}=\frac{0\times5}{18\times1}=\frac{0}{18}=0$

11. (a) $\frac{-54}{216}=\frac{-54\div27}{216\div27}=\frac{-2}{8}=\frac{-1}{4}$

(b) $\frac{-54}{216}=\frac{-54\div18}{216\div18}=\frac{-3}{12}=\frac{-1}{4}$

12. $\frac{-1}{2}=\frac{-1\times2}{2\times2}=\frac{-2}{4},\frac{3}{4},0,\frac{1\times2}{2\times2}=\frac{1\times2}{2\times2}=\frac{2}{4},\frac{-3}{4}$

$\Rightarrow \frac{3}{4}\frac{2}{4},0,\frac{-2}{4},\frac{-3}{4}$

$=\frac{3}{4},\frac{1}{2},0.\frac{-1}{2},\frac{-3}{4}$

13. Sum of two rational numbers is –4.

One number $=\frac{-9}{7}$

Let the other number = x

A.T.Q, $x-\frac{9}{7}=-4\Rightarrow x=-4+\frac{9}{7}=\frac{-28+9}{7}$

$x=\frac{-19}{7}$

14. A.T.Q

$-1+x=\frac{9}{7}$

$\Rightarrow x=\frac{9}{7}+1=\frac{9+7}{7}=\frac{16}{7}$

Chapter 09 Perimeter and Area

WORKSHEET 1: PERIMETER OF A SQUARE, RECTANGLE, TRIANGLE AND CIRCLE

1. Perimeter of square = 4 × side
   = 4 × 5 cm = 20 cm

2. Perimeter of rectangle = 2 (l + b) cm
   = 2(25 + 105) cm = 2 × 130 cm
   = 260 cm
   ∴ Perimeter of square = 260 cm
   ∴ Side of square = $\frac{\text{Perimeter}}{4} = \frac{260}{4}$ = 65 cm

3. (a) 9 + 4 + 4 + 4 + 2 + 5 + 5 + 3 = 36 cm
   ⇒ P = 36 cm
   (b) P = 80 + 40 + 70 + 60 = 250 cm
   (c) P = 15 × 5 = 75 cm
   (d) P = 25 + 18 + 12 + 5 + 10 + 8 = 78 cm

4. Side of square = 98 m
   ∴ Perimeter of square = 4 × side m
   = 4 × 98 m = 392 m
   ∴ 2 layers of barbed wire has to be put
   Length of the wire required = 2 × P
   = 2 × 392 m = 784 m
   ∴ 1 metre of wire cost = ₹ 5
   ∴ 784 m of wire costs = ₹ 5 × 784 = ₹ 3920

5. Let breadth of field = x m
   So, length of field = 3x m
   ∴ Perimeter of the field = x + 3x = 4x
   Distance covered by Latika = 5 times of perimeter
   = 5 × 4x = 20x
   ⇒ 20x = 6.5 km (given) = 6500.0 metres
   ⇒ $x = \frac{6500}{20}$ = 325 m = breadth
   and length = 3 × x = 3 × 325 m = 975 m

6. a. radii = 3.9 cm
   circumference of circle = 2 πr
   = $2 \times \frac{22}{7} \times 3.9$ cm = 24.51 cm
   b. r = 0.16 m
   Circumference = $2\pi r = 2 \times \frac{22}{7} \times 0.16$ m
   = 1.005 cm
   c. r = 9 cm
   Circumference = 2πr
   = $2 \times \frac{22}{7} \times 9$ cm
   = 56.57 cm

7. a. D = 15 cm
   Circumference of circle
   = $\pi D = \frac{22}{7} \times 15$ cm
   = $\frac{330}{7}$ = 47.14 cm
   b. D = 48 cm
   Circumference = $\pi D = \frac{22}{7} \times 48$ m
   = 150.85 m
   c. D = 72 cm
   Circumference = $\pi D = \frac{22}{7} \times 72$ cm
   = $\frac{1584}{7}$ cm = 226.28 cm

8. Distance covered by wheel in 5 revolutions = 220 m
   Distance covered by wheel in 1 revolution = $\frac{220}{5}$ m = 44 m

Perimeter of the wheel = 44 cm

$\therefore$ Diameter $= \frac{44}{\pi} = \frac{44}{22/7} = \frac{44 \times 7}{22} = 14$ m

9. Perimeter of square = 4 × side cm = 4 × 11 cm = 44 cm

$\therefore$ Perimeter of circle = Perimeter of square = 44 cm

$\Rightarrow$ $2\pi r = 44$

$r = \frac{44}{2\pi} = 22 \times \frac{7}{22} = 7$ cm

$\therefore$ $D = 2r = 2 \times 7 = 14$ cm

10. Radius of wheel = 2.5 m

Perimeter of wheel $2\pi r = 2\pi (2.5)$ m

$= 5.0\pi$

Now, distance covered in one round = Perimeter of wheel = 5π

$\therefore$ Distance covered in 230 revolutions

$= 230 \times 5 \times \frac{22}{7} = 3614.28$ m

WORKSHEET 2: AREA OF SQUARE AND RECTANGLE

1. a. $l = 9$ dm, $b = 6.5$ dm

Area $= l \times b^2 = 9 \times 6.5$ dm$^2 = 58.5$ dm^2

b. $l = 5.6$ m, $b = 7$ m

Area $= l \times b^2 = 5.6 \times 7$ m$^2 = 39.2$ m^2

2. a. Side of square = 4.8 cm

Area of square = side × side

$= 4.8 \times 4.8$ cm$^2 = 23.04$ cm^2

b. Side of square = 7.9 cm

Area of square = 7.9×7.9 cm$^2 = 62.41$ cm^2

c. Side of square = 8.1 cm

Area of square = side × side

$= 8.1 \times 8.1$ cm$^2 = 65.61$ cm^2

3. Area of square = 6400 m^2

$\Rightarrow$ side × side = 6400

$\Rightarrow$ side $= \sqrt{\frac{6400}{4}} = 80$ m

4. Let the length of rectangle = 8 x

Breadth of rectangle = 10 x

Perimeter of rectangle = 2 (l + b)m

$\Rightarrow$ $1440 = 2 (8x + 10x)$m

$\Rightarrow$ $\frac{1440}{2} = 18x$

$\Rightarrow$ $18x = 720$

$\therefore$ $x = \frac{720}{18} = 40$ m

Length $= 8x = 8 \times 40$ m $= 320$ m

Breadth $= 10x = 10 \times 40$ m $= 400$ m

5. Given, area of rectangle = area of five squares

$\Rightarrow$ 3125 m$^2 = 5$ [side]^2

$\Rightarrow$ $\frac{3125}{5} =$ [side]^2

$\Rightarrow$ $625 =$ [side]^2

$\therefore$ side = 25 m

Hence, each side of a square = 25 m

6. Diagonal of square = $\left(6\sqrt{2}\right)$ cm

Let side of its length = x

$\therefore$ $x^2 + x^2 = \left(6\sqrt{2}\right)^2$

$\Rightarrow$ $2x^2 = 36 \times 2$

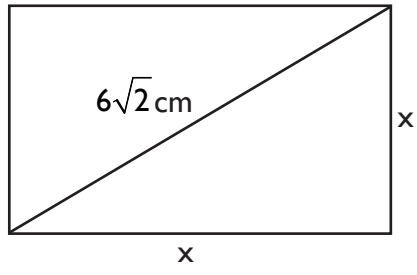
$\Rightarrow$ $x^2 = \frac{36 \times 2}{2} = 36$

$\Rightarrow$ $x = \sqrt{36}$ cm $= 6$ cm.

length of its side = 6 cm.

