Direct And Inverse Proportions

Exercise 10.1

Q. 1. The cost of 5 meters of a particular quality of cloth is Rs. 210. Find the cost of (i) 2 (ii) 4 (iii) 10 (iv) 13 meters of cloth of the same quality.

Answer : Given: Cost of 5 m of cloth = Rs. 210

To Find: Cost of 2m, 4m, 10m and 13m of cloth.

Formula: $\frac{x_1}{y_1} = \frac{x_2}{y_2}$

(i) Substituting $x_1 = 5$, $y_1 = 210$ and $x_2 = 2$ in the formula,

$$\frac{5}{210} = \frac{2}{y_2}$$

Gives $y_2 = 84$

∴ The cost of 2m cloth is Rs. 84

(ii) Substituting $x_1 = 5$, $y_1 = 210$ and $x_2 = 4$ in the formula,

$$\frac{5}{210} = \frac{4}{y_2}$$

Gives $y_2 = 168$

∴ The cost of 4m cloth is Rs. 168

(iii) Substituting $x_1 = 5$, $y_1 = 210$ and $x_2 = 10$ in the formula,

$$\frac{5}{210} = \frac{10}{y_2}$$

Gives $y_2 = 420$

∴ The cost of 10m cloth is Rs. 420

(iv) Substituting $x_1 = 5$, $y_1 = 210$ and $x_2 = 13$ in the formula,

$$\frac{5}{210} = \frac{13}{y_2}$$

Gives $y_2 = 546$

∴ The cost of 2m cloth is Rs. 546

Q. 2. Fill the table.

No. of Apples	1	4	7	12	20
Cost of Apples (in Rs)	8	.....	.....	.....	.....

Answer : Given: Cost of 1 Apple = Rs. 8

To Find: Cost of 4, 7, 12, 20 apples.

Formula: $\frac{x_1}{y_1} = \frac{x_2}{y_2}$

(i) Substituting $x_1 = 1$ $y_1 = 8$ and $x_2 = 4$ in the formula,

$$\frac{1}{8} = \frac{4}{y_2}$$

Gives $y_2 = 32$

∴ The cost of 4 apples is Rs. 32

(ii) Substituting $x_1 = 1$ $y_1 = 8$ and $x_2 = 7$ in the formula,

$$\frac{1}{8} = \frac{7}{y_2}$$

Gives $y_2 = 56$

∴ The cost of 7 apples is Rs. 56

(iii) Substituting $x_1 = 1$ $y_1 = 8$ and $x_2 = 12$ in the formula,

$$\frac{1}{8} = \frac{12}{y_2}$$

Gives $y_2 = 96$

∴ The cost of 12 apples is Rs. 96

(iv) Substituting $x_1 = 1$ $y_1 = 8$ and $x_2 = 20$ in the formula,

$$\frac{1}{8} = \frac{20}{y_2}$$

Gives $y_2 = 160$

∴ The cost of 20 apples is Rs. 160

Q. 3. 48 bags of paddy costs Rs 16, 800 then find the cost of 36 bags of paddy.

Given: Cost of 48 bags of paddy = Rs. 16,800
To find: Cost of 36 bags of paddy

Formula: $\frac{x_1}{y_1} = \frac{x_2}{y_2}$

Answer : Substituting $x_1 = 48$, $y_1 = 16800$, $x_2 = 36$ in the formula,

$$\frac{48}{16800} = \frac{36}{y_2}$$

Gives $y_2 = \frac{16800 \times 36}{48}$

$= \frac{16800 \times 3}{4}$

$= \frac{50400}{4}$

$= 12600$

∴The cost of 36 bags of paddy is Rs. 12,600

Q. 4. The monthly average expenditure of a family with 4 members is Rs. 2,800. Find the monthly average expenditure of a family with only 3 members.

Answer : Given: Monthly average expenditure of 4 members = Rs. 2800

To find: Monthly average expenditure of 3 members
Monthly average expenditure of 1 member = Rs. 2800/4 = Rs. 700 Monthly average expenditure of 3 members = 3 × Rs. 700 = Rs. 2100

Q. 5. In a ship of length 28 m, height of its mast is 12 m. If the height of the mast in its model is 9 cm what is the length of the model ship?

