

Chapter 1

Integers

Carry On

1. Coldest to warmest (smallest to greatest)
 Temperature = $-90, -88, -87, -86, -85, -84, -72, -71$
 Months = Aug., Jul., Sept., May, Jun., Apr., Mar., Oct.
2. Temperature of Gulmarg = -13°C
 Temperature of Shimla = -5°C
 Temperature of Ahmedabad = 20°C
 Temperature of Chennai = 25°C

The temperature difference between Gulmarg and Shimla is **greater than** the temperature difference between Ahmedabad and Chennai.

Exercise 1.1

1. To add two integers of unlike signs we find the difference of their absolute values and place the sign of the integer, which has the larger absolute value before the difference.
 - (a) $-16 + 12 = -4$
 - (b) To add two integers of like signs we find the sum of their absolute values and place the common sign before the sum.

$$(-36) + (-3) = (-39)$$
 - (c) $54 + (-54) = 0$
 - (d) $225 + (-63) + (-75) = 225 + (-138) = 87$
2. We add the additive inverse of the integer that is being subtracted, to the other integer.
 - (a) $15 - 7 = 15 + (-7) = 8$
 - (b) $8 - (-5) = 8 + (+5) = 13$
 - (c) $-50 - (-25) = -50 + (+25) = -25$
 - (d) $-8 - 17 = -8 + (-17) = -25$
3. to 6. Take help of the Answer Sheet.
7. Temperature of the hilly place on Tuesday.
 $= -4^{\circ}\text{C} - 2^{\circ}\text{C} = -6^{\circ}\text{C}$
 Temperature of the hilly place on Wednesday = $-6^{\circ}\text{C} + 3^{\circ}\text{C}$
 $= -3^{\circ}\text{C}$.
8. The height of the plane = 500 m
(positive because above the sea level)
 The height of the submarine = -1500 m
(negative because below the sea level)
 Relative height of the plane with respect to the submarine (vertical distance) between them
 $= 500 \text{ m} - (-1500 \text{ m})$

$$= 500 \text{ m} + 1500 \text{ m} = 2000 \text{ m}$$

9. Mary's total of scores $= (-5) + 25 + 15 + (-10) + 5$
 $= 25 + 15 + 5 + (-5) + (-10)$
 $= 45 - 15 = 30 \text{ marks}$

10. $a = 75, b = 84$

$$a - (-b) = a + b$$

$$75 - (-84) = 75 + 84$$

$$75 + 84 = 75 + 84$$

$$159 = 159 \text{ verified}$$

11. Sum of two integers $= -16$

First no. $= 53$

Second no. $= -16 - (53)$
 $= -16 - 53 = -69$

12. Sum of two integers $= 62$

First no. $= -30$

Second no. $= 62 - (-30)$
 $= 62 + 30 = 92$

13. Sum of the first row $= 5 + (-1) + (-4) = 5 + (-5) = 0$

Sum of the second row $= (-5) + (-2) + 7 = (-7) + 7 = 0$

Sum of the third row $= 0 + 3 + (-3) = 0 + 0 = 0$

Sum of the first column $= 5 + (-5) + 0 = 0 + 0 = 0$

Sum of the second column $= (-1) + (-2) + 3 = (-3) + 3 = 0$

Sum of the third column $= (-4) + 7 + (-3) = 7 + (-4) + (-3)$
 $= 7 + (-7) = 0$

Sum of one diagonal $= 5 + (-2) + (-3) = 5 + (-5) = 0$

Sum of the other diagonal $= 0 + (-2) + (-4) = 0 + (-6) = -6$

We see that the sum of the other diagonal is not equal to the same sum of each row, column and one diagonal.

$$-6 \neq 0$$

Therefore, the given square is not a magic square.

Exercise 1.2

1. Take help of the Answer Sheet.

2. (a) $(-4) \times (-5) \times 1$ (b) $(-4) \times (-7) \times (-1)$
 $= 20 \times 1$ $= 28 \times (-1)$
 $= 20$ $= -28$

(c) $(-25) \times (-9) \times (-53) \times 0$
 $= 225 \times (-53) \times 0$
 $= -11925 \times 0$
 $= 0$

(d) to (f) : Solve accordingly above.

3. (a) $16 \times [8 + (-3)] = [16 \times 8] + [16 \times (-3)]$

$$16 \times [8 - 3] = [16 \times 8] + [-48]$$

$$16 \times 5 = 128 - 48$$

$$80 = 80 \text{ verified.}$$

(b) Solve accordingly above.

4. Starting from $(-1) \times 5$

$$(-1) \times 5 = -5$$

$$(-1) \times 4 = -4 = -5 + 1$$

$$(-1) \times 3 = -3 = -4 + 1$$

$$(-1) \times 2 = -2 = -3 + 1$$

$$(-1) \times 1 = -1 = -2 + 1$$

$$(-1) \times 0 = 0 = -1 + 1$$

$$\text{Therefore, } -1 \times (-1) = 0 + 1 = 1$$

5. (a) $18 \times (-45) + (-45) \times (-18)$

$$= -810 + 810 = 0$$

(b) $(-25) \times 125 \times (-4) \times (-10)$

$$= -3125 \times 40 = -125000$$

(c) to (h) : Solve accordingly above.

6. Solve according to Example 5.

7. Room temperature = 40°C .

At every hour temperature reduce = 5°C

So, reduced temperature after ten hours

$$= 5 \times 10$$

$$= 50^\circ\text{C}$$

Now, room temperature after 10 hours freezing process

$$= 40 - 50$$

$$= -10^\circ\text{C}$$

8. (a) Descend mean downward,

So, distance downward from ground = $(-5) \times 15 \text{ min}$

$$= -75 \text{ m}$$

(b) So, distance after 20 minutes from 15 metres above ground

$$= 15 + (-5) \times 20$$

$$= 15 - 100$$

$$= -85 \text{ m}$$

9. Take help of the Answer Sheet.

Exercise 1.3

1. (a) $(-35) \div 7$

We know that division of unlike signs is always negative.

So,
$$\frac{(-35)}{7} = -5$$

(b) to (h) : Solve accordingly above.

2. Let's put all the given digits in both sides in the equation.

$$(a \div b) \div c = a \div (b \div c)$$

$$[40 \div (-2)] \div -2 = 40 \div (-20 \div -2)$$

$$(-20) \div -2 = 40 \div 10$$

$$10 \neq 4 \text{ verified}$$

3. Solve accordingly as Q.2 above.
4. **and 6.** Take help of the Answer Sheet.

5. Solve according to Example 6.

7. (i) Initial temperature = + 12°C

$$\text{Final temperature} = -8^\circ\text{C}$$

$$\begin{aligned}\text{Temperature difference} &= (+12) - (-8) \\ &= 20^\circ\text{C}\end{aligned}$$

$$\text{Rate} = 2 \text{ degree per hour}$$

$$\text{Time taken} = \frac{20}{2} = 10 \text{ hrs.}$$

$$\text{So, Time} = 12 \text{ noon} + 10 \text{ hr} = 10 \text{ p.m.}$$

(ii) Time gap = 12 midnight - 12 noon
= 12 hours

$$\text{So, temperature at 12 midnight}$$

$$= 12 - 12 \times 2$$

$$= 12 - 24$$

$$= -12^\circ\text{C}$$

8. Solve according to Example 7.

In Real World

$$\text{Each student contributed} = ₹ 50$$

$$\begin{aligned}\text{If there were 43 students} &= 43 \times ₹ 50 \\ &= ₹ 2150\end{aligned}$$

MCQ

1. Add and subtract.

2. (a) $-8 - (-4) + 5$

$$= -8 + 4 + 5$$

$$= -8 + 9$$

$$= 1$$

(c) $-4 - 2 + (-8)$

$$= -4 - 2 - 8$$

$$= -14$$

(b) $7 + (-11) - 5$

$$= 7 - 11 - 5$$

$$= 7 - 16$$

$$= -9$$

(d) $-10 - (-2) + 4$

$$= -10 + 2 + 4$$

$$= -10 + 6$$

$$= -4$$

So, only option (a) is not negative.

3. The additive inverse of any real number x is its opposite $-x$.

So, $-10 = 10$.

4. Only option (a) because,

$$-3 - (-5)$$

$$= -3 + 5$$

$$= 2$$

5. (a) $(-8) \times (-5)$

$$= (40)$$

- (b) $(-10) \times (-2) \times 2$

$$= 20 \times 2$$

$$= 40$$

- (c) $(-20) \times (-2)$

$$= 40$$

- (d) $(-10) \times (-4) \times (-1)$

$$(+ 40) \times (-1)$$

$$= -40$$

So, option (d).

6. (a) $(-30) \div (-6)$

$$= 5$$

- (b) $(-30) \div 6$

$$= -5$$

- (c) $30 \div (-5)$

$$= -6$$

- (d) $30 \div 5$

$$= 6$$

Positive integer is greatest than negative so, option (d).

7. Outside temperature of igloo = -18°C

Inside temperature of igloo = $-18^\circ\text{C} + 20^\circ\text{C}$

$$= 2^\circ\text{C}$$

Test Time

1. = $-1032 + 878$

$$= -154$$

$$= -35 - (-154)$$

$$= -35 + 154 = 119$$

2. = $38 + (-87)$

$$= 38 - 87 = -49$$

$$= -49 - (-134)$$

$$= -49 + 134 = 85$$

3. Take the help of Answer Sheet

4. Take the help of Answer Sheet

5. Diana climbs up 5 stairs every second.

She climbs down 2 stairs over the next second.

The net climb for Diana is 3 stairs per 2 second.

Total she has to climb is 60 stairs.

So she should take

$$\frac{60}{3} \times 2 = \frac{120}{3} = 40 \text{ seconds.}$$

6. Product of two numbers = - 180

If one number = 12

Let, the other number = x

$$12x = -180$$

$$x = \frac{-180}{12}$$

$$x = -15$$

So, the other number = - 15

7. A boy flung a pebble.

high = 15 meters

deep = 10 meters

Total distance = 15 + 10

= 25 metres

8. The price of the book = ₹ 96

Number of books bought = 60

Total cost = $60 \times 96 = ₹ 5760$

The mistaken price of each book = $96 - 5 = ₹ 91$

Total bill = $91 \times 60 = ₹ 5460$

Difference between both the bills

$$= 5760 - 5460 = ₹ 300$$

Brain Twister

1. Since Sohan came down 9 floors from 16th floor to meet Ahmed.

Ahmed lives on the $(16 - 9) = 7$ th floor

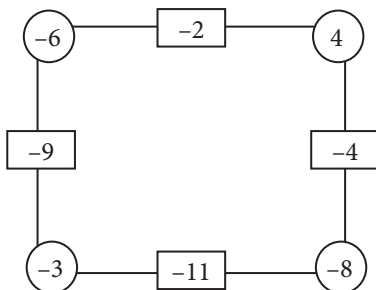
Similarly,

Justin lives on $(7 + 12) = 19$ th floor

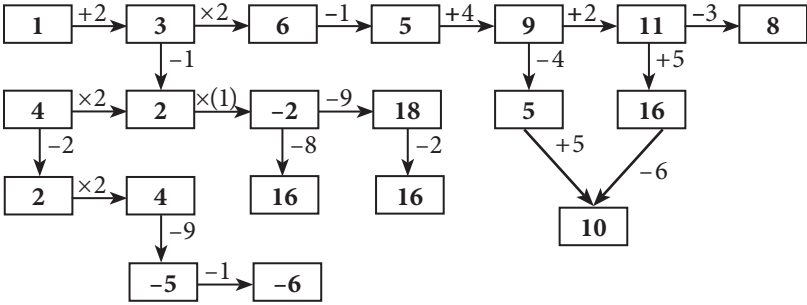
Therefore, the building has 19 floors.

2. Do it yourself.

Think Logically



Fun Task



Carry On

$$1. \frac{5}{2} + 3\frac{3}{5} + \frac{5}{4} + 2\frac{3}{4} + \frac{5}{4} = \frac{5}{2} + \frac{18}{5} + \frac{5}{4} + \frac{11}{4} + \frac{5}{4} = \frac{5}{2} + \frac{18}{5} + \frac{21}{4}$$

$$= \frac{50 + 72 + 105}{20} = \frac{227}{20} = 11\frac{7}{20} \text{ cm}$$

$$2. 3889 + 12.952 - x = 3854.002$$

$$3901.952 - x = 3854.002$$

$$x = 3901.952 - 3854.002$$

$$x = 47.95$$

Exercise 2.1

$$1. (a) 6 \times \frac{2}{3} = \cancel{6} \times \frac{2}{\cancel{3}} = 4$$

(b) to (h) : Solve according to (a).

$$2. (a) 2 \times 4\frac{1}{5} = 2 \times \frac{21}{5} = \frac{42}{5} = 8\frac{2}{5}$$

(b) to (h) : Solve according to (a).

$$3. (b) \frac{2}{3} \text{ of } 27 = \frac{2}{3} \times 27 = 2 \times 9 = 18$$

(a), (c) and (d) : Solve according to (b).

$$4. (d) \frac{5}{6} \text{ of } 9\frac{3}{10} = \frac{5}{6} \text{ of } \frac{93}{10} = \frac{5}{6} \times \frac{93}{10} = \frac{1}{2} \times \frac{31}{2} = \frac{31}{4} = 7\frac{3}{4}$$

(a), (b) and (c) : Solve according to (d).

$$5. (a) \text{ Shade } \frac{3}{3} \times 9 = 3 \times 3 = 9 \text{ triangles}$$

$$(b) \text{ Shade } \frac{3}{3} \times 12 = 3 \times 3 = 9 \text{ circles}$$

$$(c) \text{ Shade } \frac{4}{5} \times 15 = 4 \times 3 = 12 \text{ squares}$$

$$6. 1 \text{ week} = 7 \text{ days}$$

$$\text{Weight of milk yielded by the cow in a week} = 7\frac{9}{10} \text{ kg} \times 7$$

$$= \frac{79}{10} \times 7 = \frac{553}{10}$$

$$= 55\frac{3}{10} \text{ kg}$$

$$7. \text{ Total passengers} = 144$$

$$\text{Lower deck passengers} = \frac{5}{8} \times \cancel{144}^{18} = 90$$

$$\text{Upper deck passengers} = \text{Total passengers} - \text{lower deck passengers}$$

$$= 144 - 90 = 54 \text{ passengers}$$

8. Solve according to Q. 6.

9. Distance travelled by the boy = $2 \times 2\frac{4}{10}\text{ km} + 2 \times 1\frac{1}{2}\text{ km}$

$$= 2 \times \frac{24}{10} + 2 \times \frac{3}{2} = \frac{24}{5} + 3 = \frac{24}{5} + \frac{3 \times 5}{5}$$

$$\Rightarrow \frac{24}{5} + \frac{15}{5} = 7\frac{4}{5}\text{ km}$$

10. Solve according to Example 3.

11. (a) $\frac{2}{5}$ of a kg = $\frac{2}{5} \times 1000\text{ g} = 2 \times 200\text{ g} = 400\text{ g}$

(b) $\frac{7}{20}$ of a metre = $\frac{7}{20} \times 100\text{ cm} = 7 \times 5\text{ cm} = 35\text{ cm}$

(c) $\frac{3}{10}$ of a kg = $\frac{3}{10} \times 1000\text{ g} = 3 \times 100\text{ g} = 300\text{ g}$

(d) $\frac{5}{6}$ of a day = $\frac{5}{6} \times 24\text{ hours} = 5 \times 4 = 20\text{ hours}$

Exercise 2.2

1. (l) $3\frac{2}{5} \times 1\frac{2}{3} = \frac{17}{5} \times \frac{5}{3} = \frac{85}{15} = \frac{85 \div 5}{15 \div 5} = \frac{17}{3} = 5\frac{2}{3}$

(a) to (k) : Solve according to (l).

2. (d) $\frac{5}{6}$ of $\frac{5}{25} = \frac{5}{6} \times \frac{5}{25} = \frac{25}{150} = \frac{25 \div 25}{150 \div 25} = \frac{1}{6}$

(a) to (c) : Solve according to (d).

3. (a) $\frac{1}{4}$ of $\frac{6}{7} = \frac{1}{4} \times \frac{6}{7} = \frac{1 \times 3}{2 \times 7} = \frac{3}{14}$
 $\frac{3}{7}$ of $\frac{2}{3} = \frac{3}{7} \times \frac{2}{3} = \frac{2}{7} = \frac{2 \times 2}{7 \times 2} = \frac{4}{14}$

$$\frac{4}{14} > \frac{3}{14}$$

$$\frac{3}{7} \text{ of } \frac{2}{3} > \frac{1}{4} \text{ of } \frac{6}{7}$$

(b) Solve according to (a) above.