Area of the square = side × side

$= 6$ cm $\times 6$ cm $= 16$ cm^2



7. Let the length of rectangle = 2x

Breadth of rectangle = 3x

Area of rectangle = l × b m^2

$\Rightarrow$ $96 = 2x \times 3x$

$\Rightarrow$ $96 = 6x^2$ m^2

$\Rightarrow x^2 = \frac{96}{6} = 16$

$\therefore x = \sqrt{16} = 4$ m

Length = 2x = 2 × 4 m = 8 m

Breadth = 3x = 3 × 4 m = 12 m

Perimeter of rectangle = 2 (8 + 12) m

= 2 × 20 m = 40 m

8. No. of tiles = $\frac{\text{Area of total floor}}{\text{Area of 1 tile}}$

$= \frac{125 \times 250}{25} = 1250$

$\therefore$ No. of tiles = 1250.

9. Square of side = 10 cm

$\therefore$ Length of the rectangle = 5 cm

Breadth = 10 cm

Area of rectangle = (l × b) cm^2

= (5 × 10) cm^2 = 50 cm^2

10. Perimeter of rectangle = 130 cm

Let length = x

Breadth = 30 cm

Perimeter = 2 (l + b)

$\Rightarrow$ 130 = 2 (x + 30)

$\Rightarrow x + 30 = \frac{130}{2} = 65$ cm

$\Rightarrow$ x = 65 – 30 = 35 cm

$\therefore$ length = 35 cm

Area of rectangle = l × b cm^2

= 35 × 30 cm^2

= 1050 cm^2

WORKSHEET 3: AREA OF A PARALLELOGRAM

1. Let height of parallelogram = x

Base = 2x

Area of parallelogram = B × h

$\Rightarrow$ 98 = x × 2x $\Rightarrow$ 98 = $2x^2$

$\Rightarrow x^2 = \frac{98}{2} = 49$

x = 7 cm

Base = 2x = 2 × 7 cm = 14 cm and

Height = x = 7 cm

2. Given, AB = 20 cm, BC = 25 cm

Height = AE = 7.5 cm

Base = CD = 20 cm

Area of parallelogram = B × H

= 7.5 × 20 cm^2 = 150 cm^2

Base = 25 cm

Height = AF = ?

Area = B × H

$\Rightarrow$ 150 = 25 × H

$\Rightarrow \frac{150}{25} = H = AF$

$\therefore$ AF = 6 cm

3. Base = 28 cm, H = 17 cm

Area = B × H = 28 ×17 cm^2

= 476 cm^2

$\Rightarrow$ 476 = 7 × H

$\Rightarrow H = \frac{476}{7} = 68$ cm

4. Base = 16 dam

Altitude = 7 dam

Area of parallelogram = B × A

= 16 × 7 dam^2

= 112 dam^2

Cost of fence = 85 P × 112 dam^2

= ₹ 0.85 × 112

= ₹ 95.2

5. Let base = x

Altitude = 3x

Area of parallelogram = 507 m^2

$\Rightarrow x \times 3x^2 = 507$

$\Rightarrow 3x^2 = 507 \Rightarrow x^2 = \frac{507}{3} = 169$

$\therefore x = \sqrt{169}$ m = 13 m

Hence, Base = 13 m

Height = 3 × 13 m

= 39 m

WORKSHEET 4: AREA OF A TRIANGLE

1. a. B = 18 m A = 20 m

Area = $\frac{1}{2} \times B \times H = \frac{1}{2} \times 18 \times 20\ m^2$

$= 9 \times 20 = 180\ m^2$

b. Area = $\frac{1}{2} \times 12.8 \times 25\ m = 6.4 \times 25\ m^2$

$= 160\ m^2$

2. Area = $\frac{1}{2} \times 250 \times 300\ m^2 = 125 \times 300\ m^2$

$= 37500\ m^2$

Cost of levelling = ₹ 0.50 × 37500

= ₹ 18750

3. a. Perimeter = (s + s + s) cm

= (5 + 5 + 5) cm = 15 cm

b. Perimeter = (11.8 + 11.8 + 11.8) cm

= 35.4 cm

4. a. Area of triangle = $\frac{1}{2} \times B \times H\ cm^2$

$= \frac{1}{2} \times 8 \times 6\ cm^2$

$= 4 \times 6\ cm^2 = 24\ cm^2$

b. Area = $\frac{1}{2} \times 10 \times 18\ cm^2$

$= 5 \times 18\ cm^2 = 90\ cm^2$

c. Area = $\frac{1}{2} \times 30 \times 25\ cm^2$

$= 15 \times 25\ cm^2 = 375\ cm^2$

5. Let the sides of a triangle = 5x, 6x and 7x

Perimeter = 72 cm

$\Rightarrow$ 5x + 6x + 7x = 72 cm

$\Rightarrow$ 18x = 72

$\therefore x = \frac{72}{18} = 4$ cm

$\therefore$ Sides = 5x, 6x and 7x

= 5 × 4, 6 × 4, 7 × 4 = 20, 24, 28 cm

6. Let the height = x

Base = 5x

Area = $\frac{1}{2} \times B \times H = \frac{1}{2} \times x \times 5x$

$\Rightarrow$ 1125 = $\frac{1}{2} \times x \times 5x$ (given)

$\Rightarrow$ $1125 \times 2 = 5x^2$

$\Rightarrow$ $x^2 = \frac{1125 \times 2}{5} = 225 \times 2$

$\therefore$ $x = \sqrt{225 \times 2}$ m $\Rightarrow x = 15\sqrt{2}$ m

$\therefore$ Base = $5x = 5 \times 15\sqrt{2}$ m = $75\sqrt{2}$ m

Height = x = $15\sqrt{2}$ m

7. Area of parallelogram = B × H

$\Rightarrow$ 735 = 21 × H

$\Rightarrow H = \frac{735}{21}$ cm = 35 cm

Hence, height = 35 cm

8. Area of triangle = area of square

Side of square = 60 cm

Area of square = $(side)^2$

$= (60)^2 = 3600\ cm^2$

Area of triangle = $3600\ cm^2$

1/2 × b × h = 3600

1/2 × b × 90 = 3600

b = 80 cm

WORKSHEET 5: AREA OF A CIRCLE

1. Area of circle = $\pi r^2 = \frac{22}{7} \times (32)^2$

$= \frac{22}{7} \times 32 \times 32\ cm^2 = 3218.28\ cm^2$

2. D = 7.7 cm $r = \frac{7.7}{2}$ cm

Area of circle = $\pi r^2 = \frac{22}{7} \times \left(\frac{7.7}{2}\right)^2\ cm^2$

$= \frac{22}{7} \times \frac{77}{20} \times \frac{77}{20} = \frac{11 \times 11 \times 77}{1 \times 10 \times 20}\ cm^2$

$= 46.58\ cm^2$

3. Cost of levelling = ₹ 5 × 525
= ₹ 2625

4. Let r_1 = 10 cm, r_2 = 4 cm
Area of shaded region = $\pi r_1^2 - \pi r_2^2$
= $\pi(r_1^2 - r_2^2)$ cm^2
= $\pi[(10)^2 - (4)^2]$ cm^2
= $\pi[(10 + 4)(10 - 4)]$ cm^2
= $\frac{22}{7}$ [14 × 6] cm^2 = 22 × 2 × 6 cm^2
= 44 × 6 cm^2
= 264 cm^2

5. Area of the park = 7546 m^2
$\Rightarrow$ $\pi r^2 = 7546$
$\Rightarrow$ $\frac{22}{7} \times r^2 = 7546$
$\Rightarrow$ $r^2 = 7546 \times \frac{7}{22} = \frac{52822}{22} = 2401$
$r = \sqrt{2401} = 49$ m
Hence, radius = 49 m

6. Let r_1 = 13 cm, r_2 = 9.5 cm
Area = $\pi r_1^2 - \pi r_2^2$
= $\pi[(13)^2 - (9.5)^2]$ cm^2
= π[169 – 90.25] cm^2 = $\frac{22}{7}$ × 78.75 cm^2
= 247.5 cm^2
Hence, area = 247.5 cm^2

7. Perimeter of square = 4 × side
$\Rightarrow$ Side = $\frac{24}{4}$ = 6 m.
24 = 4 × side
Area of square = (side × side) cm^2
(6 × 6) m^2 = 36 m^2