Answer : Given: Height of the mast in a 28m long ship = 12m

To find: Height of the mast in a 9cm long ship

Formula: $\frac{x_1}{y_1} = \frac{x_2}{y_2}$

Substituting $x_1 = 28$, $y_1 = 12$, $x_2 = 9$ in the formula,

$\frac{28}{12} = \frac{9}{y_2}$

Gives $y_2 = \frac{108}{28}$ cm

= 3.85 cm

∴ The height of the mast in a 9 cm long ship is 3.85 cm

Conclusion: Always maintain consistency in the units of x_1 and y_1, x_2 and y_2.

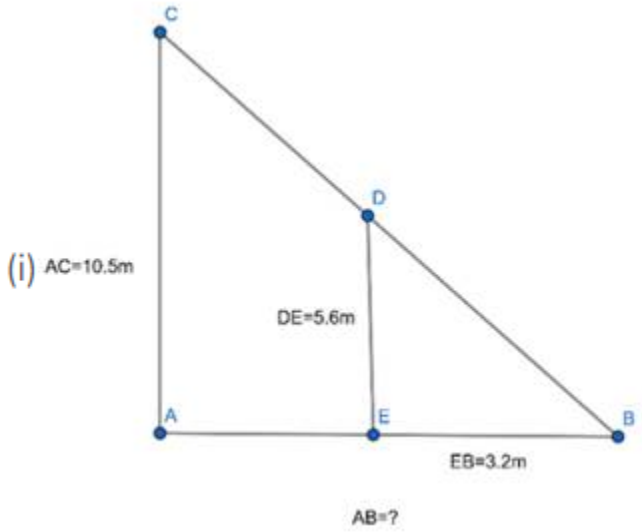
Q. 6. A vertical pole of 5.6 m height casts a shadow 3.2 m long. At the same time find (i) the length of the shadow cast by another pole 10.5 m high (ii) the height of a pole which casts a shadow 5m long.

Answer : Given: (i) Pole Height = 5.6m, Shadow Length = 3.2m
(ii) Pole Height = 10.5 m

(iii) Shadow Length = 5m

To Find: (ii) Shadow Length

(iii) Pole Height



$$\frac{\text{Pole Height of } \Delta ABC}{\text{Shadow Length of } \Delta ABC} = \frac{\text{Pole Height of } \Delta DEF}{\text{Shadow Length of } \Delta DEF}$$

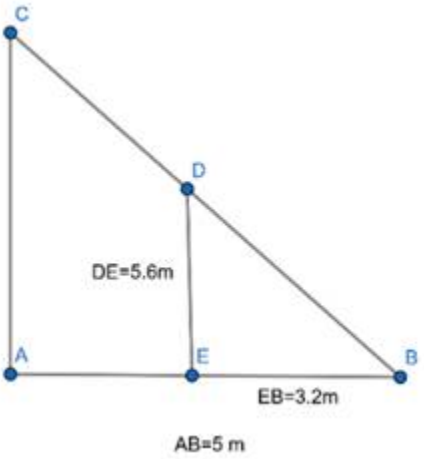
$$\Rightarrow \frac{AC}{AB} = \frac{ED}{BE}$$

$$\Rightarrow \frac{10.5}{x} = \frac{5.6}{3.2}$$

$$\Rightarrow x = 6\text{m}$$

The length of the shadow cast by a pole 10.5m long is 6m.

(ii)



$$\frac{\text{Pole Height of } \Delta ABC}{\text{Shadow Length of } \Delta ABC} = \frac{\text{Pole Height of } \Delta DEF}{\text{Shadow Length of } \Delta DEF}$$

$$\Rightarrow \frac{AC}{AB} = \frac{ED}{BE}$$

$$\Rightarrow \frac{x}{5} = \frac{5.6}{3.2}$$

$$\Rightarrow x = 8.75\text{ m}$$

The height of the pole that casts a 5m long shadow is 8.75m.