4. Side $a = 5\frac{2}{3} = \frac{17}{3}$

$$\begin{aligned} \text{Area of the square} &= a^2 \\ &= \left(\frac{17}{3}\right)^2 = \frac{289}{9} = 32\frac{1}{9}\text{ m}^2 \end{aligned}$$

$$5. \text{ Part of the book read in } 2\frac{1}{4} \text{ hours} = \frac{2}{5} \times 2\frac{1}{4} = \frac{2}{5} \times \frac{9}{4}$$

$$= \frac{1}{5} \times \frac{9}{2} = \frac{9}{10} \text{ part}$$

6. Solve according to Example 5.

$$7. \text{ Ritu bought sugar} = 5\frac{1}{2} = \frac{11}{2}$$

$$\text{Rate per kg} = ₹ 32\frac{1}{2} = \frac{65}{2}$$

$$\text{So, rate of } \frac{11}{2} \text{ kg} = \frac{65}{2} \times \frac{11}{2} = \frac{715}{4}$$

$$= ₹ 178\frac{3}{4}$$

8. Solve according to Q. 5 above.

$$9. \text{ Tina walk in 1 hr.} = \frac{5}{7} \text{ km}$$

$$\text{So, she goes in } 3\frac{1}{2} \text{ hr or } \frac{7}{2}$$

$$= \frac{5}{7} \times \frac{7}{2} = \frac{35}{14} = \frac{5}{2} \text{ km}$$

$$10. \text{ The cost of 1 litre petrol} = ₹ 42\frac{4}{7} = \frac{298}{7}$$

$$\text{So, cost of } 10\frac{1}{2} = \frac{21}{2} \text{ l of petrol}$$

$$= \frac{298}{7} \times \frac{21}{2}$$

$$= \frac{6258}{14} = ₹ 447$$

Exercise 2.3

1. Take help of the Answer Sheet.

$$2. (f) 4 \div \frac{8}{5} = 4 \times \frac{5}{8} = \frac{5}{2} = 2\frac{1}{2}$$

$$(g) 3 \div 2\frac{1}{3} = 3 \div \frac{7}{3} = 3 \times \frac{3}{7} = \frac{9}{7} = 1\frac{2}{7}$$

(a) to (e) and (h) to (j) : Solve according to (f) and (g).

$$3. (a) \frac{2}{3} \div \frac{1}{2} = \frac{2}{3} \times \frac{2}{1} = \frac{2 \times 2}{3 \times 1} = \frac{4}{3} = 1\frac{1}{3}$$

(b) to (h) : Solve according to (a) above.

$$4. \text{ Number of pieces} = 15 \text{ metres} \div 1\frac{1}{4} \text{ metre}$$

$$= 15 \div \frac{5}{4} = 15 \times \frac{4}{5} = 3 \times 4 = 12$$

$$5. D = 20 \frac{2}{3} = \frac{62}{3} \text{ km} \qquad T = 7 \frac{3}{4} = \frac{31}{4} \text{ hr.}$$

$$\begin{aligned} \text{He walked} &= \frac{62}{3} \div \frac{31}{4} \\ &= \frac{\cancel{62}}{3} \times \frac{4}{\cancel{31}} \\ &= \frac{8}{3} = 2 \frac{2}{3} \text{ km/hr} \end{aligned}$$

$$\begin{aligned} 6. \text{ Quantity of toffees got by each child} &= \frac{1}{2} \div 20 = \frac{1}{2} \div \frac{20}{1} \\ &= \frac{1}{2} \times \frac{1}{20} = \frac{1}{40} \text{ kg} = \frac{1}{40} \times 1000 \text{ g} \\ &= 25 \text{ g} \end{aligned}$$

$$7. \text{ Quotient} = 1 \frac{17}{18} = \frac{35}{18}$$

$$\begin{aligned} \text{So, } \frac{5}{12} \div \frac{35}{18} &= \frac{15}{18} = \frac{5}{12} \times \frac{18}{35} \\ &= \frac{\cancel{45}}{\cancel{420} 210} = \frac{\cancel{9}}{\cancel{210} 42} = \frac{\cancel{3}}{\cancel{42} 14} = \frac{3}{14} \end{aligned}$$

$$8. \text{ Fraction of girls} = 1 - \frac{5}{9} = \frac{1}{9} - \frac{5}{9} = \frac{9}{9} - \frac{5}{9} = \frac{9-5}{9} = \frac{4}{9}$$

$\frac{4}{9}$ fraction is equivalent to 512.

$$\begin{aligned} \text{Total number of students} &= 512 \div \frac{4}{9} = 512 \times \frac{9}{4} \\ &= 128 \times 9 \end{aligned}$$

$$\begin{aligned} \text{Number of boys} &= 128 \times 9 \times \frac{5}{9} \\ &= 640 \text{ boys} \end{aligned}$$

$$9. \text{ Other fraction} = \text{product of fractions} \div \text{one fraction}$$

$$= \frac{5}{6} \div \frac{7}{2} = \frac{5}{6} \times \frac{2}{7} = \frac{5 \times 1}{3 \times 7} = \frac{5}{21}$$

$$10. \text{ Solve according to Q. 4}$$

$$11. \text{ Length of each piece} = 7 \frac{1}{3} \text{ m} \div 11 = \frac{22}{3} \div \frac{11}{1} = \frac{22}{3} \times \frac{1}{11} = \frac{2}{3} \text{ m}$$

$$12. \text{ Area of a rectangle} = 65 \frac{1}{4} = \frac{261}{4} \text{ m}^2$$

$$\text{Breadth } b = 5 \frac{17}{16} \text{ m} = \frac{97}{16} \text{ m}$$

$$\text{Length } a = \frac{261}{4} \div \frac{97}{16} = \frac{261}{4} \times \frac{16}{97} = \frac{1044}{97} = 10 \frac{74}{97} \text{ m}$$

Exercise 2.4

- Solve according to Example 7.
- Multiply according to Example 7.
- Moving decimal point 1, 2 or 3 places while multiplying by 10, 100 or 1000 :
 - $2.4 \times 10 = 24.0 = 24$ (e) $3.1 \times 100 = 310$
 - $0.503 \times 100 = 50.3$
 Solve the rest accordingly.
- Solve according to Example 9.
- Total distance covered by the car = Distance covered in 1 litre petrol
 × given quantity of petrol
 $= 46.4 \times 5.5 \text{ km} = 255.20 \text{ km}.$
- Area of the rectangle = length × breadth = $4.2 \text{ m} \times 1.35 \text{ m}$
 $= 5.67 \text{ m}^2$
- Area of the square = side × side = $3.1 \text{ cm} \times 3.1 \text{ cm} = 9.61 \text{ cm}^2$
 Perimeter of the square = $4 \times \text{side} = 4 \times 3.1 \text{ cm} = 12.4 \text{ cm}$
- Quantity of soft drink in 16 bottles = $16 \times 0.25 \text{ litre} = 4.00 \text{ litre} = 4 \text{ litres}$
- Fat in 1 kg of milk = 0.264 kg
 So fat in 12.5 kg of milk = $0.264 \times 12.5 = 3.3 \text{ kg}$
- Cost of 1 m cloth = ₹ 145.50
 So, cost of 12.75 m of clothes = ₹ 145.50×12.75
 $= ₹ 1855.125$

Exercise 2.5

- Dividing without decimal = $6 \div 3 = 2$
 Putting decimal after 1 place starting from the rightmost digit
 $= .2 = 0.2$
 - Dividing without decimal = $42. \div 7 = 6$
 Putting decimal after 2 places starting from the rightmost digit
 $= .06 = 0.06$
 - to (h)** : Solve according to (b) above.
- Shifting the decimal point to the left by one, two or three places while dividing by 10, 100 or 1000 :
 - $2.3 \div 10 = .23 = 0.23$ (f) $0.4 \div 100 = 0.004$**(b) to (e) and (g) to (l)** : Solve according to (a) and (f).

3. (a) $0.4 \div 0.16$

Move decimal two places to the right in both divisor and the dividend

$$\frac{0.4}{0.16} = \frac{40.0}{16} = 2.5$$

(b) to (h) : Solve according to (a).

4. Distance = 90.2 km T = 2.2 hr
Average distance covered by it in 1 hr = $90.2 \div 2.2$
= 41 km
5. Side of regular polygon = 3.5 cm,
Perimeter of regular polygon = 17.5 cm
Total sides = $17.5 \div 3.5 = 5$ sides
6. Average of 3 numbers = $\frac{7.6 + 3.8 + 4.2}{3} = \frac{15.6}{3}$
Dividing without decimal = $156 \div 3 = 52$
Putting decimal point after one place starting from the rightmost digit = 5.2
7. Cost of 15 tables = ₹ 1706.25
So, cost of 1 table = ₹ $1706.25 \div 15 = ₹ 113.75$
8. Total length = 40 m
Required piece length = 1.25 m
So, quantity = $40 \div 1.25 = 32$ pieces
9. Earning per month = ₹ 8835
Save = 0.12 part = $\frac{8835}{100} \times 0.12 = ₹ 10.602$
Time taken to save ₹ 26.505 = $26.505 \div 10.602$
= 2.5 months
10. Weight of each bag of cement = 49.8 kg
Total weight of all bags = 1792.8 kg
Quantity of bags = $1792.8 \div 49.8$ kg
= 36 bags

MCQ

- Two fractions are said to be the reciprocal or multiplicative inverse of each other, if their product is 1. So option (d) is correct.
- In a proper fraction, numerator is less than the denominator value of a proper fraction is less than 1. Product of two proper fractions is also less than 1.
- Solve according to Q.2 (a) Exercise 2.2.
- Normal temperature of a human being = 98.6°F
Temperature of a person = 102.8°F

$$\begin{array}{r} \text{Difference} = 102.8 \\ - 98.6 \\ \hline 4.2 \end{array} = 4.2^\circ \text{ F}$$

5. Multiply without decimal = $10101 \times 1 = 10101$
 Putting decimal after $2 + 2 = 4$
 Places counting from the right most digit = 1.0101
6. Solve according to Q. 3. (a) Exercise 2.7
7. The number required = $\frac{0.0001}{0.1}$

Moving decimal point four places to the right in both the dividend and divisor.

$$= \frac{1}{1000} = 0.001 = 0.001$$

In Real World

Total salary of Mr. Ram prakash = ₹ 80,000

He spends on Food = $\frac{1}{10} \times ₹ 80,000 = ₹ 8000$

He spends on Education = $\frac{1}{8} \times ₹ 80,000 = ₹ 10,000$

Therefore, remaining money = ₹ 80000 - ₹ 8000 - ₹ 10000 = ₹ 62000

He spends on Books = $\frac{1}{10} \times ₹ 62000$
 = ₹ 6200

Values = Mr. Ram Prakash is soft hearted.

Test Time

1. (a) $\frac{\cancel{1}1}{\cancel{7}} \times \frac{\cancel{3}5}{\cancel{2}2} \times \frac{\cancel{1}6}{\cancel{1}5} \times \frac{\cancel{8}}{\cancel{3}} = \frac{8}{3} = 2 \frac{2}{3}$

(b) $\frac{\cancel{4}9}{\cancel{1}6} \times \frac{\cancel{5}2}{\cancel{7}} \times \frac{\cancel{2}8}{\cancel{3}} = \frac{7 \times 13 \times 7}{3} = \frac{637}{3} = 212 \frac{1}{3}$

(c) and (d) solve according to above.

2. (a) $\frac{\cancel{5}5}{\cancel{8}} \times \frac{\cancel{1}6}{\cancel{1}1} = 5 \times 2 = 10$ (b) $\frac{\cancel{5}0}{\cancel{9}3} \times \frac{\cancel{5}}{\cancel{1}0} = \frac{5}{3}$

(c) $\frac{21.976}{1.64} = 13.4$ (d) $\frac{0.8085}{0.35} = 2.31$

3. $3 \text{ kg} = 3 \times 1000 \text{ g} = 3000 \text{ g}$

So, 210 is fraction of 3000 $\text{g} = \frac{210}{3000} = \frac{7}{100}$

4. Let the salary of teacher = x

So, he spends his salary = $\frac{9}{11} x$

$$\frac{9}{11} \text{ of } x + 2640 = x$$

$$\frac{9}{11} x + 2640 = x$$

$$x - \frac{9}{11} x + 2640 = 0$$

$$\frac{2x}{11} = \frac{2640}{1320}$$

$$x = \frac{\cancel{2640} \times 11}{\cancel{2}}$$

$$x = 1320 \times 11$$

$$x = 14520$$

His monthly salary = ₹ 14520

5. Given that each jar hold 1.75 kg of jam

Number of jar required for 1.75 kg of jam = 1

Now we will calculate number of jars required for 1 kg of jam so we have,

$$\text{Number of jars required for 1 kg of jam} = \frac{1}{1.75}$$

Now we have to calculate it for 100 kg of jam that's why

Number of jars required for 100 kg of jam = $100 \times$ (number of jars required for 1kg of jam)

$$= \frac{100}{1.75}$$

$$= \frac{10000}{175}$$

$$= 57 \frac{1}{7}$$

Therefore, 57 jars can be filled completely, which contains

$$= 1.75 \times 57 = 99.75 \text{ kg}$$

Jam remaining in the vessel = $100 \text{ kg} - \text{kg of jams filled in 57 jars}$

$$= 100 \text{ kg} - 99.75 \text{ kg}$$

$$= 0.25 \text{ kg}$$

6. The price of each apple = ₹ 8.35

dozen apples = 12 apples

$$= ₹ 8.35 \times 12$$

$$= ₹ 100.2$$

7. Length = $12 \frac{1}{2}$ cm = $\frac{25}{2}$ cm

Width = $10 \frac{2}{3}$ cm = $\frac{32}{3}$ cm

perimeter of rectangular = $2(l + w)$

$$= 2 \left(\frac{25}{2} + \frac{32}{3} \right)$$

$$= 2 \left(\frac{3 \times 25 + 2 \times 32}{6} \right)$$

$$= 2 \left(\frac{75 + 64}{6} \right)$$

$$= \frac{139}{3} = 46 \frac{1}{3} \text{ cm}$$

8. The cost of 1 kg of rice = ₹ 32

The cost of 15.8 kg of rice = ₹ 32 × 15.8 kg

$$= ₹ 505.60$$

Brain Twister

1. Let the four sons be A, B, C and D.

According to the question, one-fourth part is given to his wife. So, we have three-fourths part with us.

Now, let us divide each portion into 4 equal parts. We have 12 equal parts.

So each child gets 3 parts each out of 12 parts.

		D	D
		B	D
A	B	B	C
A	A	C	C

2. Do it yourself

Think Logically

Do it yourself

Fun Task

Do it yourself

Carry On

- 1, 2, 3, 4
- 0, 1, 2, 3
- 2, -1, 1, 2
- $\frac{1}{2}$, $\frac{3}{5}$, 0.5, 0.8

Exercise 3.1

1. Show each with a denominator 1.

$$(a) \frac{1}{1} \quad (b) \frac{2}{1} \quad (c) \frac{-1}{1} \quad (d) \frac{-2}{1}$$

2. Divide the numerator by the denominator.

$$(a) -5 \quad (b) -3 \quad (c) -7 \quad (d) -5$$

3. (a) $\frac{5}{-7} = \frac{5 \times (-1)}{-7 \times (-1)} = \frac{-5}{7}$ negative

(b) same as (a)

$$(c) \frac{-9}{-13} = \frac{-9 \times (-1)}{-13 \times (-1)} = \frac{9}{13} \text{ positive}$$

(d) positive

4. (a) $\frac{35}{-63} = \frac{35 \times (-1)}{-63 \times (-1)} = \frac{-35}{63} = \frac{-35 \div 7}{63 \div 7} = \frac{-5}{9}$

(b), (c) and (d) : Solve as (a).

5. Solve according to Example 1.

6. (a) Show $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$ on the right of 0 mark at equal/unit distance.

(b) Show $\frac{-1}{8}$, $\frac{-2}{8}$, $\frac{-7}{8}$ on the left of 0 mark at equal/unit

distance.

(c) Solve according to (b).

(d) Solve according to (a).

7. (a) Write the number in standard form :

$$\frac{-7}{21} = \frac{-7 \div 3}{21 \div 3} = \frac{-1}{3}; \frac{3}{9} = \frac{3 \div 3}{9 \div 3} = \frac{1}{3} : \text{Not the same rational}$$

number

$$(b) \frac{-16}{20} = \frac{-16 \div 4}{20 \div 4} = \frac{-4}{5};$$

$$\frac{20}{-25} = \frac{20 \times (-1)}{-25 \times (-1)} = \frac{-20}{25} = \frac{-20 \div 5}{25 \div 5} = \frac{-4}{5}; \text{ Same}$$

(c) and (d) : Solve according to (a)

8. (a) $\frac{25}{40} = \frac{25 \div 5}{40 \div 5} = \frac{5}{8}$ (b) $\frac{-48}{72} = \frac{-48 \div 24}{72 \div 24} = \frac{-2}{3}$

(c) and (d) : Solve according to (b).

9. Solve according to Example 4.

10. (a) Denominators are the same,
Arrange $-2, -1, -3$ in ascending order

$$-3 < -2 < -1$$

So $\frac{-3}{5} < \frac{-2}{5} < \frac{-1}{5}$

(b) and (c) : Make the denominators same using their LCM and arrange in ascending order.

11. Solve according to Example 5.

12. (a) $\frac{3}{5}, \frac{3}{-5}, \frac{6}{-10}, \frac{9}{-15}, \dots$

We have $\frac{3}{-5} = \frac{-3 \times (-1)}{5 \times (-1)}$

$$\frac{6}{-10} = \frac{-3 \times (-2)}{5 \times (-2)}$$

$$\frac{9}{-15} = \frac{-3 \times (-3)}{5 \times (-3)}$$

Thus, we observe a pattern in these numbers,

Four more

$$\frac{-3 \times (-4)}{5 \times (-4)} = \frac{12}{-20}; \frac{-3 \times (-5)}{5 \times (-5)} = \frac{15}{-25}; \frac{-3 \times (-6)}{5 \times (-6)}$$

$$= \frac{18}{-30}; \frac{-3 \times (-7)}{5 \times (-7)} = \frac{21}{-35}$$

(b) Solve accordingly above.

Exercise 3.2

1. Solve according to Example 8.

2. Solve according to Example 10.

3. (a) $\frac{-7}{15} \times \frac{5}{-14} = \frac{(-7) \times 5}{15 \times (-14)} = \frac{1 \times 1}{3 \times 2} = \frac{1}{6}$

(b) to (h) : Solve according to (a)

4. (a) $1 \div \frac{-1}{8} = 1 \times \frac{8}{(-1)} = \frac{1 \times 8}{-1} = -8$

(b) $\frac{1}{-3} \div \frac{1}{15} = \frac{1}{-3} \times \frac{15}{1} = \frac{1 \times 15}{(-3) \times 1} = -5$

(c) $0 \div \frac{-7}{-9} = 0$

(d) $\frac{-4}{15} \div \frac{-8}{9} = \frac{-4}{15} \times \frac{9}{-8} = \frac{(-4) \times 9}{15 \times (-8)} = \frac{1 \times 3}{5 \times 2} = \frac{3}{10}$

(e), (g) and (h) : Solve according to (d).