8. Area of square plate = (side × side) cm^2
= (7 × 7) cm^2 = 49 cm^2
Area of circle = 18 cm^2
Area of remaining plate = (49 – 18) cm^2
= 31 cm^2

9. Perimeter of the park = 2 × 65 + 2 × π × 7
= 130 + 14 π
= 130 + 14 × $\frac{22}{7}$
= 130 + 44 = 174 cm

10. Area of the square = (side)^2 m^2
= 15^2 m^2 = 225 m^2
Area of circle = πr^2
= $\frac{22}{7} \times (7)^2$ cm^2 = $\frac{22}{7} \times 49$ m^2
= 22 × 7 m^2
= 154 m^2
Area of shaded portion = 225 – 154 = 71 m^2

11. Radius of the circle = 21m
Inner radius = 22 – 7 = 14 cm
Area of the flowr garden = $\pi(R^2 - r^2)$
= $\frac{22}{7}$ [21^2 – 14^2]
= $\frac{22}{7}$ [441 – 196]
= $\frac{22}{7}$ × 245 = 770 m^2
Hence, area of the garden = 770 m^2

12. Area of shaded region = Area of square – Area of circle
= (side)^2 – πr^2
= (10)^2 – 3.14 × 5 × 5
= 100 – 3.14 × 25
= 100 – 78.5 = 21.5 cm^2

WORKSHEET (BASED ON COMPLETE CHAPTER)

1. (a) (ii) (b) (i) (c) (iii)

2. (a) B × H
(b) Sum of sides
(c) Circumference
(d) Area

3. (a) T (b) F (c) T
(d) T

4. Side of square = 13 cm
Area of square = (side)^2 = (13)^2 = 169 cm^2
Length of rectangle = 10 cm
Breadth of rectangle = 8 cm

Area of rectangle = $l \times b = 10 \times 8\ cm^2 = 80\ cm^2$

Square encloses more area.

5. Side of square = 24 cm

Area of square = $(24)^2 = 576\ cm^2$

Perimeter of square = 4 × side

= 4 × 24 cm = 96 cm

6. Area of rectangle = area of circle

$\Rightarrow l \times b = \pi r^2$

$\Rightarrow r^2 = \frac{l \times b}{\pi}$

7. Let height of parallelogram = x

Base of parallelogram = 2x

Area = 512 m^2

$\Rightarrow B \times H = 512\ m^2$

$\Rightarrow x \times 2x = 512\ m^2$

$\Rightarrow 2x^2 = 512\ m^2$

$\Rightarrow x^2 = \frac{512}{2} = 256$

$\therefore x = \sqrt{256} = 16$ m

$\therefore$ Base = 2 × 16 m = 32 m, height = 16 m

8. Let length of rectangle = 3x m

Breadth of rectangle = 2x m

Area = 3456 m^2

$\Rightarrow 3x \times 2x = 3456\ m^2$

$\Rightarrow 6x^2 = 3456\ m^2$

$\Rightarrow x^2 = \frac{3456}{6} = 576$

$\therefore x = \sqrt{576} = 24$ m

l = 3x = 3 x 24 = 72 m

b = 2x = 2 x 24 = 48 m

Perimeter of rectangular plot = length of fencing

Length of fencing = 2(l + b)

= 2 (72 + 48)

= 2 x 120

= 240 m

Cost of fencing = 240 x ₹ 4.50

= ₹ 1080

9. Circumference of circle = 44 cm

$\Rightarrow 2\pi r = 44$ cm

$\Rightarrow 2 \times \frac{22}{7} \times r = 44$

$\Rightarrow r = 44 \times \frac{7}{22} \times \frac{1}{2} = 7$ cm

Hence, r = 7 cm, D = 2r = 2 × 7 cm = 14 cm

10. Ratio of diameter = 4 : 6

$\Rightarrow \pi D : \pi D$

$\Rightarrow \frac{22}{7} \times 4 : \frac{22}{7} \times 6$

$\Rightarrow \frac{88}{7} : \frac{132}{7}$

= 88 : 132 = 2 : 3

11. Area of $\Delta ABC = \frac{1}{2} \times B \times H\ cm^2$

$= \frac{1}{2} \times 10.5 \times 7\ cm^2$

$= \frac{73.5}{2} cm^2 = 36.75\ cm^2$

Height from B to AC = $\frac{36.75}{8.5}\ cm^2$

= 4.32 cm

Chapter 10

Algebraic Expressions

WORKSHEET 1: INTRODUCTION TO ALGEBRAIC EXPRESSIONS

1. (a) $3x + 4$ (b) $\frac{1}{2}x + 19$
   (c) $xy + (x + y)$ (d) $5y - x^2$
   (e) $x + \frac{9}{a} + bx + \frac{9}{a} + b$
2. (a) np (b) nl
   (c) $1 \times b$ (d) $4x$
3. (a) -101 (b) $-3 \times 7 \times 15 = -315$
   (c) -1
   (d) $(-25 + 28) = 3$
4. (a) $\frac{-17}{5}$ (b) 2
5. (a) $-17\,b^2c$ (b) $\frac{+16}{3}q^3 r$
   (c) $-15y^2$
6. (a)

Terms	Factors	
$a^3\,b^3\,c$	$a \times a \times a \times b \times b \times b \times c$	
$a^2\,b^2\,c$	$a \times a \times b \times b \times c$	like terms
$a^2\,c\,b^2$	$a \times a \times c \times b \times b$	
$-5a^2\,b^2\,c$	$-5 \times a \times a \times b \times b \times c$	

   (b)

Terms	Factors	
$-3x^2\,y$	$-3x$ like Terms	like terms
$2y^2\,x^2$	$2 \times y \times y \times x \times x$	
$-5y\,x^2$	$-5 \times y \times x \times x$	
$-2x^2\,y^2$	$-2 \times x^2 \times x^2 \times y \times y$	

7. $p = -3, q = -1$ and $r = 2$
   $3p^2\,q^2\,r^2 - 2pqr + 7 = 3\ (-3)^2\ (-1)^2\ (2)^2 - (2)(-3)(-1)(2) + 7$
   $= 3(9)(1)(4) - 2(6) + 7$
   $= 108 - 12 + 7 = 115 - 12 = 103.$
8. $a = 2, b = -1, c = -2$
   (a) $\frac{1}{5}a^2 b + c = \frac{1}{2}(2)^2 \times (-1) + (-2) = -2 - 2 = -4$
   (b) $2a^2\,b^2 - 5ab + 7 = 2\,(2)^2 \times (-1)^2 - 5\,(2)\,(-1) + 7$
   $= 8 + 10 + 7 = 25$
9. Digit in the unit places = b
   digits in the tens place = a
   Number = $b \times 1 + 10 \times a = b + 10a$
   Digits are required then new number
   $= 10b + a$
10. Kajal's age = x years
    Ruhi's age = 2x years
    Sum of Ruhi's and Kajal's age = $x + 2x$
    $= 3x$ years.
11. $p = 2, q = -5, r = 1$
    $3p^3 + 4q^2 + r$
    $= 3(2)^3 + 4(-5)^2 + 1$
    $= 24 + 4\,(25) + 1$
    $= 24 + 100 + 1 = 125$

WORKSHEET 2: OPERATIONS ON ALGEBRAIC EXPRESSIONS

1. (a) $\frac{3}{2}a^2 b - \frac{1}{2}ab + 3a^2 b + 2ab + \left(\frac{-1}{2}a^2b^2\right) + \frac{3}{2}ab$

$\Rightarrow \frac{3}{2}a^2 b - \frac{1}{2}ab + 3a^2 b + 2ab - \frac{1}{2}a^2 b + \frac{3}{2}ab$

$\Rightarrow a^2 b\left(\frac{3}{2} + 3 - \frac{1}{2}\right) + ab\left(\frac{-1+4+3}{2}\right)$

$\Rightarrow a^2 b\left(\frac{8}{2}\right) + ab\left(\frac{6}{2}\right) = 4a^2b + 3ab$