Q. 7. A loaded truck travels 14 km in 25 minutes. If the speed remains the same, how far can it travel in 5 hours?

Answer : Given: Distance traveled in 25 minutes = 14 km
To Find: Distance traveled in 5 hours. The more distance will be traveled in more time, so the distance and time are in direct proportion. Therefore, Distance traveled in 1 minute = 14/25 km Distance traveled in 5 hours (5 × 60 min = 300 minutes) = 14/25 × 300 km Distance traveled in 5 hours = 168 km

Q. 8. If the weight of 12 sheets of thick paper is 40 grams, how many sheets of the same paper would weigh $16\frac{2}{3}$ kilograms?

Answer : Given: Weight of 12 sheets of paper = 40 grams

To find: Number of papers weighing $16\frac{2}{3}$ kilograms $= \frac{50}{3}$ kg $= \frac{50000}{3}$ grams

Formula: $\frac{x_1}{y_1} = \frac{x_2}{y_2}$

Substituting $x_1 = 12$, $y_1 = 40$, $y_2 = \frac{50000}{3}$ in the formula,

$$\frac{12}{40} = \frac{x_2}{\frac{50000}{3}}$$

Gives $x_2 = \frac{50000 \times 12}{3 \times 40}$

= 5000

∴ Number of papers weighing $16\frac{2}{3}$ kg are 5000.

Q. 9. A train moves at a constant speed of 75 km/hr.

(i) How far will it travel in 20 minutes?
(ii) Find the time required to cover a distance of 250 km.

Answer : Given: Speed of train = 75kmph

To Find: Distance Travelled in 20 minutes, Time required to cover 250km.

Formulation: Speed of the train is 75kmph, i.e, it requires 1 hour (60 minutes) for the train to cover 75km.

Formula: $\frac{x_1}{y_1} = \frac{x_2}{y_2}$

(i) Substituting $x_1 = 60$ $y_1 = 75$ and $x_2 = 20$ in the formula,

$$\frac{60}{75} = \frac{20}{y_2}$$

Gives $y_2 = 25$ km

∴ The train will move 25km in 20 minutes

(ii) Substituting $x_1 = 60$ $y_1 = 75$ and $y_2 = 250$ in the formula,

$$\frac{60}{75} = \frac{x_2}{250}$$

Gives $x_2 = 200$ minutes or 3 hours 20 minutes

∴ The time required to cover a distance of 250km is 3 hours 20 minutes.

Q. 10. The design of a microchip has the scale 40:1. The length of the design is 18cm, find the actual length of the microchip?

Answer : Given: Length of the microchip design = 18cm, Scale Ratio = 40:1

To find: Actual Length of microchip

$$\text{Formula: } \frac{x_1}{y_1} = \frac{x_2}{y_2}$$

Substituting $x_1 = 1$, $y_1 = 40$ $y_2 = 18$ in the formula,

$$\frac{1}{40} = \frac{x_2}{18}$$

$$\text{Gives } x_2 = \frac{18}{40} \text{ cm}$$

= 0.45 cm

∴ The actual length of the microchip is 0.45 cm

Q. 11. The average age of consisting doctors and lawyers is 40. If the doctors average age is 35 and the lawyers average age is 50, find the ratio of the number of doctors to the number of lawyers.

Answer : Given:

Average age of doctors and lawyers = 40 Average age of doctors = 35

Average age of lawyers = 50

To find: Ration of number of doctors to the number of lawyers

Let a = Number of doctors

b = Number of lawyers

x = total age of doctors

y = total age of lawyers

According to the problem, $\frac{x}{a} = 35, \frac{y}{b} = 50$

ð x = 35a and y = 50b

Total age of doctors and lawyers = x + y

According to the problem, $\frac{x+y}{a+b} = 40$

ð $\frac{35a+50b}{a+b} = 40$

ð $35a + 50b = 40a + 40b$

ð $5a = 10b$

ð $a = 2b$

ð $\frac{a}{b} = \frac{2}{1}$

Therefore, the ratio of ages of doctors and lawyers is 2:1

Exercise 10.2

Q. 1. A. Observe the following tables and find which pair of variables (x and y) are in inverse proportion

X	50	40	30	20
y	5	6	7	8

Answer :

