Class - 8 Ch - 9 Exercise - 9.1

Question 1.

Observe the following tables and find if x and y are directly proportional:

(i)

x	5	8	12	15	18	20
y	15	24	36	60	72	100

(ii)

x	3	5	7	9	10
y	9	15	21	27	30

Solution:

(i) x and y are in direct variation of $\frac{x}{y}$ is constant

Now, $\frac{x}{y} = \frac{5}{15} = \frac{1}{3}$

Similarly, $\frac{8}{24} = \frac{1}{3}$ **and** $\frac{12}{36} = \frac{1}{3}$

But $\frac{15}{60} = \frac{1}{4}$, $\frac{18}{72} = \frac{1}{4}$ **and** $\frac{20}{100} = \frac{1}{5}$ **which are not equal to** $\frac{1}{3}$

$\frac{x}{y}$ is not constantThere are not directly proportional

(ii) $\frac{x}{y} = \frac{3}{9} = \frac{1}{3}$

Similarly, $\frac{5}{15} = \frac{1}{3}, \frac{7}{21} = \frac{1}{3}, \frac{9}{27} = \frac{1}{3}$ and $\frac{10}{30} = \frac{1}{3}$

$\therefore \frac{x}{y}$ is constant

Here, x and y are directly proportional.

Question 2.

If x and y are in direct variation, complete the following tables:

(i)

x	3	5	...		10
y	45	...	90	120	

(ii)

x	4	8	...	20	28
y	7	...	21	...	...

Solution:

$$\frac{x}{y} = \frac{3}{45} = \frac{1}{15}$$

$\because$ **They are directly proportional.**

$\therefore$ $\frac{x}{y}$ **is constant which is** $\frac{1}{15}$

Now, $\frac{x_1}{y_1} = \frac{1}{15} \Rightarrow \frac{5}{y_1} = \frac{1}{15}$

$\Rightarrow y_1 = 5 \times 15 = 75$

$\frac{x_2}{y_2} = \frac{x_2}{90} = \frac{1}{15} \Rightarrow x_2 = \frac{90}{15} = 6$

$\frac{x_3}{y_3} = \frac{x_3}{120} = \frac{1}{15} \Rightarrow x_3 = \frac{120}{15} = 8$

$\frac{x_4}{y_4} = \frac{10}{y_4} = \frac{1}{15} \Rightarrow y_4 = 10 \times 15 = 150$

Hence,

x	3	5	6	8	10
y	45	75	90	120	150

(ii)

x	4	8	...	20	28
y	7	...	21	...	...

$\frac{x}{y} = \frac{4}{7}$

$\because$ x and y are directly proportional

$\frac{x}{y}$ is constant and equal to $\frac{4}{7}$

$$\frac{x_1}{y_1} = \frac{8}{y_1} = \frac{4}{7} \Rightarrow y_1 = \frac{8 \times 7}{4} = 14$$

$$\frac{x_2}{y_2} = \frac{x_2}{21} = \frac{4}{7} \Rightarrow x_2 = \frac{21 \times 4}{7} = 3 \times 4 = 12$$

$$\frac{x_3}{y_3} = \frac{20}{y_3} = \frac{4}{7} \Rightarrow y_3 = \frac{20 \times 7}{4} = 35$$

$$\frac{x_4}{y_4} = \frac{28}{y_4} = \frac{4}{7} \Rightarrow y_4 = \frac{28 \times 7}{4} = 49$$

Hence

x	4	8	12	20	28
y	7	14	21	35	49

Question 3.

If 8 metres cloth costs ₹250, find the cost of 5·8 metres of the same cloth.

Solution:

Let the cost of 5·8 m cloth = ₹ x

Length (in m)	8	5.8
Cost of cloth (₹)	250	x

Hence, it is the case of direct variation

$\therefore$ 8 : 250 = 5.8 : x

$\Rightarrow \frac{8}{250} = \frac{5.8}{x}$

$\Rightarrow x = \frac{5.8 \times 250}{8}$ = ₹181.25

Question 4.

If a labourer earns ₹672 per week, how much will he earn in 18 days?

Solution:

Let the labourer earns ₹ x in 18 days

Days	7	18
Money earned (in ₹)	672	x

Hence, it is in the case of direct variation

$$\therefore \frac{7}{672} = \frac{18}{x} \quad \Rightarrow x = \frac{18 \times 672}{7} = ₹1728$$

Question 5.

If 175 dollars cost ₹7350, how many dollars can be purchased in ₹24024?

Solution:

Let x dollars be purchased in ₹24024

Cost (in ₹)	7350	24024
Dollars	175	x

Hence, the question is of direct variation

$$\therefore \frac{7350}{175} = \frac{24024}{x}$$

$$\Rightarrow x = \frac{24024 \times 175}{7350} = 572$$

Question 6.