(b) $3x^2 - 8y^2 + 4z^2 + 2y^2 - 5x^2 + 4z^2 + 6y^2 - 9x^2 + 4z^2$

$\Rightarrow x^2(3 - 5 - 9) + y^2(-8 + 2 + 6) + z^2(4 + 4 + 4)$

$= x^2(-11) + y^2(0) + z^2(12)$

$\Rightarrow -11x^2 + 12z^2$

(c) $11x - 5y + 8 + 9x - 9y + 5$

$\Rightarrow 20x - 14y + 13$

2. (a) $-x^2 - 2xy + y^2 - (x^2 + 2xy + y^2)$

$= -x^2 - 2xy + y^2 - x^2 - 2xy - y^2$

$\Rightarrow -2x^2 - 4xy$

(b) $7x + 9z - 3x + 5z$

$\Rightarrow 4x + 14z$

(c) $c - (7a^2 + 8b^2 - 9c^2)$

$\Rightarrow c - 7a^2 - 8b^2 + 9c^2$

(d) $9 + 2a + 5b - c - 1 = 2a + 5b - c + 8$

3. (a) $4a - 10b - (-8a + 4b)$

$4a - 10b + 8a - 4b = 12a - 14b$

(b) $9x^2y - 2xy + 5 - 3 + 15xy - 20x^2y$

$\Rightarrow x^2y(9 - 20) + xy(-2 + 15) + 2$

$\Rightarrow -11x^2y + 13xy + 2.$

(c) $6c^2 + 4cd + d^2 - 5c^2 - 2cd + 2d^2$

$\Rightarrow c^2(6 - 5) + cd(4 - 2) + d^2(1 + 2)$

$\Rightarrow c^2 + 2cd + 3d^2$

(d) $7p + 3q + 10p - 8q$

$= p(7 + 10) + q(3 - 8) = 17p - 5q$

(e) $6 + [2a - \{3b - 5a - b + 6 + 2a^2\} - (a^2 - 2ab)]$

$= 6 + [2a - \{2b - 5a + 6 + 2a^2\} - a^2 + 2ab]$

$= 6 + [2a - 2b + 5a - 6 - 2a^2 - a^2 + 2ab]$

$= 6 + [a(2 + 5) - 3a^2 - 2b + 2ab]$

$= 6 + 7a - 3a^2 - 2b + 2ab.$

4. A.T.Q.

$[(4x^2 - 5x + 7) + (8 - 3x^2 - 4x)] - [6x^2 - 7x + 5]$

$= [x^2(4 - 3) + x(-5 - 4) + (7 + 8) - 6x^2 + 7x - 5$

$= x^2 - 9x + 15 - 6x^2 + 7x - 5$

$= -5x^2 - 2x + 10$

5. $A = 4x^2 - 6x - 9$, $B = x^2 + 7x - 4$, $c = -7x^2 + 4xy - 3y^2$

(a) $A + B - C$

$= 4x^2 - 6x - 9 + x^2 + 7x - 4 - (-7x^2 + 4xy - 3y^2)$

$= 5x^2 + x - 13 + 7x^2 - 4xy + 3y^2$

$= x^2(5 + 7) + x - 4xy + 3y^2 - 13$

$= 12x^2 + x - 4xy + 3y^2 + 3y^2 - 13.$

(b) $B + C - A$

$= x^2 + 7x - 4 + (-7x^2 + 4xy - 3y^2) - (4x^2 - 6x - 9)$

$= x^2 + 7x - 4 - 7x^2 + 4xy - 3y^2 - 4x^2 + 6x + 9$

$= x^2(1 - 7 - 4) + x(7 + 6) - 4 + 4xy + 9 - 3y^2$

$= -10x^2 + 13x + 4xy - 3y^2 + 5$

(c) $A - B + C$

$= 4x^2 - 6x - 9 - (x^2 + 7x - 4) + (-7x^2 + 4xy - 3y^2)$

$= 4x^2 - 6x - 9 - x^2 - 7x + 4 - 7x^2 + 4xy - 3y^2$

$= x^2(4 - 1 - 7) + x(-6 - 7) + (-5) + 4xy - 3y^2$

$= -4x^2 - 13x + 4xy - 3y^2 - 5$

(d) $A - B - C$

$= 4x^2 - 6x - 9 - (x^2 + 7x - 4) - (-7x^2 + 4xy - 3y^2)$

$= 4x^2 - 6x - 9 - x^2 - 7x + 4 + 7x^2 - 4xy + 3y^2$

$= x^2(4 - 1 + 7) + x(-6 - 7) - 5 - 4xy + 3y^2$

$= 10x^2 - 13x - 4xy + 3y^2 - 5$

6. A.T.Q

$[(5x^2 + 3xy + y^2) + [-4x^2 - 3y^2] - [x^2 - 5xy + y^2]$

$= (5x^2 + 3xy + y^2 - 4x^2 - 3y^2) - (x^2 - 5xy + y^2)$

$= x^2 - 2y^2 + 3xy - x^2 + 5xy - y^2$

$= -3y^2 + 8xy.$

7. Savi earns every month = $15a + 8b$

She spends = $3a - 2b$

$\therefore$ She save = $(15a + 8b) - (3a - 2b)$

$= 15a + 8b - 3a + 2b$

$= 12a + 10b.$

8. Ritvik spends for a shirt = $8a - 3b$

Ritvik spends for trouser and blazer = $8a + 3b$

Ritvik spens for tie = $2a - 3b$

Total money spents = ₹ 3500

A.T.Q

$\therefore 8a - 3b + 8a + 3b + 2a - 3b = 3500$

$= 18a - 3b = 3500$

9. The given expression

$2p^3 - 2p^2 + 8p - 7 - (4p^2 - 4p + 8)$

$= 2p^3 - 2p^2 + 8p - 7 - 4p^2 + 4p - 8$

$= 2p^3 - 6p^2 + 12p - 15$

10. $15a^2 - 8b^2 + 9ab - 4b^2 + 7ab$

$= 15a^2 - 12b^2 + 16ab$

WORKSHEET 3: FINDING THE VALUE OF AN EXPRESSION

1. Given $x = -3$

(a) $5x + 8 = 5(-3) + 8 = -15 + 8 = -7$

(b) $-2x^2 + 5x + 7 = -2(-3)^2 + 5(-3) + 7$

$= -18 - 15 + 7 = -33 + 7 = -26$

(c) $4x^2 - 3x - 8 = 4(-3)^2 - 3(-3) - 8$

$= 36 + 9 - 8$

$= 45 - 8 = 37.$

2. Given $x = 2, y = -2$

(a) $x^2 + xy + y^2 = (2)^2 + (2)(-2) + (-2)^2$

$4 - 4 + 4 = 4$

(b) $x^2 - 2xy - y^2 = (2)^2 - 2(2)(-2) - (-2)^2$

$= 4 + 8 - 4 = 12 - 4 = 8$

(c) $x^2 + 3y^2 = (2)^2 + 3(-2)^2 = 4 + 12 = 16$

3. Given $x = 0, y = -2$

(a) $3x^2 + 4xy + 4 = 3(0)^2 + 4(0)(-2) + 4 = 0 + 0 + 4 = 4$

(b) $4x^2y + 3xy^2 + 2xy = 4(0)^2(-2) + (-2) + 3(0)(-2)^2 + 2(0)(-2) = 0$

4. Given, $x = 3, y = -1$ and $z = -2$

(a) $5x^2yz - 3xy^2z + 4xyz$

$= 5(3)^2(-1)(-2) - 3(3)(-1)^2(-2) + 4(3)(-1)(-2)$

$= 5(9)(2) - 3(3)(-2) + 4(6)$

$= 90 + 18 + 24 = 132$

(b) $x^2 + y^2 + 2^2 - xy - yz - zx$

$= (3)^2 + (-1)^2 + (-2)^2 - (3)(-1) - (-1)(-2) - (-2)(3)$

$= 9 + 1 + 4 + 3 - 2 + 6 = 15 + 6 = 21.$

(c) $xy^2 - xyz + 9xy^2z + 16$

$= (3)(-1)^2 - (3)(-1)(-2) + 9(3)(-1)^2(-2) + 16$

$= 3 - 6 + 27(-2) + 16$

$= -3 - 54 + 16$

$= -57 + 16 = -41$

5. Given $a = 9$

$a^3 - 4(a - 9) = (9)^3 - 4(9 - 9)$

$= 729 - 4(0) = 729$