$x_1 = 50, y_1 = 5 \Rightarrow x_1y_1 = 250$

$x_2 = 40, y_2 = 6 \Rightarrow x_2y_2 = 240$

$x_3 = 30, y_3 = 7 \Rightarrow x_3y_3 = 210$

$x_4 = 20, y_4 = 8 \Rightarrow x_4y_4 = 160$

$x_1y_1 \neq x_2y_2 \neq x_3y_3 \neq x_4y_4$

Therefore, x and y are not in inverse proportions.

Q. 1. B. Observe the following tables and find which pair of variables (x and y) are in inverse proportion

X	100	200	300	400
y	60	30	20	15

Answer :

$x_1 = 100, y_1 = 60 \Rightarrow x_1y_1 = 6000$

$x_2 = 200, y_2 = 30 \Rightarrow x_2y_2 = 6000$

$x_3 = 300, y_3 = 20 \Rightarrow x_3y_3 = 6000$

$x_4 = 400, y_4 = 15 \Rightarrow x_4y_4 = 6000$

$x_1y_1 = x_2y_2 = x_3y_3 = x_4y_4$

Therefore, x and y are in inverse proportions.

Q. 1. C. Observe the following tables and find which pair of variables (x and y) are in inverse proportion

X	90	60	45	30	20	5
y	10	15	20	25	30	25

Answer :

$x_1 = 90, y_1 = 10 \Rightarrow x_1y_1 = 900$

$x_2 = 60, y_2 = 15 \Rightarrow x_2y_2 = 900$

$x_3 = 45, y_3 = 20 \Rightarrow x_3y_3 = 900$

$x_4 = 30, y_4 = 25 \Rightarrow x_4y_4 = 750$

$x_5 = 20, y_5 = 30 \Rightarrow x_5y_5 = 600$

$x_6 = 5, y_6 = 25 \Rightarrow x_6y_6 = 175$

$x_1y_1 = x_2y_2 = x_3y_3 \neq x_4y_4 \neq x_5y_5 \neq x_6y_6$

$(x_1, y_1), (x_2, y_2), (x_3, y_3)$ are in inverse proportions.

Q. 2. A school wants to spend Rs 6000 to purchase books. Using this data, fill the following table.

Price of each book (in Rs)	40	50		75	
Number of books that can be purchased	150		100		75

Answer : Formula: $x_ny_n = 6000$ where n = 1,2,3….

$x_1 = 40, y_1 = 150 \Rightarrow x_1y_1 = 6000$

$x_2 = 50, y_2 = ? \Rightarrow x_2y_2 = 6000 \Rightarrow y_2 = \frac{6000}{50} = 120$

$x_3 = ?, y_3 = 100 \Rightarrow x_3y_3 = 6000 \Rightarrow x_3 = \frac{6000}{100} = 60$

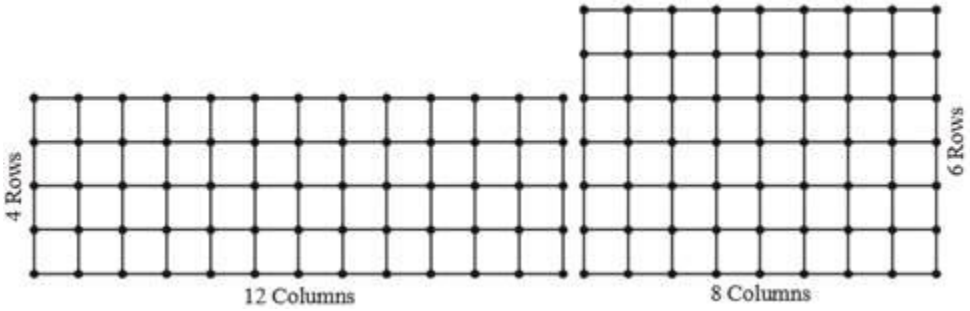
$x_4 = 75, y_4 = ? \Rightarrow x_4y_4 = 6000 \Rightarrow y_4 = \frac{6000}{75} = 80$