(f) $\frac{-3}{5} \div (-3) = \frac{-3}{5} \times \frac{1}{-3} = \frac{(-3) \times 1}{5 \times (-3)} = \frac{1}{5}$

5. $\frac{-6}{11} - \frac{4}{9}$

L.C.M. of 11 and 9 = 99

$99 \div 11 = 9; \frac{-6 \times 9}{11 \times 9} = \frac{-54}{99}$

$99 \div 9 = 11; \frac{4 \times 11}{9 \times 11} = \frac{44}{99}$

Thus, $\frac{-6}{11} - \frac{4}{9} = \frac{-54}{99} - \frac{44}{99} = \frac{-54 - 44}{99} = \frac{-98}{99}$

6. Solve according to Q.5 above.

7. $\frac{1}{2} + \frac{1}{3} + \frac{1}{5}$, L.C.M. of 2, 3 and 5 = 30

$30 \div 2 = 15; \frac{1 \times 15}{2 \times 15} = \frac{15}{30}, 30 \div 3 = 10; \frac{1 \times 10}{3 \times 10} = \frac{10}{30},$

$30 \div 5 = 6; \frac{1 \times 6}{5 \times 6} = \frac{6}{30}$

Thus, $\frac{1}{2} + \frac{1}{3} + \frac{1}{5} = \frac{15}{30} + \frac{10}{30} + \frac{6}{30} = \frac{15 + 10 + 6}{30} = \frac{31}{30}$

Now, to find digit = $\frac{3}{1} - \frac{31}{30}$

L.C.M. of 30 and 1 = 30

$30 \div 1 = 30; \frac{3 \times 30}{1 \times 30} = \frac{90}{30}; 30 \div 30 = 1; \frac{31 \times 1}{30 \times 1} = \frac{31}{30}$

Thus, $\frac{3}{1} - \frac{31}{30} = \frac{90}{30} - \frac{31}{30} = \frac{90 - 31}{30} = \frac{59}{30}$

8. $\frac{-15}{28} \div \frac{-5}{7} = \frac{-15}{28} \times \frac{7}{-5} = \frac{3}{4}$

9. Solve according to Q.8 above.
10. Length of each rope = $3\frac{3}{4} = \frac{15}{4}$ m. Total length of rope = 30 m
 Let quantity x so, $x \times \frac{15}{4} = 30$

$$x = \frac{30 \times 4}{15} = 8$$

In Real World,

Time taken by $1\frac{3}{4}$ litres of water = 1 hour

Time taken by 1 litre of water = $1 \div 1\frac{3}{4} = 1 \div \frac{7}{4} = 1 \times \frac{4}{7} = \frac{4}{7}$ hours

Time taken by 20 litres of water = $\frac{4}{7} \times 20$

$$= \frac{80}{7} = 11\frac{3}{7} \text{ hours}$$

MCQ

1. A rational number can't have zero in the denominator. So, option (d).
2. Solve according to Q. 7 Exercise 3.1.

$$3. \frac{-\cancel{10}2^6}{\cancel{10}7} = \frac{-6}{7}$$

4. Solve according to Example 8.
5. Take help of the Answer Sheet.
6. The multiplicative inverse or reciprocal of a rational number is multiplied by which we get 1.

So, multiplicative inverse of $\frac{-1}{2} = \frac{-2}{1}$.

7. Solve according to Q. 3 (a) Exercise 3.2
8. Solve according to Q.5 Exercise 3.2.

Chapter Test

1. $\frac{3}{5}$

Numerator = 3

(a) 9

numerator (9) \div numerator (3) = 3

$$\frac{3 \times 3}{5 \times 3} = \frac{9}{15}$$

(b) -18

numerator (-18) \div numerator (3) = -6

$$\frac{3 \times -6}{5 \times -6} = \frac{-18}{-30}$$

(c) and (d) : Solve according to (a), (b).

2. $\frac{5}{7}$ denominator = 7

(a) denominator = 63

denominator (63) \div denominator (7) = 9

$$\frac{5 \times 9}{7 \times 9} = \frac{45}{63}$$

(b), (c) and (d) : Solve according to (a)

3. Do it yourself

4. $\frac{-5}{7}$ and $\frac{-3}{8}$

L.C.M. of 7 and 8 = 56

So, $\frac{-5 \times 8}{7 \times 8} = \frac{-40}{56}$

$$\frac{-3 \times 7}{8 \times 7} = \frac{-21}{56}$$

Now, the five rational numbers that lie between $\frac{-5}{7}$ and $\frac{-3}{8}$ are

$$\frac{-23}{56}, \frac{-25}{56}, \frac{-27}{56}, \frac{-29}{56}, \frac{-31}{56}.$$

5. $\frac{3}{4}$ or $\frac{-2}{3}$

$$\frac{3}{4} = \frac{-2}{3} \quad \Rightarrow \quad 3 \times 3 = -2 \times 4$$

$$9 = -8$$

So,

$$9 > -8$$

$$\frac{3}{4} > -\frac{2}{3}$$

$\frac{3}{4}$ is greater.

6. (a) $\frac{-14}{-49}$

The given number is $\frac{-14}{-49}$.

HCF of -14 and -49 = -7

$$\therefore \frac{-14}{-49} = \frac{-14 \div (-7)}{-49 \div (-7)} = \frac{2}{7}$$

Hence, $\frac{-14}{-49} = \frac{2}{7}$ (in standard form).

(b), (c) and (d) : Solve according to (a).

$$\begin{aligned}
 7. \text{ The sum of } \frac{12}{5} \text{ and } \frac{13}{7} &= \frac{12}{5} + \frac{13}{7} \\
 &= \frac{7 \times 12 + 5 \times 13}{35} \\
 &= \frac{84 + 65}{35} \\
 &= \frac{149}{35}
 \end{aligned}$$

$$\begin{aligned}
 \text{The product of } \frac{-4}{7} \text{ and } \frac{-1}{2} &= \frac{-4}{7} \times \frac{-1}{2} = \frac{2}{7} \\
 \text{And} \\
 \text{Divide} &= \frac{149}{35} \div \frac{2}{7} = \frac{149}{35} \times \frac{7}{2} \\
 &= \frac{149}{10} = 14 \frac{9}{10}
 \end{aligned}$$

8. Let the other number = x

$$\text{One of the number} = \frac{5}{12}$$

$$\text{Product of two rational numbers} = \frac{-35}{18}$$

$$\frac{5}{12} \times x = \frac{-35}{18}$$

$$x = \frac{-35}{18} \times \frac{12}{5}$$

$$x = \frac{-14}{3} = -4 \frac{2}{3}$$

$$\text{The other number is } -4 \frac{2}{3}$$

$$\text{An average speed of car} = 3 \frac{1}{9} \text{ km/hr}$$

$$\text{Time} = 5 \frac{1}{7} \text{ hours}$$

$$\text{Distance} = ?$$

$$\text{Distance} = \text{speed} \times \text{time}$$

$$= 3 \frac{1}{9} \times 5 \frac{1}{7}$$

$$= \frac{28}{9} \times \frac{36}{7} = 16 \text{ km}$$

10. Two packets of sweets weight = $2 \frac{7}{8}$ kg, $3 \frac{1}{4}$ kg

$$\begin{aligned}
 \text{Total weight of the sweets} &= 2\frac{7}{8} + 3\frac{1}{4} \\
 &= \frac{23}{8} + \frac{13}{4} \\
 &= \frac{23 + 2 \times 13}{8} \\
 &= \frac{23 + 26}{8} = \frac{49}{8} = 6\frac{1}{8} \text{ kg}
 \end{aligned}$$

Brain Twister

1. Let the cricketer made x runs in previous season.

In the current season he made $\frac{2}{9}$ th more runs than previous season.

So, he made in the current season = $x + \frac{2x}{9}$

Then, $253 - \frac{2x}{9} = x$

$$253 = \frac{x + 2x}{9} = \frac{11x}{9}$$

$$253 = \frac{11x}{9}$$

$$9 \times 253 = 11x$$

$$x = \frac{9 \times 253}{11}$$

$$x = 9 \times 23$$

$$x = 207$$

The cricketer made 207 runs in previous season.

2. In a **supermarket**

The cost of a table lamp = ₹ 870

$$\frac{1}{5} \text{ th is off} = ₹ 870 \times \frac{1}{5} = ₹ 174$$

$$= 870 - 174 = ₹ 696$$

In electric shop

The cost of a table lamp = ₹ 920

$$\text{Discount} = \frac{1}{10} \text{ th}$$

$$= 920 \times \frac{1}{10} = ₹ 92$$

$$= ₹ 920 - ₹ 92 = ₹ 828$$

So, from supermarket should one buy the lamp.

Difference in prices = $828 - 696 = ₹ 132$

Carry On $\boxed{2 \times 2} \times 2 = 4 \times 2 = 8$

$\boxed{2 \times 2 \times 2} \times 2 = 8 \times 2 = 16$

$\boxed{2 \times 2 \times 2 \times 2} \times 2 = 16 \times 2 = 32$

$\boxed{2 \times 2 \times 2 \times 2 \times 2} \times 2 = 32 \times 2 = 64$

Exercise 4.1

1. (a) $7 \times 7 \times 7 \times 7 \times 7 = 7^5$
 (b) $4 \times 4 \times 4 \times 9 \times 9 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 = 2^6 \times 3^4$
 (c) $3 \times 3 \times x \times x \times x = 3^2 \times x^3$
 (d), (e) and (f) : Solve according to (c).

2. Solve according to Example 1.

3. Solve according to Example 2.

4. First we factorise 900.

$$900 = 3 \times 3 \times 2 \times 2 \times 5 \times 5$$

$$= 2^2 \times 3^2 \times 5^2$$

$$\begin{array}{r} 3 \overline{)900} \\ \underline{3 \ 300} \\ 2 \overline{)100} \\ \underline{2 \ 50} \\ 5 \overline{)25} \\ \underline{5 \ 5} \\ 1 \end{array}$$

(b) to (d) : Solve accordingly above.

5. (a) to (f) : Solve according to Example 5.

(g) $\left(\frac{-2}{3}\right)^4 = \frac{-2 \times -2 \times -2 \times -2}{3 \times 3 \times 3 \times 3} = \frac{16}{81}$

(h) $\left(\frac{-4}{5}\right)^5 = \frac{-4 \times -4 \times -4 \times -4 \times -4}{5 \times 5 \times 5 \times 5 \times 5} = \frac{-1024}{3125}$

6. Solve according to Example 3.

7. (a) In 4×10^{12} and 3×10^{12} exponents are equal

Since $4 > 3$ so $4 \times 10^{12} > 3 \times 10^{12}$

(b) and (c) : Solve according to (a).

Exercise 4.2

1. (a) $128 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^7$

$729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^6$

$128 \times 729 = 2^7 \times 3^6$

Show factorisation in the side.

(b), (c) and (d) : Solve according to (a).

2. (a) $2^m \times 2^n = 2^{m+n}$ $(a^m \times a^n = a^{m+n})$
 (b) $x^6 \times x^3 = x^{6+3} = x^9$ $(a^m \times a^n = a^{m+n})$
 (c) $(4^2)^3 \times 4^5 = 4^6 \times 4^5$ $(a^m)^n = a^{m \times n}$
 $= 4^{6+5} = 4^{11}$ $(a^m \times a^n = a^{m+n})$
 (d) $6^x \div 6^y = 6^{x-y}$ $(a^m \div a^n = a^{m-n})$
 (e) $(3^2)^5 \times (3^4)^2 = 3^{2 \times 5} \times 3^{4 \times 2}$ $[(a^m)^n = a^{mn}]$
 $= 3^{10} \times 3^8 = 3^{10+8} = 3^{18}$ $(a^m \times a^n = a^{m+n})$
 (f) $25^3 \div 5^6 = (5^2)^3 \div 5^6$ $[(a^m)^n = a^{mn}]$
 $= 5^{2 \times 3} \div 5^6 = 5^6 \div 5^6 = 5^{6-6} = 5^0 = 1$ $[a^m \div a^n = a^{m-n}]$
 (g) $(2^3 \times 2)^4 = (2^{3+1})^4 = (2^4)^4 = 2^{4 \times 4} = 2^{16}$
 (h) $(7^{15} \times 7^5) \div 7^9 = 7^{15+5} \div 7^9 = 7^{20} \div 7^9 = 7^{20-9} = 7^{11}$
3. (a) $10^0 = 1$ and $(100)^0 = 1$ So $10^0 = (100)^0$ is true.
 (b) $10 \times 10^6 = 10^{1+6} = 10^7$
 $100^6 = (10^2)^6 = 2^{2 \times 6} = 10^{12}$
 So $10 \times 10^6 = 100^6$ is false.
 (c) $6^5 = (2 \times 3)^5 = 2^5 \times 3^5$
 So $2^2 \times 3^3 = 6^5$ is false.
 (d) $(2^3)^5 \times (2^5)^3 = 2^{3 \times 5} \times 2^{5 \times 3} = 2^{15} \times 2^{15} = 2^{15+15} = 2^{30}$
 $(2^8)^8 = 2^{8 \times 8} = 2^{64}$
 So $(2^3)^5 \times (2^5)^3 = (2^8)^8$ is false.
4. Solve according to Example 14.
 5. Solve according to Example 16.

Exercise 4.3

1. **and 3.** Solve according to Example 17.
 2. (a) 2.001×10^7 : Move the decimal point 7 places towards right putting zeroes to complete the number of places = 2,00,10,000
(b) and (c) : Solve according to (a).

MCQ

1. $\left(\frac{-1}{2}\right)^6 = \frac{-1 \times -1 \times -1 \times -1 \times -1 \times -1}{2 \times 2 \times 2 \times 2 \times 2 \times 2} = \frac{1}{64} = 64$
2. Reciprocal of $\left(\frac{2}{3}\right)^4 \times \left(\frac{-3}{4}\right)^3$

$$= \frac{-2 \times -2 \times -2 \times -2}{3 \times 3 \times 3 \times 3} = \frac{-3 \times -3 \times -3}{4 \times 4 \times 4}$$

$$= \frac{\cancel{16}}{81} \times \frac{\cancel{27}}{64} = -12$$

3. Take help of the Answer Sheet.
4. Solve according to Example 7.
5. If x is a non-zero rational number $x^0 = 1$.

So, $a^0 = 1$

6. $10^{-1} = x \times (-8)^{-1}$

$$\frac{1}{10} = x \times \frac{1}{-8} = x = \frac{1}{10} \div \frac{1}{-8} = \frac{1}{10} \times \frac{-8^{\cancel{4}}}{1} = \frac{-4}{5}$$

7. $(5^2 - 4^2) \times \frac{1}{3^2}$

$$(25 - 16) \times \frac{1}{9} = \cancel{9} \times \frac{1}{\cancel{9}} = 1$$

8. $0.00003 \times 10^6 = 3 \times 10^{-5} \times 10^6$
 $= 3 \times 10 = 30$

So, option (b) is correct.

In Real World

The standard notation of the population of the country

$$= 1,12,000,000$$

$$= 112 \times 10^6$$

$$= 11.2 \times 10^7$$

Consequences of high population as follow:

1. Deforestation
2. Air pollution, water pollution and noise pollution
3. Changes in water cycles.

Chapter Test

1. $2^3 = 2 \times 2 \times 2 = 8$

$$3^2 = 3 \times 3 = 9$$

So, 2^3 not equal to 3^2 .

2. (a) $(3^2)^4 = (3^{2 \times 4}) = 3^8$

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

$$= 6561$$

(b) $(5^3)^8 = (5^{3 \times 8}) = 5^{24}$

3. (a) $(5x)^3$

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

(b) $(-2ab)^4$

$$\therefore a = \frac{3}{5}, b = \frac{-1}{2}$$

$$\begin{aligned}
 &= \left(\cancel{\not{2}} \times \frac{-2}{\cancel{\not{2}}} \right)^3 &= \left(-\cancel{\not{2}} \times \frac{3}{5} \times \frac{-1}{\cancel{\not{2}}} \right)^4 \\
 &= (-2)^3 &= \left(\frac{3}{5} \right)^4 = \frac{3 \times 3 \times 3 \times 3}{5 \times 5 \times 5 \times 5} = \frac{81}{625} \\
 &= -2 \times -2 \times -2 \\
 &= -8
 \end{aligned}$$

4. (a) $(-4) \times (-4) \times (-4) \times (-4) \times (-4) = (-4)^5$

(b) $\frac{-1}{3} \times \frac{-1}{3} \times \frac{-1}{3} = \left(\frac{-1}{3} \right)^3$

(c) $\frac{-1}{243} = \frac{-1}{3} \times \frac{-1}{3} \times \frac{-1}{3} \times \frac{-1}{3} \times \frac{-1}{3} = \left(\frac{-1}{3} \right)^5$

(d) $\frac{-27}{125} = \frac{-3}{5} \times \frac{-3}{5} \times \frac{-3}{5} = \left(\frac{-3}{5} \right)^3$

5. (a) $100 = 2 \times 2 \times 5 \times 5 = 2^2 \times 5^2$

(b) $1000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5 = 2^3 \times 5^3$

(c) $3600 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5 = 2^4 \times 3^2 \times 5^2$

(d) $16000 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 = 2^7 \times 5^3$

6. (a) $(2)^{x+2} = (2)^8$ (b) $x^3 = 9^3$

$x + 2 = 8$

$x = 9$

$x = 8 - 2$

$x = 6$

(c) $5 + (3 - x) = 3$

(d) $(7)^2 \times (-7)^x = (-7)^3$

$5 + 3 - x = 3$

$2 + x = 3$

$8 - x = 3$

$x = 3 - 2$

$-x = 3 - 8$

$x = 1$

$-x = -5$

$x = 5$

7. Let, x should be divided by $(-30)^{-1}$

So, the quotient $= (-6)^{-1} = \frac{1}{-6}$

$= (-30)^{-1}$

$= \frac{1}{-30} \div x = \frac{-1}{6}$

$= \frac{-1}{\cancel{\not{30}} 5} \times -\cancel{\not{6}} = x$

$= \frac{-1}{5} \times -1 = x$

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

8. (a) $36,500 = 3.65 \times 10^4$
 (b) $6,08,08,000 = 6.0808 \times 10^7$
 (b) and (c) : Solve according to (a) and (d).

Brain Twister

1. Maximum number of regions 7 lines.

$$\begin{aligned} \text{formula} &= \frac{1}{2} (x^2 + x) + 1 \\ &= \frac{1}{2} [(7)^2 + 7] + 1 \\ &= \frac{1}{2} [49 + 7] + 1 \\ &= \frac{56}{2} + 1 = 29 \end{aligned}$$

2. The principal's secretary calls = 3 families

Then, each family calls = 3 other

In first round there are 3 families = $3^1 = 3$

Now, these three families are called other three families therefore in second round number of families becomes

$$3^2 = 9$$

Now, again these 9 families call the other families which is equal to $3^3 = 27$

And, so on.

Therefore, in the seventh round the number of families would be

$$3^7 = 2187$$

Now, we can say that 2187 families were notified at the seventh round of the call.