6. Given $b = -15$

$b^4 - 3b^2 - 200$

$= (-15)^4 - 3(-15)^2 - 200$

$= 50625 - 675 - 200 = 50625 - 875 = 49750$

7. Given $a = 3, b = -5$

$3(a^3 + a^2b) + 4 - 2ab$

$= 3[(3)^3 + (3)^2(-5)] + 4 - 2(3)(-5)$

$= 3[27 - 45] + 4 + 30$

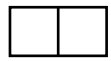
$= 3(-18) + 4 + 30 = -54 + 34 = -20$

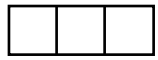
WORKSHEET 4: USING ALGEBRAIC EXPRESSIONS FORMULAS AND RULES

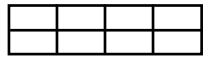
1.

No. of sq.
No. of line segment

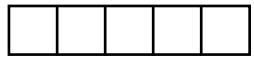
4  1

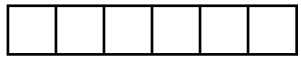
7  2

10  3

13  4

[∴ $3 \times 4 + 1 = 12 + 1 = 13$]

16  5

19  6

n^{th} term will be $3x + 1$

50^{th} square contains = $3 \times 50 + 1 = \underline{151}$ line segments

The total no. of line segments for 12^{th} square = $3(12) + 1$

$= 36 + 1 = \underline{37}$

2. Given expression for line segment = $3n - 1$
   (a) n = 11, $3(11) - 1 = 33 - 1 = 32$
   (b) n = 31, $3(31) - 1 = 93 - 1 = 92$
   (c) n = 45, $3(45) - 1 = 135 - 1 = 134$
   (d) n = 81 $3(81) - 1 = 243 - 1 = 242$
   (e) n = 100 $3(100) - 1 = 300 - 1 = 299$
3. Given expression for line segment = $5n + 3$
   (a) n = 15 $5(15) + 3 = 75 + 3 = 78$
   (b) n = 40 $5(40) + 3 = 200 + 3 = 203$
   (c) n = 108 $5(108) + 3 = 540 + 3 = 543$
   (d) n = 253 $5(253) + 3 = 1265 + 3 = 1268$
4. (a) $5 \times n + 2 = 5n + 2$
   (b) $5 \times 18 + 2 = 90 + 2 = 92$
   (c) $5 \times 49 + 2 = 245 + 2 = 247$
   (d) $5 \times 65 + 2 + 5 \times 78 + 2$
   $= 325 + 2 + 390 + 2$
   $= 327 + 392 = 719.$
5. (a) $6 \times 8 + \underline{4} = 48 + \underline{4} = \underline{52}$
   (b) $6 \times \underline{9} + \underline{4} = \underline{54} + \underline{4} = \underline{58}$
   (c) $6 \times \underline{15} + \underline{4} = \underline{90} + \underline{4} = 94$
   (d) $6 \times \underline{18} + \underline{4} = 108 + 4 = 112$

WORKSHEET (BASED ON COMPLETE CHAPTER)

1. (a) (i) (b) (iii) (c) (i)
   (d) (ii) (e) (ii) (f) (iii)
   (g) (iii)
2. (a) Monomial (b) Trinomial
   (c) Binomial
3. (a) $25x^2z^2$ (b) $-11x^3$ (c) $95bx$
4. (a) $4xy = 4 \times x \times y$
   $-6x^2y = -6 \times x \times x \times y$ — like terms
   $-7yx = -7 \times y \times x$
   $x^2y = x \times x \times y$ — like terms
   (b) $3x^2y^2 = 3 \times x \times x \times y \times y$
   $-4xy = -4 \times x \times y$ — like terms
   $6xy = 6 \times x \times y$
   $x^2y^2 = x \times x \times y \times y$ — like terms
5. Degree = 3.
6. (a) $16x - [7x^3 + 4x^2 - \{9x^2 - (5 - 6x - x^3) - 4x^3\} - 5x$
   $= 16x - [7x^3 + 4x^2 - \{9x^2 - 3x^3 + 6x - 5\} - 5x]$
   $= 16x - [7x^3 + 4x^2 - 9x^2 + 3x^3 - 6x + 5 - 5x]$
   $= 16x - [10x^3 - 5x^2 - 11x + 5]$
   $= 16x - 12x^3 + 5x^2 + 11x - 5$
   $= -12x^3 + 5x^2 + 27x - 5$
   (b) $80 - [25x - 42x + 30 - 3\{10x - 28 + 35x\}]$
   $= 80 - [-17x + 30 - 3(45x - 28)]$
   $= 80 - [-17x + 30 - 135x + 84]$
   $= 80 - [-152x + 114] = 80 + 152x - 114]$
   $= 152x - 34$
7. Given $x = -2, y = 1, 2 = -3$
   $x^2 + y^2 + z^2 - xy - yz - zx$
   $= (-2)^2 + (1)^2 + (-3)^2 - (-2)(1) - (1)(-3) - (-3)(-2)$
   $= 4 + 1 + 9 + 2 + 3 - 6$
   $= 19 - 6 = 13$
8. Given, $x = 3, y = -4, z = -2, a = -2, b = -3$
   $x^2y + 4z^2 - 8y + 3ax^2 + 3ax^2 - 2by$
   $= (3)^2(-4) + 4(-2)^2 - 8(-4) + 3(-2)(3)^2 - 2(-3)(-4)$
   $= -36 + 4(4) + 32 + (-6)(9) - 2(12)$
   $= -36 + 16 + 32 - 54 - 24$
   $= -114 + 48 = -66$
9. $\frac{x}{2} - \frac{1}{4} = \frac{x}{3} + \frac{1}{2}$
   $\Rightarrow \frac{x}{2} - \frac{x}{3} = \frac{1}{2} + \frac{1}{4}$
   $\Rightarrow \frac{3x - 2x}{6} = \frac{2+1}{4} \Rightarrow \frac{x}{6} = \frac{3}{4}$
   $\Rightarrow 4x = 18 \Rightarrow x = \frac{18}{4} = \frac{9}{2}$

10. $6x - 14 = 4x - 10$

$\Rightarrow 6x - 4x = 14 - 10 \Rightarrow 2x = 4 \Rightarrow x = 2$

11. Let the number = x

A.T.Q

$\frac{1}{6}x = 8 \Rightarrow x = 8 \times 6 = 48$

12. Let the number = x

A.T.Q

$x - 27 = 49 \Rightarrow x = 49 + 27$

$\Rightarrow \quad x = 76$

13. Let the first number = x + 1

Let the second number = x + 3

A.T.Q

$x + 1 + x + 3 = 36$

$\Rightarrow \quad 2x + 4 = 36 \Rightarrow 2x = 36 - 4 = 32$

$\Rightarrow \quad x = \frac{32}{2} = 16$

$\therefore$ Smaller number = 16 + 1 = 17

14. Let the number of girls = x

Let the number of boys = (45 – x)