$x_5 = ?, y_5 = 75 \Rightarrow x_5y_5 = 6000 \Rightarrow x_5 = \frac{6000}{75} = 80$

The completed table would be

Price of each book (in Rs)	40	50	**60**	75	**80**
Number of books that can be purchased	150	**120**	100	**80**	75

Q. 3. Take a squared paper and arrange 48 squares in different number of rows as shown below:



Number of Rows (R)	2	3	4	6	8
Number of Columns (C)	24	16	12	8	6

What do you observe? As R increases, C decreases

(i) Is $R_1 : R_2 = C_2 : C_1$?

(ii) Is $R_3 : R_4 = C_4 : C_3$?

(iii) Is R and C inversely proportional to each other?
(iv) Do this activity with 36 squares.

Answer : (i) Is $R_1 : R_2 = C_2 : C_1$?

Yes

(ii) Is $R_3 : R_4 = C_4 : C_3$?

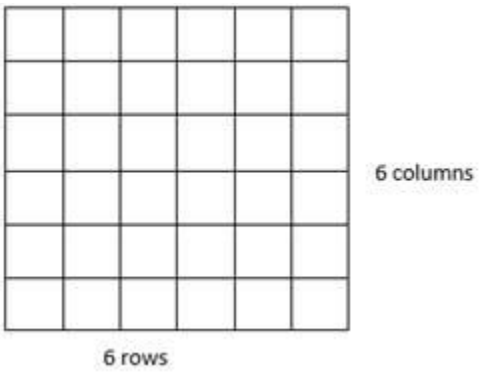
Yes

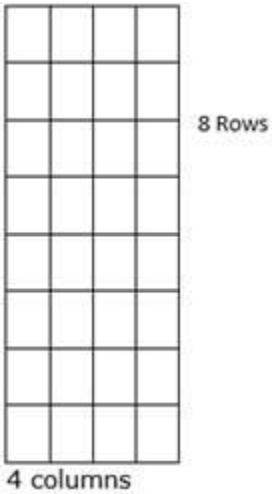
(iii) Is R and C inversely proportional to each other?

Yes

(iv) Do this activity with 36 squares.

Yes





Number of Rows (R)	2	3	4	6	8
Number of Columns (C)	18	12	8	6	4

Exercise 10.3

Q. 1. Siri has enough money to buy 5 kg of potatoes at the price of Rs 8 per kg. How much can she buy for the same amount if the price is increased to Rs 10 per kg?

Answer : Given: Price of potatoes = Rs. 8 per kg, Siri can buy = 5kg

To find: Amount of potatoes if Price is Rs. 10 per kg

Formula: $\frac{x_1}{x_2} = \frac{y_2}{y_1}$

Substituting $x_1 = 8$, $y_1 = 5$ $x_2 = 10$ in the formula,

$$\frac{8}{10} = \frac{y_2}{5}$$

Gives $y_2 = 4$ kg

∴Amount of potatoes Siri can buy is 4 kg

Q. 2. A camp has food stock for 500 people for 70 days. If 200 more people join the camp, how long will the stock last?

Answer : Given: Number of people living off the food stock for 70 days = 500

To find: Number of days the stock will last if 700 people live off.

Formula: $\frac{x_1}{x_2} = \frac{y_2}{y_1}$

Substituting $x_1 = 500$, $y_1 = 70$ $x_2 = 700$ in the formula,

$$\frac{500}{700} = \frac{y_2}{70}$$

Gives $y_2 = 50$ days

∴ If 200 more people join, the food will last for 50 days.

Q. 3. 36 men can do a piece of work in 12 days. In how many days 9 men can do the same work?

Answer : Given: Number of men required to do a work in 12 days = 36

To find: Number of days required for 9 men to do the same work

Formula: $\frac{x_1}{x_2} = \frac{y_2}{y_1}$

Substituting $x_1 = 36$, $y_1 = 12$ $x_2 = 9$ in the formula,

$$\frac{36}{9} = \frac{y_2}{12}$$

Gives $y_2 = 48$ days

∴Number of days required for 9 men to do the work is 48 days.