Think Logically

Weight of new born bear = 4 kg

Its weight increases by the power of 2 in 5 years.

$$\begin{aligned} \text{So, weight of bear in 5 years} &= (\text{weight of bear at present})^2 \\ &= (4)^2 = 16 \text{ kg} \end{aligned}$$

Carry On

Do it yourself

Exercise 5.1

- 1. and 3 to 9 :** Take help of the Answer Sheet.
- Solve according to the tree diagrams on page 54-55 of the text book.

Exercise 5.2

- 2 and 8 :** Solve according to Example 5.
- 4 and 5 :** Solve according to Example 6.
- (a) $7x + 2(x - 3) = 7x + 2x - 6 = 9 \times (2) - 6 = 18 - 6 = 12$
(b) and (c) : Solve according to (a).
- (a) $5x - 7 - 2x + 4 = 5x - 2x - 7 + 4 = 3x - 3$
 $= 3 \times 4 - 3 = 12 - 3 = 9$
(b) and (c) : Solve according to (a).
- $3(a^2 + ab) + 4 - ab = 3a^2 + 3ab - ab + 4 = 3a^2 + 2ab + 4$
 $= 3(4)^2 + 2 \times 4 \times (-2) + 4 = 3 \times 4 \times 4 + 2 \times 4 \times (-2) + 4$
 $= 48 - 16 + 4 = 32 + 4 = 36$

MCQ

- 1. to 4.** Take help of the Answer Sheet.
- Put the value of x and y into equation $x^2 + y^2$
 $= (-2)^2 + (2)^2$
 $= -2 \times -2 + 2 \times 2$
 $= 4 + 4 = 8$
- Value $ax^2 + bx + c$ at $x = \frac{-b}{a}$
 $= \left(\frac{-b}{a}\right)^2 a + \left(\frac{-b}{a}\right)b + c$
 $= \frac{b^2}{a^2} \times a + \frac{-b^2}{a} + c$
 $= \frac{\cancel{b^2}}{a} - \frac{\cancel{b^2}}{a} + c = c$

In Real World

Sheena bought = $(3x + 5)$ kg

If $x = 3$

$$3x + 5$$

$$3 \times 3 + 5$$

$$9 + 5 = 14 \text{ kg.}$$

Chapter Test

1. Take help of the Answer Sheet.

2. Take help of the Answer Sheet.

3. (a) $3x^2y^2$ (b) $-z^2$

$$= \frac{-3x^3y^2z^4}{3x^2y^2} = -xz^4$$

$$\frac{-3x^3y^2z^4}{-z^2} = 3x^3y^2z^2$$

(c) x^3z^3

$$= \frac{-3x^3y^2z^4}{x^3z^3} = -3y^2z$$

(d) $-xyz^2$

$$= \frac{-3x^3y^2z^4}{-xyz^2} = 3x^2yz^2$$

4. If $a = 1$, $b = 2$ and $c = -1$

(a) $a^2 + b^2 + 3ab$

$$\begin{aligned} &= (1)^2 + (2)^2 + 3 \times 1 \times 2 \\ &= 1 + 4 + 6 \\ &= 11 \end{aligned}$$

(b) $a^2 + b^2 + c^2 - ab - bc - ca$

$$\begin{aligned} &= (1)^2 + (2)^2 + (-1)^2 - 1 \times 2 - 2 \times -1 - (-1 \times 1) \\ &= 1 + 4 + 1 - 2 + 2 + 1 \\ &= 7 \end{aligned}$$

Brain Twister

1. Let the three consecutive integers be x , $x + 1$ and $x + 2$.

The smallest and greatest integers amongst them are x and $x + 2$.

Now, according to question

Taking, the sum of four times the smallest = $4x$

twice the biggest of three consecutive = $2(x + 2)$

$$= 4x + 2(x + 2)$$

$$= 4x + 2x + 4$$

$$= 6x + 4$$

2. Do it yourself

Think Logically

Given,

Length of a red stick = r

Length of a blue stick = b

From the given figure,

The total number of red sticks = 18

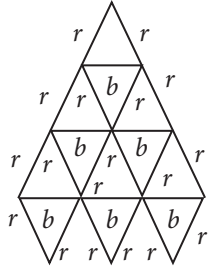
and the total number of blue sticks = 6

So,

The total length of sticks = $18r + 6b$

$$= 6(3r + b)$$

Hence, the required expression is $6(3r + b)$.



Carry On

Take help of the Answer Sheet.

Exercise 6.1

1. (a) Put the value of x in the LHS :

$$\text{LHS} = x' + 3 = -3 + 3 = 0 = \text{RHS}$$
 So the equation is satisfied with the given value of the variable.
 (c) $\text{LHS} = 5x = 5 \times (-5) = -25 \neq \text{RHS}$
 So, the equation is not satisfied.
(b), (d), (e), (f) : Solve according to (a) and (c).
2. (a) Put the value of the variable in the LHS.

$$\text{LHS} = 5x - 3 = 5 \times 4 - 3 = 20 - 3 = 17 \neq \text{RHS}$$
 So $x = 4$ is not a solution of the equation.
 (d) $\text{LHS} = 5p + 2 = 5 \times 3 + 2 = 15 + 2 = 17 = \text{RHS}$
 So, $p = 3$ is a solution to the given equation.
(b), (c), (e), (f) : Solve according to (a) and (d).
3. **4. and 6 :** Take help of the Answer Sheet.
5. Solve according to Example 4.

Exercise 6.2

1. (a) $x + 3 = 7$
 Subtract 3 from both sides,

$$x + 3 - 3 = 7 - 3$$

$$\Rightarrow x = 4$$
- (b) $x - 3 = 5$
 Add 3 to both sides,

$$x - 3 + 3 = 5 + 3$$

$$x = 8$$
- (i) $5y = 35$
 Divide both sides by 5,

$$\frac{5y}{5} = \frac{35}{5}$$

$$\Rightarrow y = 7$$
- (j) $\frac{p}{2} = 5$
 Multiply both sides by 2

$$\frac{p}{2} = 2 = 5 \times 2$$

$$\Rightarrow p = 10$$

Solve the rest (c) to (h) and (k) to (p) according to (a), (b), (i), (j) above.

2. (a) $3x - 2 = 40$

Add 2 to both sides,

$$3x - 2 + 2 = 40 + 2$$

$$\Rightarrow 3x = 42$$

Divide both sides by 3,

$$\frac{3x}{3} = \frac{42}{3}$$
$$x = 14$$

(b) $4m + 5 = 29$

Subtract 5 from both sides,

$$4m + 5 - 5 = 29 - 5$$

$$\Rightarrow 4m = 24$$

Divide both sides by 4,

$$\frac{4m}{4} = \frac{24}{4}$$

$$\Rightarrow m = 6$$

Solve (c) to (l) according to (a) and (b) above.

Exercise 6.3

1. (a) $2x + 18 = 12$

Transposing 18 to RHS,

$$2x = 12 - 18$$

$$\Rightarrow 2x = -6$$

Divide both sides by 2,

$$\frac{2x}{2} = \frac{-6}{2}$$
$$x = -3$$

(f) $\frac{2b}{3} - 5 = 3$

Transposing -5 to RHS,

$$\frac{2b}{3} = 3 + 5$$

$$\Rightarrow \frac{2b}{3} = 8$$

Multiply both sides by $\frac{3}{2}$

$$\frac{2b}{3} \times \frac{3}{2} = 8 \times \frac{8}{2}$$

$$b = 4 \times 3 = 12$$

(b), (c), (d), (e), (g) and (h) : Solve according to (a) and (f) above.

2. **(a) to (d)** : Solve according to Example 7.

$$(e) \quad 4 = 7(p - 3)$$

$$\Rightarrow 4 = 7 \times p + 7 \times (-3)$$

$$\Rightarrow 4 = 7p - 21$$

Transposing $7p$ to LHS and 4 to RHS, we get

$$-7p = -21 - 4$$

$$\Rightarrow -7p = -25$$

Dividing both sides by -7 ,

$$\frac{-7p}{-7} = \frac{-25}{-7}$$

$$\Rightarrow p = \frac{25}{7} = 3 \frac{4}{7}$$

(f), (g) and (h) : Solve according to (e) above.

3. Solve according to Q. 2 (e) above.

Exercise 6.4

1. Let the number be x .

Three-fourths of the number = 3 less than 21

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

$$\Rightarrow \frac{3}{4}x = 18$$

Multiply both sides by $\frac{4}{3}$,

$$\frac{3}{4}x \times \frac{4}{3} = 18 \times \frac{4}{3}$$

$$\Rightarrow x = 6 \times 4 = 24$$

2. **to 5** : Solve according to Q. 1 and Example 9.

6. Let lowest marks = x

So, $3x - 7 = 86$

$$3x = 86 + 7$$

$$3x = 93$$

Divide both sides by 3, $\frac{3x}{3} = \frac{93}{3}$

$$x = 31$$

7. Let each of the base angle is x .

$$\therefore \text{Vertex angle} = 2 \times x = 2x$$

$$\text{Sum of the three angles} = x + x + 2x = 180$$

$$\Rightarrow 4x = 180$$

Divide both sides by 4,

$$\frac{4x}{4} = \frac{180}{4}$$

$$x = 45$$

Each base angle = 45° , Vertex angle = $2 \times 45 = 90^\circ$

8. Let runs scored by Vikram = x

Runs scored by Sachin = $2x$

$$\text{Double century} = 2 \times 100$$

$$= 200$$

Together their runs fell 2 short of a double century,

$$x + 2x = 200 - 2$$

$$\Rightarrow 3x = 198$$

Divided both sides by 3,

$$\frac{3x}{3} = \frac{198}{3}$$

$$x = 66$$

Runs scored by Vikram = 66 runs

Runs scored by Sachin = $2 \times 66 = 132$ runs

9. and 11. to 13 : Make the equations and solve according to Q. 1, 7, 8 above.

10. Take the help of the Answer Sheet.

14. Let the width of the rectangle = x

Length of the rectangle = $3x$

Perimeter = 2 (length + width)

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

$$= 2 \times 4x$$

$$= 8x$$

$$8x = 80$$

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

$$\Rightarrow x = 10$$

Width = 10m, length = $3 \times 10 = 30$ m

In Real World

Let the present condition = x

The absent condition = y

Now, by present condition = $x + y = 30$

$$x = 30 - y \quad \dots(1)$$

By absent condition

$$120x - 20y = 2760 \quad \dots(2)$$

Eq. (2) divide by 20

$$6x - y = 138 \quad \dots(3)$$

From eq. (1) Put the value of x in eq. (3)

$$6(30 - y) - y = 138$$

$$180 - 6y - y = 138$$

$$180 - 7y = 138$$

$$180 - 138 = 7y$$

$$42 = 7y$$

$$y = \frac{42}{7}$$

$$y = 6$$

Value of y put in eq. (1)

$$x = 30 - y \quad (\because y = 6)$$

$$x = 30 - 6$$

$$x = 24$$

So, he is absent 6 days and present 24 days.

MCQ

1. $(2n + 5) = 3(3n - 10)$

$$(2n + 5) = 9n - 30$$

$$2n - 9n = -30 - 5$$

$$7n = 35$$

Divide both sides by 7.

$$\frac{7n}{7} = \frac{35}{7}$$

$$n = 5$$

2. $\frac{5}{6} = \frac{x}{30}$

by cross multiplication

$$\frac{5}{6} \times \frac{x}{30}$$

$$6x = 30 \times 5$$

$$6x = 150$$

Divide both sides by 6.

$$\frac{6x}{6} = \frac{150}{6}$$

$$x = 25$$

3. Take help of the Answer Sheet.

4. $2m - 10 = 7m - 15 + 5$

$$2m - 7m = -15 + 5 + 10$$

$$5m = -15 + 15$$

$$5m = 0$$

divide 5 by both sides

$$\frac{5m}{5} = \frac{0}{5}$$

$$m = 0$$

$$5. \frac{x}{4} + 3 = 4 \Rightarrow \frac{x}{4} = 4 - 3 = 1 \Rightarrow x = 4 \times 1 = 4$$

6. Take help of the Answer Sheet.

$$7. \frac{3}{4}x = 36 \Rightarrow \frac{3}{4}x \times \frac{4}{3} = 36 \times \frac{4}{3} \Rightarrow x = 12 \times 4 = 48$$

Explore it

Do it yourself

Chapter Test

1. (a) $x - 4.2 = 11.4$

$$x = 11.4 + 4.2$$

$$x = 15.6$$

(c) $\frac{w}{-8} = -4$

$$w = -4 \times -8$$

$$w = 32$$

(b) $-12 + p = 23$

$$p = 23 + 12$$

$$p = 35$$

(d) $6x + 14 = 16$

$$6x = 16 - 14$$

$$6x = 2$$

$$x = \frac{2}{6}$$

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

(e) $7(x - 4) + 13 = 6$

$$7x - 28 + 13 = 6$$

$$7x - 15 = 6$$

$$7x = 15 + 6$$

$$7x = 21$$

$$x = 3$$

(f) $\frac{12 - x}{5} = x$

$$12 - x = 5x$$

$$12 = 5x + x$$

$$12 = 6x$$

$$x = \frac{12}{6} = 2$$

$$x = 2$$

2. $16(3x - 5) - 10(4x - 8) = 40$

$$48x - 80 - 40x + 80 = 40$$

$$8x = 40$$

$$x = 5$$

3. Take help of the Answer Sheet.

4. $x - \left[2x - \frac{3x - 4}{7} \right] = \frac{4x - 27}{3} - 3$

$$= x - \left(\frac{14x - 3x - 4}{7} \right) = \frac{4x - 27 - 9}{3}$$

$$= x - \left(\frac{11x - 4}{7} \right) = \frac{4x - 36}{3}$$

$$= \frac{7x - 11x - 4}{7} = \frac{4x - 36}{3}$$

$$= \frac{-4x - 4}{7} = \frac{4x - 36}{3}$$

$$= \frac{-\cancel{4}(x+1)}{7} = \frac{\cancel{4}(x-9)}{3}$$

$$= -3(x+1) = 7(x-9)$$

$$= -3x - 3 = 7x - 63$$

$$= -3x - 7x = 3 - 63$$

$$= -10x = -60$$

$$= 10x = 60$$

$$x = 6$$

5. Let, the number = x

We take the two less than 4 times the number x .

This given

$$4x - 2$$

Now, we take the number x plus 34 which is equal to

$$x + 34$$

We get

$$4x - 2 = x + 34$$

$$4x - x = 34 + 2$$

$$3x = 36$$

$$x = \frac{36}{3}$$

$$x = 12$$

So, the number = 12

6. Let, The age of Rohit = x years

So,

Rohit's mother is 4 years more than three times Rohit's age

$$= 3 \times x + 4 = 40$$

$$= 3x + 4 = 40$$

$$= 3x = 40 - 4$$

$$= 3x = 36$$

$$= x = 12$$

The age of Rohit 12 years.

7. Let,

The age of Mahesh daughter = x years

The age of Mahesh = 48 years

Mahesh is 7 years less than 5 times =

$$5 \times x - 7 = 48$$

$$5x - 7 = 48$$

$$5x = 48 + 7$$

$$5x = 55$$

$$x = 11$$

So, The age of Mahesh daughter = 11 years

8. Let the three consecutive natural numbers = x , $(x + 1)$ and $(x + 2)$

According to question

$$x + (x + 1) + (x + 2) = 114$$

$$x + x + 1 + x + 2 = 114$$

$$3x + 3 = 114$$

$$3x = 114 - 3$$

$$3x = 111$$

$$x = \frac{111}{3}$$

$$x = 37$$

So,

The three consecutive natural numbers

$$\text{first } x = 37$$

$$\text{second} = x + 1$$

$$= 37 + 1 = 38$$

$$\text{third} = x + 2 = 37 + 2 = 39$$

9. Let the third side = x m.

Then, the two equal sides are of length = $(2x - 5)$ m

Perimeter of triangle = 55m

According to question

$$x + (2x - 5) + (2x - 5) = 55$$

$$x + 2x - 5 + 2x - 5 = 55$$

$$5x - 10 = 55$$

$$5x = 55 + 10$$

$$5x = 65$$

$$x = \frac{65}{5}$$

$$x = 13$$

So, the third side = 13 m

The two equal sides are of length = $(2 \times 13 - 5)$ m

$$= 26 - 5\text{m}$$

$$= 21\text{m}$$

10. Let the story books = x

and the picture books = y

The number of picture books he bought is two-fifths of the number of story books =

$$y = \frac{2x}{5} \quad \dots(1)$$

A boy bought some story books costing = ₹ $48x$

some picture books costing = ₹ $32y$

spend = ₹ 912

$$48x + 32y = 912$$

...(2)

From eq. (1) putting the value of y in eq. (2)

$$48x + 32 \times \frac{2x}{5} = 912$$

$$48x + \frac{64x}{5} = 912$$

$$\frac{5 \times 48x + 64x}{5} = 912$$

$$240x + 64x = 912 \times 5$$

$$304x = 4560$$

$$x = \frac{4560}{304}$$

$$x = 15$$

Putting the value of x in eq. (1)

$$y = \frac{2 \times \cancel{15}^3}{\cancel{5}}$$

$$y = 2 \times 3$$

$$y = 6$$

The story books = 15

and the picture books = 6

Brain Twister

1. Let the number of flowers = x

If one bee lands on each flower, then one bee will be left.

So number of bees in this case = $x \times 1 + 1$

$$= x + 1$$

If two bees land on each flower then one flower will be left so

number of bees = $2 \times (\text{Numbers of flowers} - 1)$

Now, we have $\Rightarrow x + 1 = 2(x - 1)$

$$x + 1 = 2x - 2$$

$$x - 2x = -2 - 1$$

$$-x = -3$$

$$x = 3$$

Number of flowers = $x = 3$

Number of bees = $x + 1$

$$= 3 + 1 = 4$$

2. We are given that Divya pays ₹ 145 per month for her mobile service and 75 paise for each extra minute she talks over the allowed number of minutes in the monthly plan.

Let the number of extra minutes = x

First, we convert paise into rupees.