If a car travels 67·5 km in 4·5 litres of petrol, how many kilometres will it travel in 26.4 litres of petrol?

Solution:

Let car travels x km in 26·4 litres of petrol

Distance (in km)	x	67.5
Petrol (in l)	26.4	4.5

Hence, the question is of direct variation

$$\therefore \frac{x}{26.4} = \frac{67.5}{4.5}$$

$$x = \frac{67.5 \times 26.4}{4.5} = 396 \text{ km}$$

Question 7.

If the thickness of a pile of 12 cardboard sheets is 45 mm, then how many sheets of the same cardboard would be 90 cm thick?

Solution:

Thickness of 12 cardboard = 45 mm

Let x be the number of cardboard whose thickness is 90 cm = 900 m

12 : x = 45 : 900 $\Rightarrow \frac{12}{x} = \frac{45}{900}$

$\Rightarrow$ x = $\frac{12 \times 900}{45}$ = 240 mm

Thickness of 90 cardboard = 240 mm

Question 8.

In a model of a ship, the mast (flagstaff) is 6 cm high, while the mast of the actual ship is 9 m high. If the length of the ship is 33 m, how long is the model of the ship?

Solution:

Height of a model of ship = 6 cm

But height of actual ship = 9 m

If length of ship = 33 m

Let length of model = x

$\therefore$ 6 : x = 9 m : 33

$$\Rightarrow \frac{6}{x} = \frac{9}{33}$$

$$\Rightarrow x = \frac{6 \times 33}{9} = 22 \text{ cm}$$

$\therefore$ Length of model = 22 cm

Question 9.

The mass of an aluminium rod varies directly with its length. If a 16 cm long rod has a mass of 192 g, find the length of the rod whose mass is 105 g.

Solution:

Length of rod = 16 cm and mass = 192 g

If mass is 105 g, then

Let length of rod = x cm

∴ 16 : x = 192 : 105

$$\frac{16}{x} = \frac{192}{105}$$

$$\Rightarrow x = \frac{16 \times 105}{192} = \frac{35}{4}\text{ cm}$$

= 8.75 cm

Question 10.

Anita has to drive from village A to village B. She measures a distance of 3.5 cm between these villages on the map. What is the actual distance between the villages if the map scale is 1 cm = 20 km?

Solution:

Distance from village A to B on the map = 3.5 cm

Scale of map 1 cm = 20 km

Let actual distance = x km

∴ 1 : 3.5 = 20 : x

$\frac{1}{3.5} = \frac{20}{x} \Rightarrow$ x = 20 × 3.5 km 3.5

⇒ x = 70 km

∴ Distance between village A and village B 20 km

Question 11.

A 23 m 75 cm high water tank casts a shadow 20 m long. Find at the same time;

(i) the length of the shadow cast by a tree 9 m 50 cm high.

(ii) the height of the tree if the length of the shadow is 12 m.

Solution:

Height of a water tank = 23 m 75 cm

$= 23\frac{3}{4}m = \frac{95}{4}m$

and its shadow = 20 m

(i) If height of a tree = 9 m 50 cm = $9\frac{1}{2}$ m

$$= \frac{19}{2}\text{m}$$

Let its shadow be = x m

$$\therefore \quad \frac{95}{4} : \frac{19}{2} :: 20 : x$$

$$\Rightarrow \frac{95}{4} \times \frac{2}{19} = \frac{20}{x} \Rightarrow \frac{5}{2} = \frac{20}{x}$$

$$x = \frac{20 \times 2}{5} = 8 \text{ m}$$

$\therefore$ Its shadow = 8 m

(ii) Let height of a tree = x m

and its shadow = 12 m

$$\therefore \frac{95}{4} : x = 20 : 12$$

$$\Rightarrow \frac{95}{4x} = \frac{20}{12}$$

$$4x = \frac{95 \times 12}{20} \Rightarrow x = \frac{95 \times 12}{4 \times 20} = \frac{57}{4} \text{ m}$$

$\Rightarrow$ x =14 m 25 cm

$\therefore$ Height of the tree = 14 m 25 cm

Question 12.

If 5 men or 7 women can earn ₹525 per day, how much would 10 men and 13 women will earn per day.

Solution:

Since in a day, 5 men can earn ₹525

$\therefore$ In a day, 1 men can earn = ₹ $\frac{525}{5}$ = ₹105

$\therefore$ In a day, 10 men will earn ₹105 × 10 = ₹1050

As in a day 7 women can earn ₹525

$\therefore$ In a day, 1 women can earn = ₹$\frac{525}{7}$ = ₹75

In a day 13 women will earn ₹75 × 13 = ₹975

$\therefore$ Total earning of 7 men and 13 women in a day = ₹(1050 + 975) = ₹2025