A.T.Q

Number of boys = 2/3 x number of girls

(45 – x) = (2/3) * x

3(45 – x) = 2x

135 – 3x = 2x

5x = 135

x = 27

Number of girls = x = 27

Number of boys = (45 – x) = 45 – 27 = 18

15. Let the number = x

A.T.Q

$x + 10x = 110$

$\Rightarrow \quad 11x = 110 \Rightarrow x = \frac{110}{11} = 10$

Numbers are = 10, 10 × 10, 100

16. The required expression

$(7y + 8) - (6y^2 + 5y - 4)$

$= 7y + 8 - 6y^2 - 5y + 4 = 2y + 12 - 6y^2$

17. The required expression

$(-5x^3 + 3x^2 + 8) - (-4x^2 + 10x + 9)$

$= -5x^3 + 3x^2 + 8 + 4x^2 - 10x - 9$

$\Rightarrow -5x^3 + 7x^2 - 10x - 1$

18. 15^{th} term = 11 × 15 – 5

= 165 – 5 = 160

19. Area of rectangle = l × b = (5x + 3y) x (2x – 5y)

$= 5x(2x - 5y) + 3y(2x - 5y)$

$= 10x^2 - 25xy + 6xy - 15y^2$

$= 10x^2 - 19xy - 15y^2$

20. (a) (iii) (b) (iv) (c) (ii)

(d) (i)

Chapter 11

Exponents and Powers

WORKSHEET 1: INTRODUCTION TO ALGEBRAIC EXPRESSIONS

1. (a) Base = 5, Exponent = 8
   (b) Base = 9 Exponent = 4
   (c) Base = (–16) Exponent = 7
   (d) Base = (–12) Exponent = 1
2. (a) $5 \times 5 \times 5 \times 5 \times 5 = (5)^5$
   (b) $(-13)^7$
   (c) $8^4 \times 9^3 \times 2^2 \times 5$
   (d) $\frac{3\times3\times3\times3}{4\times4\times4\times4} = \left(\frac{3}{4}\right)^4$
   (c) $-1331 = -11 \times -11 \times -11 = (-11)^3$
   (f) $1024 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = (2)^{10}$
3. (a) $15^6 = 15 \times 15 \times 15 \times 15 \times 15 \times 15$
   (b) $(-19)^3 = (-19) \times (-19) \times (-19)$
   (c) $(11)^{11} = 11 \times 11 \times 11 \times 11 \times 11 \times 11 \times 11 \times 11 \times 11 \times 11 \times 11$
4. (a) $(-33)^2 = (-33) \times (-33) = 1089$
   (b) $(-1)^{89} = -1$
   (c) $(-5)^8 = (-5) \times (-5) \times (-5) \times (-5) \times (-5) \times (-5) \times (-5) \times (-5) \times (-5) = 390625$
   (d) $2^9 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 512$
   (e) $(-9)^2 \times (-3)^5 = (-9) \times (-9) \times (-3) \times (-3) \times (-3) \times (-3) \times (-3)$
   $= 81 \times (-243) = -19683$
   (f) $(-2)^7 \times 0 \times (-1)^{64} = 0$
   (g) $(-16)^2 \times 2^5 = (-16) \times (-16) \times 32$
   $= 256 \times 32 = 8192$
   (h) $(-1)^{111} \times (-1)^{63} = (-1) \times (-1) = 1$
5. (a) 3^5 or 5^3
   $5^3 = 5 \times 5 \times 5 = 125$
   $\therefore$ $243 > 125$
   $\therefore$ $3^5 > 5^3$
   (b) 6^3 or 3^6 $6^3 = 6 \times 6 \times 6 = 216$
   $3^6 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 729$
   $729 > 216$
   $\therefore$ $3^6 > 6^3$
   (c) $200^{100} > 100^2$
6. $-64 = -4 \times -4 \times -4 = (-4)^3$
7. $3125 = (-5) \times (-5) \times (-5) \times (-5) \times (-5)$
   $= (-5)^5$
8. (a) True (b) False (c) False
   (d) True

WORKSHEET 2: LAWS OF EXPONENTS

1. (a) $a^x \times b^x = (ab)^x$
   (b) $7^9 \times (2)^9 = (7 \times 2)^9 = (14)^9$
   (c) $a^n \times a^n = (a)^{n+n} = (a)2^n$
   (d) $2^7 \times 3^7 = (2 \times 3)^7 = (6)^7$
   (e) $4^x \times 2^x = (4 \times 2)^x = 8^x$
   (f) $p^m \times q^m = (p \times q)^m = (pq)^m$
2. (a) $3^6 \times 3^3 = (3)^{6+3} = (3)^9$
   $= 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 19683$
   (b) $(-2)^5 \times (-2)^3 \times (-2)^2$
   $= (-2)^{5+3+2} = (-2)^{10} = 1024$
   (c) $\left(\frac{6}{7}\right)^4 \times \left(\frac{6}{7}\right)^4 = \left(\frac{6}{7}\right)^{4+4} = \left(\frac{6}{7}\right)^8$
   (d) $x^p \times x^q = (x)^{p+q}$
3. (a) $(10^3)^4 = 10^{3\times4} = 10^{12}$
   (b) $\left[\frac{-1^2}{3}\right]^4 = \left(\frac{-1}{3}\right)^4 = \frac{1}{3\times3\times3\times3} = \frac{1}{81}$
   (c) $\{(-2)^n\}^3 = (-2)^{3n}$
   (d) $(a)^q - (a^p)^q = a^q - a^{pq} = a^q(1 - a^p)$

4. (a) 8 billion = 8×10^9

(b) $22500000000 = 2.25 \times 10^{10}$

(c) $853.347 = 8.53347 \times 10^2$

(d) 348 million = 3.48×10^5

5. (a) $9.5 \times 10^8 = 950000000$

(b) $3.6 \times 10^5 = 360000$

(c) $6.073 \times 10^3 = 6073$

(d) $7.77 \times 10^5 = 777000$

6. (a) 72062

(b) 370304428

7. (a) 15cm = $\underline{1.5}$ dm

(b) 9m = $\underline{0.9}$ dam

(c) 1km = $\underline{1000}$ m

(d) 21 dm = $\frac{21}{100} = 0.21cm$

8. (a) $(7)^5 \times (6)^5 \times (3)^5$

$= (7)^5 \times (3\times 2)^5 \times 3^5$

$= 7^5 \times 3^5 \times 2^5 \times 3^5$

$= (7^5 \times 2^5) \times (3)^{5+5}$

$= (14)^5 \times (3)^{10}$

(b) $(2^{18} \div 2^{12}) \times 2^4 = (2^{18-12}) \times 2^4$

$= (2^6) \times 2^4 = (2)^{6+4}$

$= (2)^{10}$

(c) $\left(\frac{3}{5}\right)^6 \times \left(\frac{5}{6}\right)^6$

$= \frac{3}{\cancel{5}} \times \frac{3}{\cancel{5}} \times \frac{3}{\cancel{5}} \times \frac{3}{\cancel{5}} \times \frac{3}{\cancel{5}} \times \frac{3}{\cancel{5}} \times \frac{\cancel{5}}{6} \times \frac{\cancel{5}}{6} \times \frac{\cancel{5}}{6} \times \frac{\cancel{5}}{6} \times \frac{\cancel{5}}{6} \times \frac{\cancel{5}}{6}$

$= \frac{1\times1\times1\times1\times1\times1}{2\times2\times2\times2\times2\times2} = \frac{1}{64} = \left(\frac{1}{2}\right)^6.$

9. (a) $\frac{2^3 \times 3^4 \times 2^2}{3^2 \times 2^5} = \frac{(2)^{3+2} \times 3^4}{3^2 \times 2^5} = \frac{2^5 \times 3^4}{3^2 \times 2^5}$

$= 3^{4-2} = (3)^2 = 3 \times 3 = 9$

(b) $(4^0 + 5^0 + 6^0) \times 3^0 = (1+1+1) \times 1$

$= 3 \times 1 = 3$

(c) $\frac{3^9}{3^4 \times 3^5} = \frac{3^9}{(3)^{4+5}} = \frac{3^9}{3^9} = 1$

10. (a) $\frac{3^5 \times 10^5 \times 125}{5^7 \times 6^4}$

$= \frac{3^5 \times (5\times 2)^5 \times (5)^3}{5^7 \times (3\times 2)^4}$

$= \frac{3^5 \times 5^5 \times 2^5 \times 5^3}{5^7 \times 3^4 \times 2^4} = \frac{3^5 \times (5)^{5+3} \times 2^5}{5^7 \times 3^4 \times 2^4}$