We know that 100 paise = ₹ 1

Therefore, 75 paise = ₹ 0.75

So, the total number of extra minutes and charge of each minutes

$$= 0.75x$$

That is $0.75x + 145 = 178$

$$0.75x = 178 - 145$$

$$0.75x = 33$$

$$x = 44$$

The number of extra minutes = 44

Think Logically

Clues :

(a) A is 8 times B

$$A = 8B$$

C is 10 less than 13 = $C = 13 - 10$

$$C = 3$$

(b) A is 4 times D

$$A = 4D$$

E is one more than D

$$E = D + 1$$

(c) G is 2 times E

$$G = 2E$$

H is 2 times D

$$H = 2D$$

(d) I is 3 more than J

$$J = I + 3$$

J is half of K

$$J = \frac{K}{2}$$

(e) L is one more than M

$$L = M + 1$$

So, Equations are

$$A = 8B \quad \dots(1)$$

$$C = 3 \quad \dots(2)$$

$$A = 4D$$

$$E = D + 1$$

$$G = 2E$$

$$H = 2D$$

$$J = I + 3$$

$$J = \frac{K}{2}$$

$$L = M + 1$$

We know that the magic sum is 34.

So,

$$A + B + C + 13 = 34$$

from eq. (2)

$$A + B + 3 + 13 = 34$$

$$(\because C = 3)$$

from eq. (1)

$$8B + B + 16 = 34$$

$$(\because A = 8B)$$

$$9B = 34 - 16$$

$$9B = 18$$

$$B = \frac{18}{9}$$

$$\boxed{B = 2}$$

Put the value of B in eq. (1)

$$A = 8 \times 2$$

$$\boxed{A = 16}$$

Remaining (b), (c), (d), (e) will be solve as (a).

Fun Task

Do it yourself

Carry On

Do it yourself

Exercise 7.1

1. Solve according to Example 1.
2. (a) To convert decimals into percentage multiply it by 100%

$$0.05 = 0.05 \times 100\% = 5\%$$

(b) to (d) : Solve accordingly above.

3. (a) $80\% = 0.80 = 0.8$
- $$80\% = \frac{80}{100} = \frac{4}{5}$$

(b) : Solve according to (a) above.

(c) $6\% = 0.06$

$$6\% = \frac{6}{100} = \frac{3}{50}$$

(d) $150\% = \frac{150}{100} = \frac{3}{2}$

4. (a) Shaded part $= \frac{3}{8} = \frac{3}{8} \times 100\% = \frac{75}{2}\% = 37\frac{1}{2}\%$

(b) and (c) : Solve according to (a) above.

(d) First square and second square each is shaded half in each case.

$$\text{Shaded part} = \frac{1}{2} \text{ of the total figure} = \frac{1}{2} \times 100\% = 50\%$$

5. (a) $5\% \text{ of } 1 \text{ hour} = 5\% \text{ of } 60 \text{ minutes} = \frac{5}{100} \times 60 \text{ minutes}$
 $= 3 \text{ minutes}$

(b), (c) and (d) : Solve according to (a) above.

6. Percentage of nickle $= (100 - 54 - 26)\%$
 $= (100 - 80)\%$
 $= 20\%$

7. Solve according to Q. 6 above.

8. Percentage of voters who did not vote $= (100 - 60)\% = 40\%$

Number of voters who actually did not vote $= 40\% \text{ of } 17000$

$$= \frac{40}{100} \times 17000 = 6800$$

9. Solve according to Example 7.

10. Good apples $= 400 - 8 \text{ dozen} = 400 - 8 \times 12 = 400 - 96 = 304$

$$\text{Percentage of good apples} = \frac{304}{400} \times 100 = 76\%$$

$$11. \text{ Fraction of marks} = \frac{435}{500}$$

$$\text{Percentage of marks} = \frac{435}{500} \times \frac{100}{100}$$

$$\Rightarrow = \frac{435}{500} \times 100\% = 87\%$$

$$12. \text{ Percentage of marks obtained by Priya} = \frac{540}{600} \times 100 = 90\%$$

Percentage of marks obtained by Sonali

$$= \frac{750}{800} \times 100 = \frac{375}{4} = 93 \frac{3}{4}\%$$

Therefore percentage of Sonali is better.

$$13. (a) 80 \times \frac{5}{100} = 4$$

$$80 + 4 = ₹ 84$$

(b) and (d) : Solve accordingly above.

$$(c) 120 \times \frac{100}{3 \times 100} \Rightarrow 40 + 120 = ₹ 160$$

14. Solve according to Q. 13 above (Subtract for decreasing).

Exercise 7.2

1. and 2. Solve according to Example 11.

3. and 7. Solve according to Example 16.

4. Solve according to Example 14.

5. Solve according to Example 15.

6. 50 quintal rice = ₹800 × 50 = ₹40,000

Octroi charges = ₹ 400 and transportation charges = ₹ 600

Total C.P. = ₹ 40,000 + ₹400 + ₹600 = ₹41,000

S.P. = ₹750 × 50 = ₹ 37,500

So, he loss = C.P. – S.P. = ₹ 41,000 – ₹ 37,500

$$= ₹ 3,500$$

$$8. \text{ S.I.} = \frac{PRT}{100}$$

$$\Rightarrow 829.50 = \frac{x \times 10 \times 3}{100} \Rightarrow 829.50 = \frac{3x}{10}$$

$$\Rightarrow \frac{3x}{10} = 829.50$$

$$3x = 829.50 \times 10$$

$$3x = 8295$$

$$x = \frac{8295}{3} = 2765$$

Sum = ₹ 2765

9. Mahesh lent out = ₹ 8000 × $\frac{15}{100}$ × 5 = ₹ 1200 × 5 = ₹ 6000

Borrowed = ₹ 6000 × $\frac{12}{100}$ × 3 = ₹ 720 × 3 = ₹ 2160

So, his gain = ₹ (6000 - 2160) = ₹ 3840

10. Let Principal P

S.I. in Ist case = $\frac{PRT}{100} = \frac{P \times \frac{7}{2} \times T}{100} = \frac{49P}{200}$

S.I. in IInd case = $\frac{PRT}{100} = \frac{P \times 5 \times 4}{100} = \frac{20P}{100}$

Difference = $\frac{49P}{200} - \frac{20P}{100} = \frac{49P - 40P}{200} = \frac{9P}{200}$

$\Rightarrow \frac{9P}{200} = 225 \Rightarrow P = \frac{225 \times 200}{9} = ₹ 5000$

11. Let Sum x , then S.I. = x

Time = $\left[\frac{100 \times \text{S.I.}}{PR} \right] = \frac{100 \times x}{x \times 10}$ years

Time = 10 years

12. Let Sum = ₹ x , then amount = ₹ $\left(\frac{8x}{5} \right)$

\therefore S.I. = ₹ $\left(\frac{8x}{5} \right) \Rightarrow ₹ \left(\frac{3x}{5} \right)$

Required rate $R = \left(\frac{100 - \text{S.I.}}{PR} \right)$

= $\left[\left(100 \times \frac{3x}{5} \right) / P \times 5 \right] \% = 12\%$

13. Solve according to Example 19.

14. Solve according to Example 18.

In Real World

Total marks = 500

Ridhima's marks = 333

Percentage of marks obtained by Ridhima

Percentage = $\frac{\text{Ridhima's mark}}{\text{Total marks}} \times 100\%$

= $\frac{333}{500} \times 100$

= $\frac{333}{5} = 66.6\%$

MCQ

1. Solve according to Example 11.

2. Let C.P. = x

$$\text{then } x - \frac{1x}{7} = 144$$

$$\frac{6x}{7} = 144$$

$$x = 144 \times \frac{7}{6} = 168$$

S.P. = 189

$$\text{gain per cent} = \text{Profit} \times \frac{100}{\text{C.P.}}$$

$$= (189 - 168) \times \frac{100}{168} = 21 \times \frac{100}{168} = 12.5\%$$

3. $\frac{25}{2} \times \frac{x}{100} = 150$

$$x = 150 \times 8 = 1200$$

4. Term = S.I. $\times \frac{100}{PR}$

$$\text{S.I.} = 1344 - 1200 = 144$$

$$\text{Term} = \frac{144 \times 100}{1200 \times 6} = 2 \text{ years}$$

5. **Case I :** When $T = 2$ years

$$\text{S.I.} = \frac{PRT}{100} \Rightarrow \text{Amount} - P = \frac{PR \times 2}{100}$$

$$\Rightarrow 696 - P = \frac{PR}{50} \quad \dots\dots(i)$$

Case II : When $T = 5$ years

$$\text{S.I.} = \frac{PRT}{100} \Rightarrow \text{Amount} - P = \frac{PR \times 5}{100}$$

$$\Rightarrow 840 - P = \frac{PR}{20} \quad \dots\dots(ii)$$

dividing (i) by (ii) we get

$$\frac{696 - P}{840 - P} = \frac{20}{25} \Rightarrow \frac{696 - P}{840 - P} = \frac{2}{5}$$

$$\Rightarrow 2(840 - P) = 5(696 - P)$$

$$\Rightarrow 1680 - 2P = 3480 - 5P$$

$$\Rightarrow -2P + 5P = 3480 - 1680$$

$$3P = 1800$$

$$P = \frac{1800}{3} = 600$$

Chapter Test

1. Let the total no. of population of the town = x

$$40\% \text{ of the population are men} = \frac{40x}{100}$$

$$39\% \text{ of the population are women} = \frac{39x}{100}$$

$$\text{Total number of men and women} = \frac{40x}{100} + \frac{39x}{100} = \frac{79x}{100}$$

$$\text{Therefore, the remaining are children} = x - \frac{79x}{100} = \frac{21x}{100}$$

According to question,

$$\frac{21x}{100} = 12600$$

$$21x = 1260000$$

$$x = \frac{1260000}{21}$$

$$x = 60,000$$

$$\text{Population of men} = \frac{40x}{100}$$

$$= \frac{4 \times 60,000}{100} = 2,400$$

2. Let original price of blanket = x

After 12% discount

Reduced price of blanket = 748

Then,

$$x \left[1 - \frac{12}{100} \right] = 748$$

$$x \left(1 - \frac{3}{25} \right) = 748$$

$$x \left(\frac{22}{25} \right) = 748$$

$$22x = 748 \times 25$$

$$x = \frac{748 \times 25}{22}$$

$$x = 34 \times 25$$

$$x = 850$$

So, original price of blanket = ₹ 850

3. Total rice = 150 quintals

Purchasing rate = ₹ 400 per quintal

Selling rate = ₹ 4.50 per kg

$$\begin{aligned}\text{Total cost} &= 150 \times 400 \\ &= ₹ 60000 + \text{Transportation} \\ &= ₹ 60000 + ₹ 5000 = ₹ 65000\end{aligned}$$

Now,

We have to convert quintals into kilograms

$$\begin{aligned}\text{Total rice} &= 150 \text{ quintals} \\ &= 150 \times 100 \\ &= 15000 \text{ kg}\end{aligned}$$

$$\begin{aligned}\text{Total selling price} &= ₹ 4.50 \times 15000 \\ &= ₹ 67500\end{aligned}$$

Now,

$$\begin{aligned}\text{Amount of profit} &= 67500 - 65000 \\ &= ₹ 2500\end{aligned}$$

$$\begin{aligned}\% \text{ of profit} &= \frac{100 \times 2500}{65000} \\ &= 3.84\%\end{aligned}$$

4. Let the principal = p

$$t = 2 \text{ years, } r = 6.5\%$$

$$\text{S.I.} = \frac{P \times 2 \times 6.5}{100} = \frac{13p}{100}$$

$$\text{Amount} = P + \text{S.I.}$$

$$9040 = P + \frac{13p}{100}$$

$$9040 = \frac{100p + 13p}{100}$$

$$9040 = \frac{113p}{100}$$

$$9040 \times 100 = 113p$$

$$p = \frac{9040 \times 100}{113}$$

$$p = 8000$$

Now,

$$t = 3 \text{ years } 3 \text{ months} = 3.25 \text{ years}$$

$$r = 9\%, P = 8000$$

$$\text{S.I.} = \frac{8000 \times 3.25 \times 9}{100}$$

$$\text{S.I.} = 2340$$

$$\text{Amount} = P + \text{S.I.}$$

$$= 8000 + 2340 = 10,340$$

Brain Twister

1. Percent increase = 50 to 80

$$\text{Old} = 80$$

$$\text{New} = 50$$

$$\begin{aligned} \text{\% Formula} &= \frac{\text{Old} - \text{New}}{\text{New}} \times 100\% \\ &= \frac{80 - 50}{50} \times 100 = \frac{30}{50} \times 100 \\ &= 30 \times 2 = 60\% \end{aligned}$$

- Percent decrease = 80 to 50

$$\begin{aligned} \text{\% Formula} &= \frac{\text{New} - \text{Old}}{\text{Old}} \times 100\% \\ &= \frac{50 - 80}{80} \times 100 \\ &= \frac{-30}{80} \times 100 = \frac{-300}{8} = -37.5\% \end{aligned}$$

No, because percent is different in each.

2. C.P. = $63x$

$$\text{S.P.} = \frac{4}{9} \times \cancel{63}x \times \frac{115}{100} + \frac{1}{7} \times \cancel{63}x \times \frac{150}{100} + \left(1 - \frac{4}{9} - \frac{1}{7}\right) \times 63x \times \frac{75}{100}$$

$$\left(\because 15\% = 1 + \frac{15}{100} = \frac{115}{100}\right)$$

$$\left(\because 50\% = 1 + \frac{50}{100} = \frac{150}{100}\right)$$

$$\text{S.P.} = \frac{28 \times 115x}{100} + \frac{9 \times 150x}{100} + \left(63 - \frac{28 - 9}{\cancel{63}}\right) \times \cancel{63}x \times \frac{75}{100}$$

$$= \frac{161x}{5} + \frac{27x}{2} + \cancel{26}x \times \frac{3}{4_2}$$

$$= \frac{161x}{5} + \frac{27x}{2} + \frac{39x}{2} = \frac{161x}{5} + \frac{66x}{2}$$

$$= \frac{322x}{10} + \frac{330x}{10} = \frac{652x}{10}$$

$$\text{Profit} = \text{S.P.} - \text{C.P.}$$

$$= \frac{652x}{10} - 63x$$

$$= \frac{652x - 630x}{10} = 7700$$

$$= \frac{\cancel{22}x}{10} = \frac{350}{\cancel{77}00}$$

$$= \frac{x}{10} = 350$$

$$= x = 350 \times 10$$

$$= x = 3500$$

$$\boxed{x = 3500 \text{ each sheep}}$$

$$\text{C.P.} = 63x$$

$$= 63 \times 3500$$

$$= 2,20,500$$

Think Logically

$$\text{Least C.P.} = ₹ (200 \times 8) = ₹ 1600$$

$$\text{Greatest S.P.} = ₹ (425 \times 8) = ₹ 3400$$

$$\text{Required profit} = ₹ (3400 - 1600)$$

$$= ₹ 1800$$

Carry On

Do it yourself

Exercise 8.1

- To find complement, subtract each from 90° .
- To find supplement subtract each from 180° .
- Add :
 - $45^\circ + 45^\circ = 90^\circ$, complementary.
 - $112^\circ + 68^\circ = 180^\circ$, supplementary.
 - $63^\circ + 27^\circ = 90^\circ$, complementary.
 - $65^\circ + 115^\circ = 180^\circ$, supplementary.
- The other angle would increase in the same amount.
- to 7 : Take help of the Answer Sheet.

Exercise 8.2

- Take help of the Answer Sheet.
- (a) $x = 60^\circ$ (alternate angles)
 (b) $y + 120^\circ = 180^\circ \Rightarrow x = 180^\circ - 120^\circ = 60^\circ$
 (c) $z + 130^\circ = 180^\circ \Rightarrow x = 180^\circ - 130^\circ = 50^\circ$
- 4. and 5 :** Take help of the Answer Sheet.
- Draw PEQ parallel to AB dividing $\angle x$ into two parts $\angle x_1$ and $\angle x_2$.
 $AB \parallel PEQ$, AE intersects them, alternate angles are equal; $\angle x = 30^\circ$;
 $CD \parallel PEQ$, CE intersects them, alternate angles are equal : $\angle x_2 = 40^\circ$;
 $\angle x = \angle x_1 + \angle x_2 = 30^\circ + 40^\circ = 70^\circ$

In Real World

$$\begin{array}{r} \angle DCB = 60 \text{ (External)} \\ + 55 \\ \hline 115 \end{array}$$

$$180^\circ - 115^\circ = 65^\circ$$

 $DE \parallel BC$

$$\angle DCB = 25^\circ$$

$$\angle EDC = \angle DOB = 25^\circ \text{ (Alternate angle)}$$

$$\angle A = 65^\circ$$

$$\angle DEA = 60^\circ = \angle ACB \text{ (Corresponding angle)}$$

$$\angle ABC = \angle EDA = 55^\circ \text{ (Corresponding angle)}$$

MCQ

2, 3 and 6 : Take help of the Answer Sheet.

1. According to diagram on question

$$65^\circ + y = 180^\circ$$

$$y = 180^\circ - 65^\circ = 115^\circ$$

$$x + y = 360^\circ$$

$$x + 115 = 360^\circ$$

$$x = 360^\circ - 115^\circ$$

$$= 245^\circ$$

4. $\angle A + \angle B = 90^\circ$

$$7 + 4x + x + 23 = 90^\circ$$

$$30 + 5x = 90^\circ$$

$$5x = 90 - 30 = 60^\circ$$

$$x = \frac{60}{5} = 12$$

$$\angle A = 7 + 4 \times 12 = 55^\circ$$

$$\angle B = 12 + 23 = 35^\circ$$

So, (a) is true statement.

5. $\angle 1 = \angle 5$ (corresponded by)

$$2x - 15 = x + 40$$

$$2x - x = 40 + 15$$

$$x = 55$$

Chapter Test

1. (a) $40^\circ = 90^\circ - 40^\circ = 50^\circ$

Complement of 40° is 50°

(b), (c) and (d) : Take help of the Answer Sheet.

2. (a) $110^\circ = 180^\circ - 110^\circ = 70^\circ$

Supplement of 110° is 70°

(b), (c) and (d) : Take help of the Answer Sheet.