$= \frac{3^5 \times (5)^8 \times 2^5}{5^7 \times 3^4 \times 2^4} = (3)^{5-4} \times (5)^{8-7} \times (2)^{5-4}$

$= (3)^1 \times (5)^1 \times (2)^1$

$= 15 \times 2 = 30$

(b) $\left[\left(\frac{3}{4}\right)^5 \times \left(\frac{3}{4}\right)^2\right] \div \left(\frac{3}{4}\right)^7$

$= \left[\left(\frac{3}{4}\right)^{5+2}\right] \div \left(\frac{3}{4}\right)^7 = \left(\frac{3}{4}\right)^7 \div \left(\frac{3}{4}\right)^7$

$= \left(\frac{3}{4}\right)^{7-7} = \left(\frac{3}{4}\right)^0 = 1$

(c) $\left[\left(\frac{-4}{7}\right)^3 \times \left(\frac{-4}{7}\right)^5\right] \div \left(\frac{16}{49}\right)^2$

$= \left[\left(\frac{-4}{7}\right)^{3+5}\right] \div \left[\frac{4\times4}{7\times7}\right]^2$

$= \left(\frac{-4}{7}\right)^8 \div \left[\frac{4}{7}\right]^{2\times2} = \left(\frac{-4}{7}\right)^8 \div \left(\frac{4}{7}\right)^4$

$= (-1)^8 \left(\frac{4}{7}\right)^{8-7}$

$= \left(\frac{4}{7}\right)^4 = \frac{256}{2401}$

11. (a) $\left(\frac{343}{27}\right)^5 \times \left(\frac{343}{27}\right)^x = \left(\frac{7}{3}\right)^{21}$

$\Rightarrow \left(\frac{343}{27}\right)^{5+x} = \left(\frac{7}{3}\right)^{21}$

$\Rightarrow \left(\frac{343}{27}\right)^{5+x} = \left(\frac{343}{27}\right)^{18} \left[\because \left(\frac{7}{3}\times\frac{7}{3}\times\frac{7}{3}\right)^{18}\right.$

$\Rightarrow 5 + x = 18$

$\Rightarrow x = 18 - 5 = 13$

Hence, $x = 13$

(b) $\left(\frac{3}{4}\right)^{12} \div \left[\left(\frac{3}{4}\right)^{3}\right]^{6} = \left(\frac{3}{4}\right)^{x-3}$

$\Rightarrow \left(\frac{3}{4}\right)^{12} \div \left(\frac{3}{4}\right)^{3\times6} = \left(\frac{3}{4}\right)^{x-3}$

$\Rightarrow \left(\frac{3}{4}\right)^{12} \div \left(\frac{3}{4}\right)^{18} = \left(\frac{3}{4}\right)^{x-3}$

$\Rightarrow \left(\frac{3}{4}\right)^{12-18} = \left(\frac{3}{4}\right)^{x-3} \Rightarrow \left(\frac{3}{4}\right)^{-6} = \left(\frac{3}{4}\right)^{x-3}$

$\Rightarrow -6 = x - 3$

$\Rightarrow -6 + 3 = x$

$\therefore \quad x = -3$

WORKSHEET (BASED ON COMPLETE CHAPTER)

8. (a) (i) (b) (ii) (c) (iii)
(d) (ii) (e) (iii)

2. (a) $12 \times 12 \times 12 = 1728$
(b) $8 \times 8 \times 8 \times 8 = 4096$
(c) $11 \times 11 \times 11 \times 11 = 14641$

3. (a) $\left(\frac{13}{17}\right)^{3}$ (b) $(4)^3 \times (7)^3 \times (3)^2$
(c) $\left(\frac{-4}{8}\right)^{2}$

4. (a) -1
(b) $(-5) \times (-5) \times (-5) \times (-5) \times (-5) \times (-5) = 15625$
(c) $26 \times 26 \times 26 \times 26 = 456976$

5. (a) $-1 \times (-2) \times (-2) \times (-2) \times (-2) \times 36$
$= -1 \times 16 \times 36 = -576$
(b) $(-5) \times (-5) \times (-5) \times (-5) \times (-6) \times (-6) \times (-6) \times (-6) \times (-6) = -625 \times 7776$
$= -4860000$

6. (a) $9^5 = 9 \times 9 \times 9 \times 9 \times 9 = 59049$
$5^9 = 5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 = 1953125$
$\therefore \quad 5^9 > 9^5$
(b) $6^2 > (-6)^3$

7. (a) $\frac{8}{27} = \frac{2\times2\times2}{3\times3\times3} = \left(\frac{2}{3}\right)^{3}$

(b) $\frac{-5\times-5\times-5}{9\times9\times9} = \left(\frac{-5}{9}\right)^{3}$

$\frac{5\times5\times5\times5}{6\times6\times6\times6} = \left(\frac{-5}{6}\right)^{4}$

8. (a) $\frac{-5}{8}\times\frac{-5}{8} = \frac{25}{64}$

(b) $\frac{-2}{3}\times\frac{-2}{3}\times\frac{-2}{3}\times\frac{-2}{3}\times\frac{-2}{3}\times\frac{-2}{3} = \frac{64}{729}$

(c) $\frac{5}{6}\times\frac{5}{6}\times\frac{5}{6}\times\frac{5}{6} = \frac{625}{1296}$

9. (a) $\left(\frac{3}{-2}\right)^{121}$ (b) $\left(\frac{-1}{9}\right)^{6}$ (c) $\left(\frac{3}{4}\right)^{4}$

10. (a) $\left(\frac{-3}{5}\right)\times\left(\frac{-3}{5}\right)\times\left(\frac{-3}{5}\right)\times\left(\frac{-3}{5}\right)\times\left(\frac{-3}{5}\right)$
$\times\frac{4}{9}\times\frac{4}{9}\times\frac{4}{9}\times\frac{4}{9}\times\frac{4}{9}\times\frac{-15}{18}\times\frac{-15}{18}\times\frac{-15}{18}$

$= \frac{-1\times4\times4\times4\times4\times4\times(-3)\times(-3)\times(-3)}{5\times5\times3\times3\times3\times3\times3\times18\times18\times18}$

$= \frac{4\times4\times4\times4\times4}{25\times9\times18\times18\times18} = \frac{2\times2\times2\times16}{25\times9\times9\times9\times9}$

$= \frac{128}{25\times6561} = \frac{128}{164025}$

(b) $\frac{12^4\times9^3\times7}{6^4\times7^2\times81} = \frac{6^4\times2^4\times9^3\times7}{6^4\times7\times7\times9^2} = \frac{2^4\times9}{7}$

$= \frac{144}{7}$.

(c) $\frac{3}{7}\times\frac{3}{7}\times\frac{60}{27}\times\left(\frac{-1}{6}\right)\times\left(\frac{-1}{6}\right)$

$\Rightarrow \frac{3}{7}\times\frac{3}{7}\times\frac{10}{3\times3\times3\times6} = \frac{10}{49\times3\times6}$

$= \frac{5}{49\times3\times3} = \frac{5}{49\times9}$

$= \frac{5}{441}$

11. (a) $93 \div 33 = \frac{93}{33} = \frac{31}{11}$

(b) $\frac{2^3 \times (2)^3 \times (3)^5}{3^2 \times (2^5)} = \frac{(2^6) \times 3^5}{3^2 \times (2)^5}$

$= (2)^{6-5} \times (3)^{5-2} = 2 \times (3)^3 = 2 \times 27 = 54$

12. (a) $(5)^{4n-2n} = 5^6 \Rightarrow (5)^6$

$\Rightarrow (5)^{4n-2n} = \Rightarrow (5)^{2n} = (5)^6$

$\Rightarrow 2n = 6 \therefore n = \frac{6}{2} = 3$

(b) $\left(\frac{3}{4}\right)^{5+6} = \left(\frac{3}{4}\right)^{n-5} \Rightarrow \left(\frac{3}{4}\right)^{11} = \left(\frac{3}{4}\right)^{n-5}$