3. $\angle EAD + \angle DAC + \angle CAB = 180^\circ$

$$(3x - 5^\circ) + (x + 20^\circ) + 65^\circ = 180^\circ$$

$$3x - 5^\circ + x + 20^\circ + 65^\circ = 180^\circ$$

$$3x + x - 5^\circ + 20^\circ + 65^\circ = 180^\circ$$

$$4x - 5^\circ + 85^\circ = 180^\circ$$

$$4x + 80^\circ = 180^\circ$$

$$4x = 180^\circ - 80^\circ$$

$$4x = 100$$

$$x = \frac{100}{4}$$

$$x = 25^\circ$$

$$4. = 180^\circ - 125^\circ \text{ (External)}$$

$$= 55^\circ$$

$$\angle OMN + 55^\circ + x = 180^\circ$$

$$35^\circ + 55^\circ + x = 180^\circ$$

$$90^\circ + x = 180^\circ$$

$$x = 180^\circ - 90^\circ$$

$$\boxed{x = 90^\circ}$$

$$5. x + y = 180^\circ \quad \dots(1)$$

$$(\because x = 2y)$$

$$2y + y = 180^\circ$$

$$3y = 180^\circ$$

$$y = \frac{180^\circ}{3}$$

$$y = 60^\circ$$

Putting the value of y in eq. (1)

$$x + 60^\circ = 180^\circ$$

$$x = 180^\circ - 60^\circ$$

$$\boxed{x = 120^\circ}$$

6. Given in the figure, $AB \parallel EF$

$$\angle BAC = 57^\circ, \angle ACE = 22^\circ$$

$$\angle ECD = 35^\circ \text{ and } \angle ACE = 22^\circ$$

To prove : $AB \parallel EF$

$$\text{Proof : } \angle ECD + \angle CEF = 35^\circ + 145^\circ$$

$$= 180^\circ$$

But these are co-interior angles

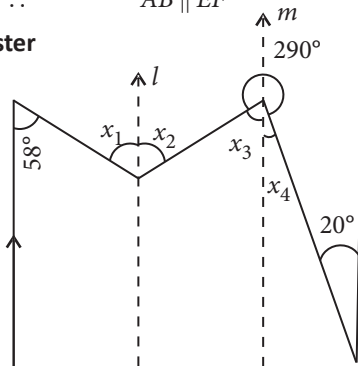
$$\therefore EF \parallel CD$$

$$\text{But } AB \parallel CD$$

$$\therefore AB \parallel EF$$

Brain Twister

1.



Draw two parallel lines l, m parallel to the given other parallel lines.

Now,

$$y = x_1 + x_2$$

...(1)

First find out the values of x_1 , x_2 , x_3 and x_4 .

$$x_1 = 58^\circ \quad (\because \text{Corresponding angles})$$

$$x_3 = 20^\circ \quad (\because \text{Corresponding angles})$$

$$x_2 = 360^\circ - 290^\circ - 20^\circ$$

$$x_2 = 360^\circ - 310^\circ$$

$$x_2 = 50^\circ$$

$$x_3 = 50^\circ \quad (\because \text{Corresponding angles})$$

$$y = x_1 + x_2$$

$$y = 58^\circ + 50^\circ$$

$$\boxed{y = 108^\circ}$$

2. (i) $JK \parallel GI$ and DH is transversal.

$$\therefore \angle GHD = \angle HDC \text{ (Alternate angle)}$$

$$\angle GHD = \angle HDC + 48^\circ$$

$$\angle GHD - \angle HDC = 48^\circ$$

(ii) $GI \parallel EF$ and BC is transversal

$$\angle BCI + 66^\circ = 180^\circ$$

$$\angle BCI = 180^\circ - 66^\circ$$

$$= 114^\circ$$

As, $HA \parallel CB$ and AB is transversal

$$\angle CBF = \angle HAB \quad (\text{Corresponding angles})$$

$$\therefore \angle HAB = 66^\circ$$

$$\text{Now, } \angle BCI + \angle HAB = 114^\circ + 66^\circ = 180^\circ$$

Think Logically

Do it yourself

Carry On

Take the help of Answer Sheet.

Exercise 9.1

1. (a) Take help of the first figure in the middle of page 94 of the text book.
 (b) Take help of the side figure up page 94.
 (c) Take help of the third figure in the middle of page 94.
2. Draw an isosceles triangle with two sides equal. Draw a median from the common vertex of the equal sides to the middle point of the unequal side. It is also an altitude. Measure the angle.
3. Take help of the second figure in the middle of page 94. It is a right angled triangle.
4. Take help of the side figure above the page 95–96 and first figure in the middle of page 94. It is an equilateral triangle.
5. Draw a rough sketch of an obtuse angle. Take help of the third figure in the middle of page 94.

Exercise 9.2

1. and 4. Solve according to Example 1.
2. and 5. Solve according to Example 2.
3. The two exterior angles thus formed at each vertex are vertically opposite and hence equal.
6. Exterior angle = Sum of opposite interior angle

$$\begin{aligned}
 x + x &= 100 \\
 2x &= 100 \quad \Rightarrow \quad x = \frac{100}{2} = 50
 \end{aligned}$$

7. We know that, exterior angle = Sum of opposite interior angle.

The ratio given = 2 : 3

Required angles are $2x$, $3x$

$$\begin{aligned}
 2x + 3x &= 130^\circ \\
 5x &= 130^\circ \\
 x &= \frac{130}{5} = 26 \\
 2x &= 2 \times 26^\circ \\
 &= 52^\circ \\
 3x &= 3 \times 26^\circ = 78^\circ
 \end{aligned}$$

So, the required angles are 52° and 78° .

Exercise 9.3

- Solve according to Example 3.
- (a) Exterior angle $x =$ sum of the interior opposite angles.

$$= 50^\circ + 60^\circ = 110^\circ$$

Sum of the three angles of a triangle = 180°

$$y + 50^\circ + 60^\circ = 180^\circ \Rightarrow y = 180^\circ - 50^\circ - 60^\circ = 70^\circ$$

- (b) $x =$ exterior angle $120^\circ -$ interior angle $50^\circ = 70^\circ$

$$y = 180^\circ - 120^\circ = 60^\circ \quad (\text{linear pair})$$

- (c) $y = 80^\circ$ (vertically opposite angles)

$$x + 80^\circ + 50^\circ = 180^\circ \Rightarrow x = 180^\circ - 80^\circ - 50^\circ = 50^\circ$$

- (d) $y + y + 30^\circ = 180^\circ \Rightarrow 2y = 180^\circ - 30^\circ$

$$2y = 180^\circ - 30^\circ$$

$$2y = 150^\circ$$

$$y = 75^\circ \quad (\text{vertically opposite angles})$$

$$x = 75^\circ$$

- (e) $y = 90^\circ$ (vertically opposite angles)

$$90^\circ + x + x = 180^\circ \Rightarrow 2x = 180^\circ - 90^\circ = 90^\circ$$

$$\Rightarrow x = 90^\circ \div 2 = 45^\circ$$

- (f) Two angles of the triangle are x° each (vertically opposite angles)

$$y = x \text{ (vertically opposite angles)}$$

$$x + x + x = 180^\circ \Rightarrow 3x = 180^\circ \Rightarrow x = 180^\circ \div 3 = 60^\circ$$

$$y = x = 60^\circ$$

- Let one of the equal angles = x

$$x + x + 100^\circ = 180^\circ \Rightarrow 2x = 180^\circ - 100^\circ = 80^\circ \Rightarrow x = 80^\circ \div 2 = 40^\circ$$

- Solve according to Example 6.

- Let the third angle be x . Each of the equal angle = $2x$

$$x + 2x + 2x = 180^\circ \Rightarrow 5x = 180^\circ \Rightarrow x = 180^\circ \div 5 = 36^\circ$$

$$\text{Angles of the triangle} = 36^\circ, 36^\circ \times 2 = 72^\circ, 36^\circ \times 2 = 72^\circ$$

- Let the other acute angle be x° .

$$x + 64^\circ + 90^\circ = 180^\circ$$

$$x = 180^\circ - 64^\circ - 90^\circ = 26^\circ$$

- The angle of triangle are $(x - 40)^\circ$, $(x - 20)^\circ$ and $\left(\frac{1}{2}x - 10\right)^\circ$

We know that the sum of the angles of triangle = 180°

$$\text{So, } (x - 40) + (x - 20) + \left(\frac{1}{2}x - 10\right) = 180^\circ \text{ [Angle sum property]}$$

$$x - 40 + x - 20 + \frac{x}{2} - 10 = 180^\circ$$

$$\Rightarrow 2x + \frac{x}{2} - 70 = 180 \quad \Rightarrow \quad \frac{4x + x}{2} = 180 + 70$$

$$\Rightarrow \quad \frac{5x}{2} = 250$$

$$\Rightarrow \quad x = \frac{250 \times 2}{5} = 100$$

Now, angle of the Δ are :

$$(100 - 40)^\circ, (100 - 20)^\circ \text{ and } \left(\frac{100}{2} - 10 \right)^\circ \\ = 60^\circ, 80^\circ \text{ and } 40^\circ$$

8. Let, $A = \frac{x}{2}$, $B = \frac{x}{3}$, $C = \frac{x}{6}$

$$A + B + C = 180^\circ$$

$$\frac{x}{2} + \frac{x}{3} + \frac{x}{6} = 180^\circ$$

$$\frac{3x + 2x + x}{6} = 180 \quad \Rightarrow \quad 6x = 180 \times 6$$

$$6x = 180$$

$$x = \frac{1080}{6} = 180^\circ$$

So, $A = \frac{180}{2} = 90^\circ$, $B = \frac{180}{3} = 60^\circ$, $C = \frac{180}{6} = 30^\circ$

$$A = 90^\circ, B = 60^\circ, C = 30^\circ$$

9. In ΔACD

$$\angle ABC = 90^\circ (CD \perp AB)$$

$$\angle A = 65^\circ$$

$$\angle ACD = 180 - (90 + 65)$$

$$= 180 - 155 = 25^\circ$$

$$\angle BCD = 90 - \angle ACD = 90 - 25 = 65^\circ$$

In ΔBCD

$$\angle BCD + \angle BDC + \angle CBD = 180^\circ$$

$$65 + 90 + \angle CBD = 180^\circ \Rightarrow \angle CBD = 180 - 155 = 25^\circ$$

10. Take help of the Answer Sheet.

Exercise 9.4

1. and 4. Solve according to Example 8.

2. 5 and 6. Take help of the Answer Sheet.

3. The higher limit of the length of the third side can make it largest of the three sides.

The lower limit of the length of the third side can make it largest of the three sides.

The sum of the given two sides $>$ the third side even if it may be the largest or the third side $<$ the sum of the given two sides
 $< 10 \text{ cm} + 14 \text{ cm}$ or $< 24 \text{ cm}$

Now, if the third side be one of the two smaller sides, then the side of length 13 cm will be the largest

Then, $10 \text{ cm} + \text{third side} > 14 \text{ cm}$

or $\text{third side} > 14 \text{ cm} - 10 \text{ cm}$

or $\text{third side} > 4 \text{ cm}$

Hence, the length of third side would be greater than 4 cm but, less than 24 cm.

Exercise 9.5

1. (a) $x^2 = 40^2 + 9^2 \Rightarrow x^2 = 1600 + 81 \Rightarrow x^2 = 1681 = 41^2 \Rightarrow x = 41$
 (b) $x^2 + 7^2 = 25^2 \Rightarrow x^2 = 25^2 - 7^2 = 625 - 49 = 576 = 24^2 \Rightarrow x = 24$
 (c) $x_1^2 = (37^2 - 12^2)$, $= 1369 - 144 = 1225 = 35^2 \Rightarrow x_1 = 35$
 Also $x_2 = 35$
 $\Rightarrow x = 35 + 35 = 70$
2. $BC^2 = AB^2 + AC^2 = 10^2 + 24^2 = 100 + 576 = 676 = 26^2$
 $\Rightarrow BC = 26$
3. $QR^2 + PR^2 = PQ^2 \Rightarrow QR^2 + 7^2 = 25^2$
 $\Rightarrow QR^2 = 25^2 - 7^2 = 625 - 49 = 576 = 24^2$
 $\Rightarrow QR = 24$
4. Solve according to Example 11.
5. $\angle P + \angle Q + \angle R = 180^\circ \Rightarrow \angle P + 25^\circ + 65^\circ = 180^\circ$
 $\Rightarrow \angle P + 90^\circ = 180^\circ \Rightarrow \angle P = 180^\circ - 90^\circ = 90^\circ$
 The side opposite to $\angle P = QR$
 So $PQ^2 + RP^2 = QR^2$
6. $(\text{diagonal})^2 = (\text{length})^2 + (\text{breadth})^2$
 $= 27^2 + 36^2 = 729 + 1296 = 2025 = 45^2$
 diagonal = 45 m
7. Solve according to Example 14.
8. $\text{length}^2 + \text{width}^2 = \text{diagonal}^2$
 $40^2 + \text{width}^2 = 41^2$
 $\text{width}^2 = 41^2 - 40^2 = 1681 - 1600 = 81 = 9^2$
 width = 9 cm
 Perimeter = 2 (length + width)
 $= 2 \times (40 + 9) \text{ cm} = 2 \times 49 \text{ cm} = 98 \text{ cm}$
9. Solve according to Example 13.
10. Diagonals of the rhombus bisect each other at 90° .

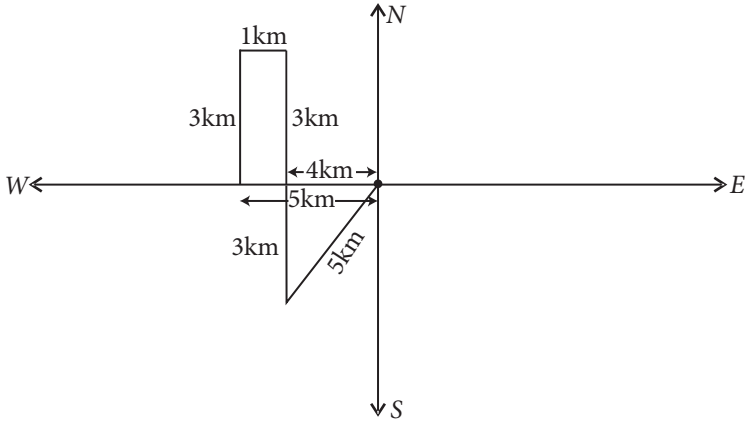
Thus the rhombus is divided into 4 equal triangles. The sides of the triangle making right angle are of $\frac{16}{2} = 8$ cm and $\frac{30}{2} = 15$ cm.

The side of the rhombus is the hypotenuse of the triangle.

$$(\text{side of the rhombus})^2 = 8^2 + 15^2 = 64 + 225 = 289 = 17^2$$

$$\text{side of the rhombus} = 17 \text{ cm}$$

In Real World



(i) Total distance = 5 km + 3 km + 1 km + 6 km
= 15 km

(ii) By pythagoras property

$$AC^2 = CB^2 + AB^2$$

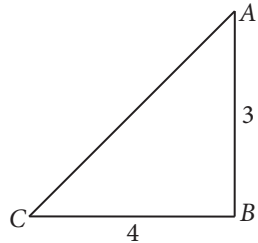
$$AC^2 = 4^2 + 3^2$$

$$= 15 + 9$$

$$= 25$$

$$AC = \sqrt{25}$$

$$AC = 5 \text{ km}$$



(iii) South, West

MCQ

1. Let each acute angle be x .

$$x + x + 90^\circ = 180^\circ$$

$$\Rightarrow 2x + 90^\circ = 180^\circ$$

$$\Rightarrow 2x = 180^\circ - 90^\circ = 90^\circ$$

$$\Rightarrow x = 90^\circ \div 2 = 45^\circ$$

2. In a right angled triangle, all the three altitudes meet at the vertex of right angle (as shown in the second figure in the middle of page 111 of the text book.)

3, 4. and 7. : Take help of the Answer Sheet.

5. We know that in an isosceles triangle, base angles are of equal measurement, so each base angle = 55°

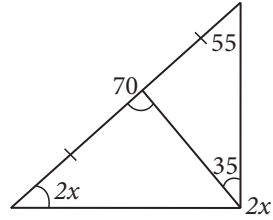
Sum of both base angles = $55^\circ + 55^\circ = 110^\circ$

Sum of three angles = Sum of base angles + Vertical angles

So, $180^\circ = 110^\circ + \text{Vertical angle}$

So, vertical angle = $180^\circ - 110^\circ = 70^\circ$

6. $< 7 + 3 = < 10$ cm
8. $70 + 2x + 2x = 180^\circ$
 $4x = 180 - 70 = 110^\circ$
 $x = \frac{110}{4} = 27.5^\circ$



Chapter Test

1. (a) Solution

$$\angle DCA + \angle ACB = 180^\circ \quad (\text{linear pair})$$

$$90^\circ + \angle ACB = 180^\circ$$

$$\angle ACB = 180^\circ - 90^\circ$$

$$\angle ACB = 90^\circ$$

In $\triangle ABC$

Sum of all three angles is 180°

$$\angle ABC + \angle ACB + \angle BAC = 180^\circ$$

$$30^\circ + 90^\circ + \angle BAC = 180^\circ$$

$$\angle BAC = 180^\circ - 120^\circ$$

$$= 60^\circ$$

- (b) Solution $\angle x = ?$

SPT is a straight line, sum of all angles is 180°

$$\angle SPQ + \angle QPR + \angle TPR = 180^\circ$$

$$60^\circ + \angle QPR + 70^\circ = 180^\circ$$

$$\angle QPR = 180^\circ - 130^\circ$$

$$\angle QPR = 50^\circ$$

Exterior angle of triangles is equal to sum of two opposite interior angles of triangle

Thus,

$$\angle PRU = \angle PQR + \angle QPT$$

$$\angle PRU = 60^\circ + 50^\circ$$

$$\angle PRU = 110^\circ$$

$$\angle x = 110^\circ$$

2. By angle sum property $\angle A + \angle B + \angle C = 180^\circ$

Let the $\triangle ABC$ be right angled at A

$$\therefore \angle A = 90^\circ$$

$$\therefore \angle B + \angle C = 180^\circ - \angle A$$

$$= 180^\circ - 90^\circ$$

$$= 90^\circ$$

Given that

$$\angle B : \angle C = 2 : 3$$

Let $\angle B = 2x$ and $\angle C = 3x$

$$\Rightarrow 2x + 3x = 90^\circ$$

$$5x = 90^\circ$$

$$= \frac{90}{5}$$

$$x = 18^\circ$$

$$\therefore \angle B = 2 \times 18^\circ$$

$$= 36^\circ \text{ and}$$

$$\angle C = 3 \times 18^\circ$$

$$= 54^\circ$$

Here, the two right-angled triangle are 36° and 54° .