$\Rightarrow 11 = n - 5$

$\Rightarrow x = 11 + 5 = 16.$

13. (a) $60000000 = 6 \times 10^7$

(b) $6183900000 = 6.1839 \times 10^9$

(c) $100,000,000,000 = 1 \times 10^{11}$

14. (a) $4.621 \times 10^5 = 462100$

(b) $3.59 \times 10^7 = 35900000$

Chapter 12

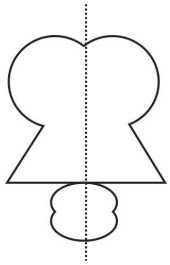
Symmetry

WORKSHEET 1: LINE OF SYMMETRY FOR REGULAR POLYGONS

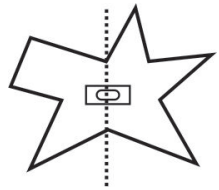
1. (a), (c), (e) and (f)

2. (a) 1 (b) 0 (c) 4 (d) 2 (e) 1 (f) 3

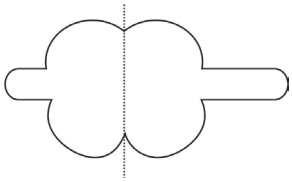
3. (a)



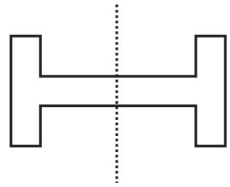
(b)



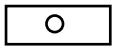
(c)



(d)

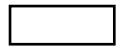


4.



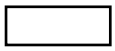
Bangladesh

America

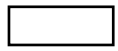


Bahamas

Argentina



Austria



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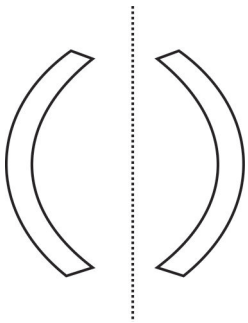
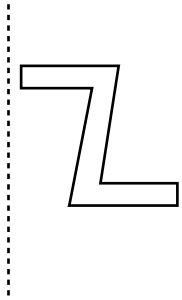
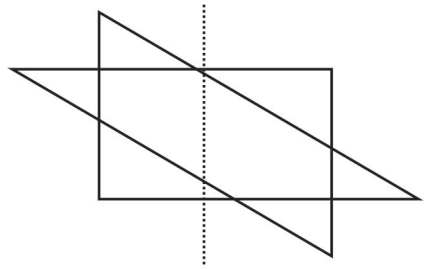
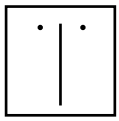


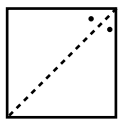




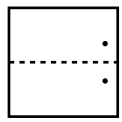
7. (a)



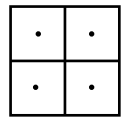
(b)



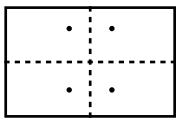
(c)



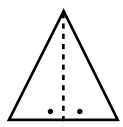
(d)



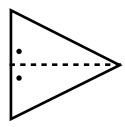
(e)



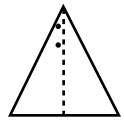
(f)



(g)



(h)

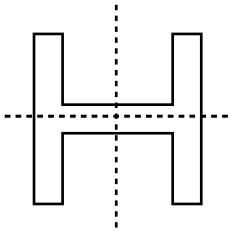


8. (a) 3 (b) 2 (c) 1 (d) 6
(e) 4 (f) 2

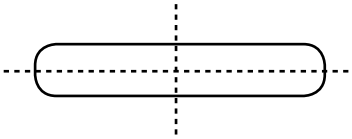
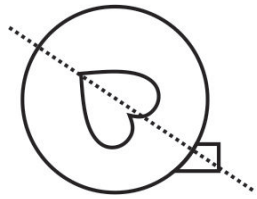
WORKSHEET 2: ROTATIONAL SYMMETRY

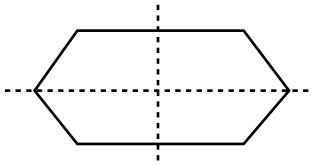
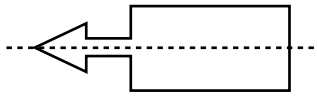
1. (a), (b) and (c)
2. (a) 3 (b) 2 (c) 3
3. (a) 2 (b) 2 (c) 1 (d) 5
4. (a) 4, 4 (b) M and W (c) 1
(d) 1
5. (a) F (b) F (c) T (d) T
(e) T (f) T (g) T

WORKSHEET (BASED ON COMPLETE CHAPTER)

1. (a)  (b) No line of symmetry

2. (a) No (b) No (c) Yes (d) No

3. (a)  (b) 

(c)  (d) 

4. 2

5. (a) Yes, the given figure has both line and rotational symmetry.
(b) No, the given figure does not have both line and rotational symmetry.

Chapter 13

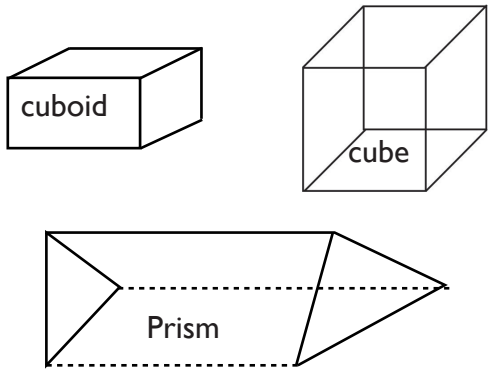
Visualising solid shapes

WORKSHEET 1: PLANE FIGURES AND SOLID SHAPES

1. (a) AB, AD, AA'
   (b) CD, DD′, D′C′, CC′
   (c) AD D′ A′, C′ B′
   (d) BCC′ B′
   (e) ABCD
2. (a) Ice cream, cap, funnel
   (b) Dice, block, ice cubes, match box
   (c) Tube light, LPG cylinder, pipe, bottle, flute
   (d) Ball, orange, Sun
3. Plane figures: Rhombus, Pentagon, Circle, Hexagon, Trapezium
   Solid figures: Cylinder, Sphere, Pyramid
4. (a) F (b) F (c) T
   (d) T (e) F (f) T
5. (a) no (b) a tetrahedron
   (c) oblong prism (d) 12, 8
   (e) vertex
   (g) Pyramid (h) Hemisphere
3. (a) → (iii) (b) → (i) (c) – (iv)
   (d) → (ii)
4. (a) Cube – 8 vertices, 12 edges and 6 faces
   V + F – E = 8 + 6 – 12 = 14 – 12 = 2
   (b) Cuboid 8 vertices, 12 edges and 6 faces
   V + F – E = 8 + 6 – 12 = 14 – 12 = 2
   (c) Triangular prism – 6 vertices, 9 edges, 5 faces
   V + F – E = 6 + 5 – 9 = 11 – 9 = 2
   (d) Triangular pyramid – 4 vertices, 6 edges, 4 faces
   V + F – E = 4 + 4 – 6 = 8 – 6 = 2
   (e) Square pyramid = 5 vertices, 8 edges, 5 faces
   V + F – E = 5 + 5 – 8 = 2
   Thus, V + F – E is same in each case
5. (c) is the net of a cube
6. (c) is not the net of a square pyramid.
7. Prism
8. Number of cubes = 36 and 30

WORKSHEET 2: PLANE FIGURES AND SOLID SHAPES CONCEPT BASED

1. (a)



2. (a) Cuboid (b) Cube (c) Cone
   (d) Sphere (e) Pyramid (f) Cylinder

WORKSHEET (BASED ON COMPLETE CHAPTER)

1. (a) (ii) (b) (i) (c) (iv)
   (d) (ii)
2. (a) cube (b) 3, 6 (c) net
   (d) rectangular (e) cube
3. (a) F (b) F (c) T
   (d) F (e) T
4. A cuboid has 12 diagonals.