3. Given that

$$\angle A = 65^\circ \text{ and } \angle B = 55^\circ$$

As we know $DE \parallel BC$

$$\angle D = \angle B = 55^\circ$$

As we know

$$\angle A + \angle B + \angle C = 180^\circ \quad (\because \text{angle sum property})$$

$$65^\circ + 55^\circ + x = 180^\circ$$

$$x = 180^\circ - 120^\circ$$

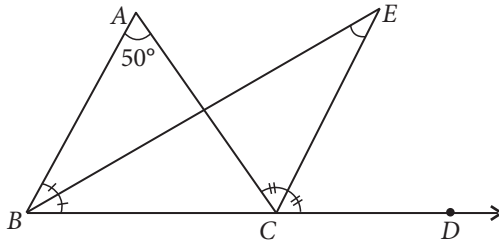
$$x = 60^\circ$$

$$\angle E = \angle C = 60^\circ$$

$$(a) \angle ADE = 55^\circ \quad (b) \angle AED = 60^\circ \quad (c) \angle C = 60^\circ$$

4. In $\triangle ABC$, $\angle A = 50^\circ$

BC is produced



Bisectors of $\angle ABC$ and $\angle ACD$ meet at $\angle E$

$$\therefore \angle E = \frac{1}{2} \angle A = \frac{1}{2} \times 50^\circ = 25^\circ$$

5. Given $\angle ADB = 70^\circ$

$$\angle CAB = 100^\circ$$

Find $\angle ABD$ and $\angle ABC = ?$

$$\angle CAB + \angle DAB = 180^\circ$$

$$100^\circ + \angle DAB = 180^\circ$$

$$\angle DAB = 180^\circ - 100^\circ$$

$$\angle DAB = 80^\circ$$

Let's consider $\angle ABD$

$$\angle ABD + \angle DAB + \angle ADB = 180^\circ$$

$$\angle ABD + 80^\circ + 70^\circ = 180^\circ$$

$$\boxed{\angle ABD = 30^\circ}$$

Let's consider $\angle CBD$

$$\angle CBD + \angle DAB + \angle CBD = 180^\circ$$

$$30^\circ + x^\circ + 3x^\circ + 70^\circ = 180^\circ$$

$$4x^\circ + 100^\circ = 180^\circ$$

$$4x^\circ = 180^\circ - 100^\circ$$

$$4x^\circ = 80^\circ$$

$$\boxed{x = 20^\circ}$$

6. For any triangle to be a right angle one,

It has to satisfy pythagoras theorem.

Pythagoras Theorem-

Sum of squares of the two smaller sides = Square of the largest side

Here, L.H.S.

$$6^2 + 8^2 = 36 + 64$$

$$= 100$$

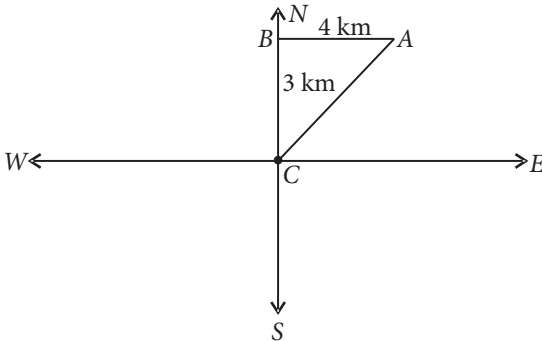
$$\text{R.H.S.} = 11^2$$

$$= 121$$

$$\text{L.H.S.} \neq \text{R.H.S.}$$

The above triangle is not a right angle triangle.

- 7.



By pythagoras theorem

$$AC^2 = AB^2 + BC^2$$

$$= (4)^2 + (3)^2$$

$$= 16 + 9 = 25$$

$$AC = \sqrt{25}$$

$$AC = 5 \text{ km}$$

8. As height of building will be perpendicular and distance from wall to rope will be base and required length of rope will be hypotenuse.

$$\begin{aligned} \text{Pythagoras theorem of hypotenuse} &= \sqrt{8^2 + 6^2} \\ &= \sqrt{64 + 36} \\ &= \sqrt{100} \\ &= 10 \text{ m} \end{aligned}$$

9. If interior angle is x then exterior angle will be $2x$

As we know,

Total sum of interior angles of a triangle is 180° so interior angle will be $x + x + x = 3x = 180^\circ$

$$\begin{aligned} 3x &= 180^\circ \\ x &= \frac{180^\circ}{3} \\ x &= 60^\circ \end{aligned}$$

All its interior angles are of 60° each.

10. We know that the side opposite to largest angle is longest side of triangle.

$\angle A$ is the largest angle and side opposite to it is BC .

So, BC is the largest side.

Then comes $\angle B$ and side opposite to it is AC .

So, it is the smallest side.

Brain Twister

1. In $\triangle TCE$, we have

$$x = \angle TCE + \angle TEC \quad (\text{Exterior angle property})$$

$$x = 35^\circ + 31^\circ$$

$$x = 61^\circ$$

In $\triangle SBD$, we have

$$\angle AST = \angle SBD + \angle SDB$$

$$\angle AST = 30^\circ + 36^\circ = 66^\circ$$

In $\triangle ATS$, we have

$$y + x + \angle AST = 180^\circ \quad (\text{Angle sum property})$$

$$y + 66^\circ + 66^\circ = 180^\circ$$

$$y = 180^\circ - (66^\circ + 66^\circ)$$

$$y = 48^\circ$$

2. Consider the figure,

We know that

Sum of the angles in a triangle is 180° but in fig. $\triangle ECB$ the sum of angles is $80 + 40 + 70 = 190$

So, it is wrong.

And we calculate $\angle CDE$ and $\angle DCE$ by data

$$\begin{aligned}\angle CDE &= 132^\circ - 110^\circ \\ &= 22^\circ\end{aligned}$$

So, the sum of the $\angle CDE$

$$\begin{aligned}\angle CDE &= 110^\circ + 22^\circ + 32^\circ \\ \angle CDE &= 164^\circ\end{aligned}$$

So, it is wrong.

$$\begin{aligned}\angle DCE &= 22^\circ + 32^\circ + 110^\circ \\ \angle DCE &= 164^\circ\end{aligned}$$

So, it is wrong.

Think Logically

Do it yourself.

Carry On

Take the help of Answer Sheet.

Exercise 10.1

1. Solve according to Example 1.
2. Solve according to Example 5.
3. and 11. Solve according to Example 2.
4. Perimeter of rhombus = $4 \times \text{side} = 24 \text{ m}$
 $\text{side} = 24 \text{ m} \div 4 = 6 \text{ m}$
 $\text{height of rhombus} = \frac{\text{area}}{\text{side}} = \frac{30 \text{ m}^2}{6 \text{ m}} = 5 \text{ m}$
5. Side of the square = perimeter $\div 4 = 64 \text{ m} \div 4 = 16 \text{ m}$
 Area of the square = $16 \times 16 = 256 \text{ m}^2$
 Area of the parallelogram = Area of the square = 256 m^2
 Corresponding base of the parallelogram
 $= \frac{\text{Area}}{\text{Height}} = \frac{256 \text{ m}^2}{8 \text{ m}} = 32 \text{ m}$
6. Area of a right-angled triangle = $\frac{ab}{2}$
 $= \frac{20.8 \times 14.7}{2} = 152.88 \text{ m}^2$
7. Solve according to Example 7.
8. Solve according to Example 8.
9. Let the base and height of the triangle are $3x$ and $4x$.
 Area of the triangle = $\frac{1}{2} \times \text{base} \times \text{height}$
 $= \frac{1}{2} \times 3x \times 4x = 6x^2 = 96 \text{ cm}^2$
 $x^2 = 96 \text{ cm}^2 \div 6 = 16 \text{ cm}^2 = (4 \text{ cm})^2$
 $x = 4 \text{ cm}$
 base = $3x = 3 \times 4 \text{ cm} = 12 \text{ cm}$
 height = $4x = 4 \times 4 \text{ cm} = 16 \text{ cm}$
10. Let the same height = $x \text{ cm}$
 Area of the rectangle = length \times breadth
 $= \text{base} \times \text{height} = 5 \text{ cm} \times x \text{ cm} = 5x \text{ cm}^2 = 20 \text{ cm}^2$
 $\Rightarrow 5x = 20 \Rightarrow x = 20 \div 5 = 4$
 Area of the triangle = $\frac{1}{2} \times \text{base} \times \text{height}$
 $= \frac{1}{2} \times 5 \text{ cm} \times 4 \text{ cm} = 10 \text{ cm}^2$

12. For $\triangle ABC$ base $BC = 9$ cm height $AD = 6$ cm
 (i) Area of $\triangle ABC = \frac{1}{2} \times bh = \frac{1}{2} \times 9 \times 6 = 27 \text{ cm}^2$
 (ii) Base $BA = 7.5$ cm height $CE = ?$
 Area = $\frac{1}{2} \times bh = \frac{1}{2} \times 7.5 \times h = 27$

$$h = \frac{2 \times 27}{7.5} = \frac{2 \times 270}{75} = 7.2 \text{ cm}$$

Exercise 10.2

1. Solve according to Example 9.
2. Solve according to Example 11.
3. Solve according to Example 15.
4. Radius of the garden = $42 \text{ m} \div 2 = 21 \text{ m}$
 Length of the rope required for 1 round

$$= 2\pi r = 2 \times \frac{22}{7} \times 21 \text{ m} = 132 \text{ m}$$

If the gardener wants to make 3 rounds of fence at three levels, then the total length of rope needed = $132 \times 3 = 396 \text{ m}$

5. **8 and 9** : Solve according to Example 16.
6. Length of the wire becomes the circumference of the circle.

$$2\pi r = 44 \text{ cm} \Rightarrow 2 \times \frac{22}{7} \times r = 44 \Rightarrow r = \frac{44 \times 7}{2 \times 22} = 7 \text{ cm}$$

$$\text{Area of the circle} = \pi r^2 = \frac{22}{7} \times 7 \times 7 = 154 \text{ cm}^2$$

Length of the same wire becomes the perimeter of the square.

$$4 \times \text{side} = 44 \text{ cm} \Rightarrow \text{side} = 44 \div 4 = 11 \text{ cm}$$

$$\text{Area of the square} = 11 \times 11 = 121 \text{ cm}^2$$

We see that the area of the circle 154 cm^2 is greater than the area of the square 121 cm^2 .

7. Take help of the Answer Sheet.
10. Solve according to Example 13.
11. Solve according to Example 12.
12. Solve according to Q.6.
13. Area of two circles and in the ratio : $\frac{r^2}{R^2} = \frac{25}{36}$

$$\frac{r}{R} = \frac{5}{6}$$

$$5R = 6r$$

$$R = \frac{6r}{5}$$

$$\text{Circumference of first} = 2 \times \pi \times r$$

$$\text{Circumference of second} = 2 \times \pi \times \frac{6r}{5}$$

$$\text{Ratio} = \frac{2 \times \pi \times r}{2 \times \pi \times \frac{6r}{5}} = \frac{r}{\frac{6r}{5}} = \frac{r \times 5}{6r} = \frac{5}{6} = 5:6$$

Note: Q. 6 and Q. 13 are reverse of each other.

14. Solve according to Q. 6.

15. Radii of the two plates = $\frac{10 \text{ cm}}{2} = 5 \text{ cm}$ and $\frac{24 \text{ cm}}{2} = 12 \text{ cm}$

Combined area of the two plates

$$= \pi \times 5^2 + \pi \times 12^2 = 25\pi + 144\pi = 169\pi$$

Area of the plate having combined area of the two plates

$$= \pi r^2 = 169\pi \Rightarrow r^2 = 169 = 13^2 \Rightarrow r = 13 \text{ cm}$$

Now, we know that diameter = $2 \times 13 = 26 \text{ cm}$

In Real World

Length = 300 m

Breath = 3 m

$$= l \times b$$

$$= 300 \times 3$$

$$= 900 \text{ m}^2$$

pay = ₹ 8.75 per m^2

$$= 900 \times 8.75$$

$$= ₹ 7875$$

Both side = $2 \times ₹ 7875$

$$= ₹ 15,750$$

MCQ

1. Area of triangle = $\frac{1}{2} \times \text{base} \times \text{height}$

$$= \frac{1}{2} \times 12 \times 8^4$$

$$= 48 \text{ m}^2$$

2. Area = side \times distance between parallel sides

$$180 = 15 \times x$$

$$x = \frac{180}{15} = 12 \text{ cm}$$

3. Area of triangle = $\frac{1}{2} \times \text{base} \times \text{height}$

$$\text{Area of triangle} = 40 \times b$$

$$\text{So, equating both, } 40 \times b = \frac{1}{2} \times b \times h$$

$$h = 40 \times 2 = 80 \text{ cm}$$

4. Radius = 7 cm, length of wire = circumference of semi-circle
 $= \pi r + \text{diameter of semi-circle}$
 $= \pi r + 2r$
 $= \frac{22}{7} \times 7 + 2 \times 7 \Rightarrow 22 + 14 = 36 \text{ cm}$
5. Here $2\pi r = \pi r^2$
 So, $2r = r^2 \Rightarrow \frac{2r}{r} = r \Rightarrow 2 = r$
 Thus, radius $r = 2$
6. Height of an equilateral triangle = $\sqrt{6}$ Here $\sin 60^\circ = \frac{CM}{CB}$
 $\frac{\sqrt{3}}{2} = \frac{\sqrt{6}}{CB}$
 $\Rightarrow \sqrt{3} \text{ CB} = 2\sqrt{6}$
 $CB = \frac{2\sqrt{6}}{\sqrt{3}}$
 $CB = 2\sqrt{2}$
 $AB = 2\sqrt{2}$
 Area = $\frac{1}{2} \times AB \times CM$
 $= \frac{1}{2} \times 2\sqrt{2} \times \sqrt{6}$
 $= \sqrt{12} = 2\sqrt{3}$
 $= 2\sqrt{3} \text{ cm}^2$

Chapter Test

1. Let Breadth = x
 Length = 2 times of breadth = $2x$
 Perimeter = 72 m
 Perimeter of rectangle = $2(L + B)$
 $72 = 2(2x + x)$
 $72 = 2 \times 3x = 6x$
 $72 = 6x$
 $x = \frac{72}{6} = 12$
 Breadth = $x = 12 \text{ m}$
 Length = $2x = 2 \times 12 = 24 \text{ m}$
2. Let the base be $4x$ and the height be $5x$.
 Area of triangle = 90 m^2
 Area of triangle = $\frac{hb}{2}$

$$A = \frac{1}{2}hb$$

$$90 = \frac{1}{2} \times 5x \times \frac{2}{x}$$

$$90 = 10x^2$$

$$x^2 = \frac{90}{10}$$

$$x^2 = 9$$

$$\boxed{x=3}$$

$$\text{Base} = 4x = 4 \times 3 = 12\text{m}$$

$$\text{Height} = 5x = 5 \times 3 = 15\text{ m.}$$

3. Length of the wall = 4m = $4 \times 100\text{ cm}^2 = 400\text{ cm}^2$

Let, height = h

$$\text{Area of the wall} = h \times l = h \times 400\text{ cm}^2$$

$$\text{Area of 2400 tiles} = 2400 \times (25 \times 20)\text{ cm}^2 = 1200000\text{ cm}^2$$

Hence, Area of the wall = Area of 2400 tiles

$$h \times 400 = 1200000$$

$$h = 3000\text{ cm}$$

$$h = 30\text{ m}$$

Height of the wall = 30 m

4. The diameter of the well (d) = 150 cm

Therefore radius of well = 75 cm

Let radius and diameter of the parapet is R respectively.

Since, Length of the outer edge of the parapet = 660 cm

Therefore

$$2\pi R = 660\text{ cm}$$

$$2R = \frac{660}{\pi}$$

$$2R = \frac{30}{22} \times 7$$

$$\left(\because \pi = \frac{22}{7} \right)$$

$$2R = 210$$

$$R = \frac{210}{2}\text{ cm}$$

$$R = 105\text{ cm}$$

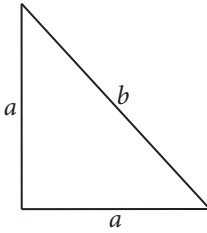
Now,

width of the parapet = (Radius of parapet – Radius of the well)

$$= (105 - 75) = 30\text{ cm}$$

width of the parapet is 30 cm.

5.



$$\text{Area} = \frac{1}{2} \times a \times a$$

$$242 = \frac{1}{2} a^2$$

$$2 \times 242 = a^2$$

$$448 = a^2$$

$$a = \sqrt{484}$$

$$a = 22 \text{ m}$$

$$\begin{aligned} \therefore b &= \sqrt{a^2 + a^2} = \sqrt{2a^2} = \sqrt{2} a \\ &= 1.41 \times 22 \text{ m} \\ &= 31.02 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{Perimeter} &= a + b + a \\ &= 2a + b \\ &= 2 \times 22 + 31.02 \\ &= 44 + 31.02 \\ &= 75.02 \text{ m} \end{aligned}$$

6. The dimensions of the rectangular sheet of acrylic = 35cm × 24cm
The number of circular buttons cut out from the sheet = 64

The diameter of the circular buttons $d = 3.5 \text{ cm}$

We know,

$$r = \frac{3.5}{2}$$

The area of the rectangular sheet = length × breadth
 $= 35 \times 24 = 816 \text{ cm}^2$

Now,

Find the area of a single circular button.

Area of each button = πr^2

$$= \frac{22}{7} \times \left(\frac{3.5}{2} \right)^2$$

$$= \frac{\cancel{22}^{11}}{\cancel{7}} \times \frac{\cancel{3.5}^{.5}}{\cancel{2}} \times \frac{3.5}{2} = \frac{11 \times .5 \times 3.5}{2} = 9.625$$

Area of all 64 buttons = $64 \times 9.625 = 616 \text{ cm}^2$

$$\begin{aligned}
 \text{The area of the remaining sheet will be} &= \text{area of the sheet} - \\
 &\quad \text{area of 64 buttons} \\
 &= 816 - 616 \text{ cm}^2 \\
 &= 200 \text{ cm}^2
 \end{aligned}$$

7. The wire is in the shape of rectangle

$$\text{length} = 18 \text{ cm}$$

$$\text{breadth} = 15 \text{ cm}$$

Now, the wire is bent into the circle.

Perimeter of rectangle = Circumference of the circle

$$2(l + b) = 2\pi r$$

$$2(18 + 15) = 2\pi r$$

$$2 \times 33 = 2\pi r$$

$$\frac{66}{2} = \pi r$$

$$33 = \pi r$$

$$33 = \frac{22}{7} \times r$$

$$7 \times 33 = 22 \times r$$

$$7 \times 3 = 2r$$

$$\frac{21}{2} = r$$

$$10.5 \times r$$

The radius of the circle is 10.5 cm

$$\text{Area of circle} = \pi r^2 = \pi \times (10.5)^2$$

$$= \frac{22}{7} \times 10.5 \times 10.5 = 346.5 \text{ cm}^2$$

The adjacent sides = $17x$, $7x$

$$\text{Second side} = 7x$$

but the second side = 3.5 cm (given)

$$\text{So, } 7x = 3.5 \text{ cm}$$

$$x = 0.5 \text{ cm}$$

$$\text{So, Ist side} = 17 \times 0.5 = 8.5 \text{ cm}$$

$$\text{IInd side} = 7 \times 0.5 = 3.5 \text{ cm}$$

$$\text{Perimeter} = 2(l + b)$$

$$= 2(8.5 + 3.5)$$

$$= 2 \times 12$$

$$= 24 \text{ cm}$$

Brain Twister

1. Since,

Length of AB , BC and CD are equal

Radius of circle = 6 cm

Now $AD = 2 \times 6 = 12$ cm

$AB + BC + CD = 12$

$3 AB = 12$ cm

$AB = 4$ cm

$AB = BC = CD = 4$ cm

Radius of semicircle $AB = 2$ cm

Radius of semicircle $BC = 4$ cm

Radius of semicircle $BD = 6$ cm

Area of semicircle $AB = \frac{1}{2} \pi r^2$

$$= \frac{1}{2} \times \frac{22}{7} \times 2 \times 2$$

$$= \frac{44}{7}$$

Area of semicircle $BD = \frac{1}{2} \pi r^2$

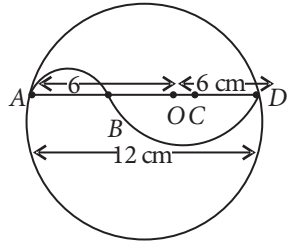
$$= \frac{1}{2} \times \frac{22}{7} \times 6 \times 6$$

$$= \frac{176}{7}$$

Total Area = $\frac{44}{7} + \frac{176}{7}$

$$= \frac{220}{7}$$

$$= 31.43 \text{ cm}^2$$



2. Area of rectangle = $l \times b$

Area of circle = πr^2

From the given figure

Area of total rectangular land = $25 \text{ m} \times 15 \text{ m}$
 $= 375 \text{ m}^2$

Area of land covered by plants = $8 \text{ m} \times 2 \text{ m} = 16 \text{ m}^2$

Area of land covered by cow = $6 \text{ m} \times 3 \text{ m} = 18 \text{ m}^2$

The region of land covered by OX is circular area

So,

diameter,

$$d = 7 \text{ cm}$$

$$\therefore \text{Radius } r = \frac{d}{2} = \frac{7}{2} = 3.5 \text{ m}$$

$$\begin{aligned} \text{Area of land covered by OX} &= \pi r^2 \\ &= \frac{22}{7} \times 3.5 \times 3.5 \end{aligned}$$

$$22 \times 0.5 \times 3.5 = 38.5 \text{ m}^2$$

$$\begin{aligned}\text{Total area} &= 16 + 18 + 38.5 \\ &= 72.5 \text{ m}^2\end{aligned}$$

Ratio of areas kept for animals and plants to the total area of the village

$$\begin{aligned}&= \frac{72.5}{375} = \frac{725}{3750} = \frac{29}{150}\end{aligned}$$

Think Logically

Do it yourself

Fun Task

Do it yourself

Carry On

Take the help of Answer Sheet.

Exercise 11.1

$$1. \text{ Mean} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

$$= \frac{1+2+3+4+5+6+7+8+9+10+11+12+13+14+15}{15} = \frac{120}{15} = 8$$

$$2. \text{ Mean of first 16 whole numbers}$$

$$= \frac{0+1+2+3+4+5+6+7+8+9+10+11+12+13+14+15}{16}$$

$$\text{Answer is not the same as to Q.1.} = \frac{120}{16} = 7.5$$

$$3. \text{ Mean of first 10 odd numbers}$$

$$= \frac{1+3+5+7+9+11+13+15+17+19}{10} = \frac{100}{10} = 10$$

The Mean 10 is not an odd number.

$$4. \text{ Mean of first five prime numbers}$$

$$= \frac{2+3+5+7+11}{5} = \frac{28}{5} = 5.6$$

$$5. \frac{x+(x+2)+(x+4)+(x+6)+(x+8)}{5} = 24$$

$$\text{So, } x+(x+2)+(x+4)+(x+6)+(x+8) = 24 \times 5$$

$$x+x+2+x+4+x+6+x+8 = 120$$

$$5x+20 = 120$$

$$5x = 120 - 20 = 100$$

$$x = \frac{100}{5} = 20$$

6. Solve according to Example 3.

7. and 8. Solve according to Example 1.

9. As mean in 5 test is 80

$$\text{So, sum of marks} = 80 \times 5 = 400$$

$$\text{Now, sum of marks in her 4 tests} = 73 + 86 + 78 + 75 = 312$$

So, she has to secure atleast = $400 - 312 = 88$ marks to get a mean of 80.

Exercise 11.2

1. Arranging the numbers with same values together in ascending order,

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

Mode of this data is 20 because it occurs highest (four) times.

Median is the middle value of the data. The number of terms is

15, So $\frac{15 + 1}{2} = 8\text{th term}$: 20 is the median. We see the mode and

median of this data are the same.

2. (a) Solve according to Q. 1.
 (b) Yes, there are two modes : 38 kg and 43 kg.
3. Take help of the Answer Sheet.
4. The size number 8 occurs highest (40) times, so 8 in the mode of the given data.
5. Arranging the values in ascending order, we get,
 ₹ 22, ₹ 24, ₹ 26, ₹ 28, ₹ 30, ₹ 32, ₹ 34

Range = Highest value – Lowest value

Range = ₹ 34 – ₹ 22 = ₹ 12

Mean = $\frac{22 + 24 + 26 + 28 + 30 + 32 + 34}{7} = \frac{196}{7} = ₹ 28$

No value occurs more than once, so there is no mode.

Median is the middle term of the data

Since number of terms is 7, $\frac{7 + 1}{2} = 4\text{th term}$ ₹ 28 is the median.

6. Solve according to Example 9, 5 and 2.
7. (a) Median is the middle term.
 Number of whole numbers = 21, so $\frac{21 + 1}{2} = 11\text{th number}$ is the median.

Starting from 0, 11th whole number is 10.

So median of first 21 whole numbers is 10.

- (b) First 7 prime numbers are : 2, 3, 5, 7, 11, 13, 17,

Median is $\frac{7 + 1}{2} = 4\text{th prime number} = 7$

$$\begin{aligned}
 8. \text{ Median} &= \frac{1}{2} \left\{ \left(\frac{n}{2} \right) \text{th observation} + \left(\frac{n}{2} + 1 \right) \text{th observation} \right\} \\
 &= \frac{1}{2} \left\{ \left(\frac{10}{2} \right) + \left(\frac{10}{2} + 1 \right) \right\} \\
 &= \frac{1}{2} (x + 2) + (x + 4)
 \end{aligned}$$

$$= \frac{1}{2}(2x + 6) = \frac{1}{\cancel{2}} \cancel{2}(x + 3)$$

$$24 = x + 3$$

$$x = 24 - 3$$

$$x = 21$$

Exercise 11.3

Solve according to Example 9 and take help of the Answer Sheet.

In Real World

Arranging the numbers with same values together, we get

10, 10, 13, 13, 19, 19, 19, 19, 20, 25, 26, 26, 26, 26, 26, 26, 26, 28, 30, 31, 31

(a) Frequency Table

Time (x_i)	Tally marks	Frequency (f)	Fx_i
10		2	20
13		2	26
19		4	76
20		1	20
25		1	25
26		6	156
28		1	28
30		1	30
31		2	62
Total		20	443

(b) Longest = 31 mint.

Shortest = 10 mint.

Range = $31 - 10 = 21$ mint.

$$10 + 10 + 13 + 13 + 19 + 19 + 19 + 19 + 20 + 25 + 26$$

$$+ 26 + 26 + 26 + 26 + 26 + 26 + 28 + 30 + 31 + 31$$

(c) Mean = $\frac{\quad}{20}$

$$= \frac{443}{20} = 22.15$$

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

The number of terms is even = 20

$$= \frac{1}{2} \left[\frac{20}{2} \text{th term} + \left(\frac{20}{2} + 1 \right) \text{th term} \right]$$

$$= \frac{1}{2} \left[10^{\text{th}} \text{ term} + 11^{\text{th}} \text{ term} \right]$$

$$= \frac{1}{2} \left[(25 + 26) \right] = \frac{1}{2} \times 51 = 25.5$$

Mode : Mode of 26 because it occurs more frequently than other observations.

(d) Mean

MCQ

1. and 4. Take help of the Answer Sheet.

2. First five whole numbers = 0, 1, 2, 3, 4

$$\text{So, mean of whole numbers} = \frac{0 + 1 + 2 + 3 + 4}{5} = \frac{10}{5} = 2$$

3. The new student shares / provides a total of 51 kg - 40 kg = 11 kg to the new group of 10 + 1 = 11 students

$$\text{Increase in the new mean} = \frac{11}{11} = 1 \text{ kg}$$

$$\text{New mean} = 40 \text{ kg} + 1 \text{ kg} = 41 \text{ kg}$$

5. Arranging the number with same values together in ascending order

9, 10, 10, 10, 11, 11, 12, 12, 12, 12, 12

12 years is the mode of this data as it occurs highest (five) times.

6. Mean = $\frac{\text{Sum of all numbers}}{\text{Total number of numbers}}$

$$\text{Mean of 100 numbers} = \frac{\text{Sum of all numbers}}{100}, \text{ let sum of all numbers} = x$$

$$\text{Mean of 100 numbers is 45} \Rightarrow 45 = \left(\frac{x}{100} \right) \text{ (cross multiply)}$$

$$4500 = x$$

So, the sum of those hundred number = 4500

$$\text{Mean of least 99 number} = \frac{\text{Sum of all ninety numbers}}{99}$$

Let, sum of ninety-nine number = y

Mean of 99 numbers is equal to 45

$$45 = \left(\frac{y}{99} \right) \text{ (cross multiply)}$$

$$4500 = y$$

So, the sum of remaining ninety-nine numbers = 4500

Now, the first number = 4500 - 4500 = 0

Chapter Test

1. Given = There are 16 numbers

$$\text{Mean} = 8$$

$$\text{Let, sum} = x$$

$$\text{So, mean} = \frac{x}{16} = 8$$

If two is added to each number then the sum increases by $16 \times 2 = 32$.

So, finding the new mean we will divide it by 16.

$$\text{Mean} = \frac{x + 32}{16}$$

$$= \frac{x}{16} + \frac{32}{16} \quad \left(\because \frac{x}{16} = 8 \right)$$

$$= 8 + 2 = 10$$

2. Let the age of fifth child = x years

$$\text{Mean} = \frac{\text{sum of observation}}{\text{total observation}}$$

$$12 = \frac{6 + 11 + 13 + 16 + x}{5}$$

$$12 \times 5 = 46 + x$$

$$60 = 46 + x$$

$$x = 60 - 46$$

$$x = 14$$

So, the age of fifth child = 14 years

3. Arranging the numbers, we get 5, 9, 10, 15, 16, 18, 20, 23, 24, 25

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

$$= \frac{1}{2} \left[\left(\frac{10}{2} \right) \text{th term} + \left(\frac{10}{2} + 1 \right) \text{th term} \right]$$

$$= \frac{1}{2} [5 \text{th term} + 6 \text{th term}]$$

$$= \frac{1}{2} [16 + 18]$$

$$= \frac{1}{2} \times 34 = \frac{34}{2}$$

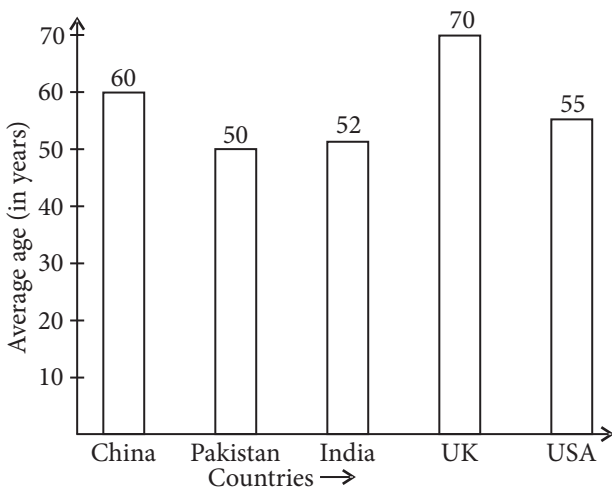
$$= 17$$

4. Arranging the numbers with same values together, we get 18, 19, 19, 20, 20, 21, 21, 21, 21, 22, 22, 22, 22, 22, 22, 22, 22, 22, 23, 23, 23, 23, 24, 24, 25, 26

$$\begin{aligned} \text{Median} &= \frac{1}{2}(n + 1) \text{th term} = \frac{1}{2}(25 + 1) \text{th term} = \frac{1}{2} \times 26 \text{th term} \\ &= 13 \text{th term} = 22 \end{aligned}$$

Median = 22

Mode = Mode of 22 because it occurs more frequently than other observation.



Brain Twister

(a) Total weight = $60 + 20 + 88 + 42 + 73 + 20 + 98 + 13 + 91$
 $= 505 \text{ kg}$

(b) Mean = $\frac{60 + 20 + 88 + 42 + 73 + 20 + 98 + 13 + 91}{9}$
 $= 56.11 \text{ kg}$

(c) to (e) Take the help of Answer Sheet

Think Logically

Do it yourself

Fun Task

Do it yourself

Carry On

Take help of Answer Sheet.

Exercise 12.1

1. and 3. Take help of the Answer Sheet.
2. (a) Take help of the Answer Sheet.
(b) Letters B and K may or may not be symmetrical depending on the writing or printing style.
(c) Some mathematicians do not approve the vertical line of symmetry in letter I .
4. (a) vertical median
(b) horizontal median
(c) vertical and horizontal lines joining midpoints of the opposite sides
(d) vertical
(e) vertical and horizontal
(f) Four lines
(g) vertical (h) vertical.
5. and 6. Draw yourself.

Exercise 12.2

Take help of the Answer Sheet.

Exercise 12.3

1. Take help of the Answer Sheet.
2. The given angle must divide 360° (the total of angles made at a point) exactly.
3. Take help of the Answer Sheet.
4. Other angles at which the figure will look exactly the same as its original position will be multiples of 60° (upto 360°).
 $60^\circ \times 2, 60^\circ \times 3, 60^\circ \times 4, 60^\circ \times 5, 60^\circ \times 6$
 $= 120^\circ, 180^\circ, 240^\circ, 300^\circ, 360^\circ$
5. Yes, because every line through the centre forms a line of symmetry and it has rotational symmetry around the centre for every angle.
6. to 8. Take help of the Answer Sheet.

In Real World

Do it yourself

MCQ

1. to 8. Take help of the Answer Sheet.

Chapter Test

1. 

2. Do it yourself

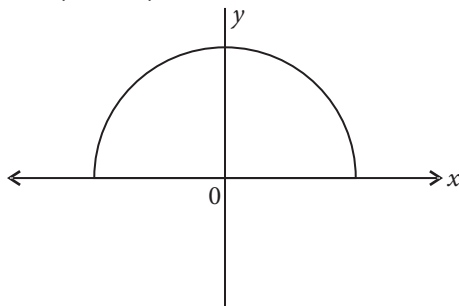
3.

English Alphabet Letter	Line Symmetry	Number of Lines of Symmetry	Rotational Symmetry	Order of Rotational Symmetry
Z	Nil	0	Yes	2
S	Nil	0	Yes	2
H	Yes	2	Yes	2
O	Yes	2	Yes	2
E	Yes	1	No	1
N	Nil	0	Yes	2
C	Yes	1	No	1

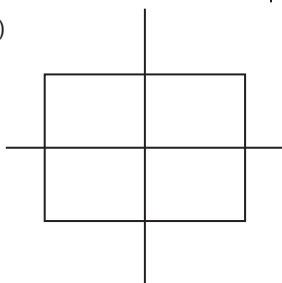
4. Line of symmetry of a semi-circle.

A line of symmetry of a plane is a line from where the plane is folded then both sides of the line coincide to look like one.

The line of symmetry of a semi-circle is shown below.



5. (a)



A rectangle has two lines of symmetry. It has rotational symmetry of order two.

(b)



6. Square, rectangle and rhombus are the quadrilaterals which have both line and rotational symmetry of order more than 1.
7. Do it yourself
8. Do it yourself

Brain Twister

1. The windmill of four blades has rotational symmetry of order 4

$$\therefore 2 \times K = 4$$

$$K = \frac{4}{2}$$

$$[K = 2]$$

2. Do it yourself

Think Logically

Do it yourself

Fun Task

Do it yourself

Chapter 13

Visualising Solid Shapes

Carry On

Do it yourself.

Exercise 13.1

- 1, 5, 6 and 7. Take help of the Answer Sheet.
2. and 3. Draw, cut and fold.
4. Draw yourself. Take help from the figures on page 143–144 of the text book.

Exercise 13.2

Take help of the figures on page 145 of the text book.

Exercise 13.3

1. and 2. Take help of the Answer Sheet.
3. (a) Square (b) circle (c) rectangle
4, 5, 6 and 7. Take help of the Answer Sheet.
8. (a), (c) Take help of the figures on page 148–149 of the text book.
(b) First study other shapes on page 149 of the text book.

In Real World

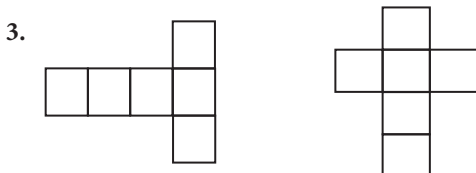
Do it yourself

MCQ

1. to 8. Take help of the Answer Sheet.

Chapter Test

1. Take the help of Answer sheet.
2. No, this cannot be a net for a die. Because one pair of opposite faces will have 1 and 4 on them and another pair of opposite faces will have 3 and 6 on them whose total is not equal to 7.



4. Take the help of Answer sheet.
5. Do it yourself.

Brain Twister

Do it yourself

Think Logically

Do it yourself

Fun Task

Do it yourself