Q. 4. A cyclist covers a distance of 28 km in 2 hours. Find the time taken by him to cover a distance of 56 km with the same speed.

Answer : Given: Distance covered in 2 hours = 28km

To find: Time taken to cover 56km in same speed.

Formula: $\frac{x_1}{x_2} = \frac{y_1}{y_2}$

Substituting $x_1 = 28$, $y_1 = 2$ $x_2 = 56$ in the formula,

$$\frac{28}{56} = \frac{2}{y_2}$$

Gives $y_2 = 4$ hours

∴ It takes 4 hours for the cyclist to cover 56km.

Q. 5. A ship can cover a certain distance in 10 hours at a speed of 16 nautical miles per hour. By how much should its speed be increased so that it takes only 8 hours to cover the same distance? (A nautical mile in a unit of measurement used at sea distance or sea water i.e. 1852 meters).

Answer : Given: Speed in 10 hours = 16 nautical miles per hour

To find: Increase in speed required if the ship has to cover the same distance in 8 hours.

Substituting $x_1 = 10$, $y_1 = 16$ $x_2 = 8$ in the formula,

$$\frac{10}{8} = \frac{y_2}{16}$$

Gives $y_2 = 20$ nautical miles per hour

Change in speed = Final Speed – Initial Speed

⇒ 20-16 = 4 nautical miles per hour.

∴ The speed must be increased by 4 nautical miles per hour for the ship to cover the same distance in 8 hours.

Q. 6. 5 pumps are required to fill a tank in $1\frac{1}{2}$ hours. How many pumps of the same type are used to fill the tank in half an hour.

Answer : Given: Number of pumps required to fill a tank in 1.5 hours = 5

To find: Number of pumps require to fill the tank in 0.5 hours

Formula: $\frac{x_1}{x_2} = \frac{y_2}{y_1}$

Substituting $x_1 = 1.5$, $y_1 = 5$ $x_2 = 0.5$ in the formula,

$$\frac{1.5}{0.5} = \frac{y_2}{5}$$

Gives $y_2 = 15$ pumps

∴ 15 pumps are required to fill the tank in 0.5 hours.

Q. 7. If 15 workers can build a wall in 48 hours, how many workers will be required to do the same work in 30 hours?

Answer : Given: Number of workers that can build a wall in 48 hours = 15

To find: Number of workers that can build a wall in 30 hours

Formula: $\frac{x_1}{x_2} = \frac{y_2}{y_1}$

Substituting $x_1 = 48$, $y_1 = 15$ $x_2 = 30$ in the formula,

$$\frac{48}{30} = \frac{y_2}{15}$$

Gives $y_2 = 24$

∴ 24 workers can build the wall in 30 hours.

Q. 8. A School has 8 periods a day each of 45 minutes' duration. How long would each period become, if the school has 6 periods a day? (Assuming the number of school hours to be the same)

Answer : Given: Number of periods per day = 8

Duration of each period = 45 minutes

To find: Duration of each period if there are 6 periods per day

Formula:

$$\frac{x_1}{x_2} = \frac{y_2}{y_1}$$

Substituting $x_1 = 8$, $y_1 = 45$ $x_2 = 6$ in the formula,

$$\frac{8}{6} = \frac{y_2}{45}$$

Gives $y_2 = 60$

∴ Duration of each period will be 60 minutes if there are 6 periods.

Q. 9. If z varies directly as x and inversely as y. Find the percentage increase in z due to an increase of 12% in x and a decrease of 20% in y.

Answer : Given: z is directly proportional to x, z α x

$$z \text{ is inversely proportional to y, } z \ \alpha \ \frac{1}{y}$$

$$\text{Therefore } z \ \alpha \ \frac{x}{y}$$

To find: Percentage increase in z if there is 12% increase in x and 20% decrease in y

$$z \ \alpha \ \frac{x}{y}$$

$$\Rightarrow z = \frac{x}{y} \text{ (Assuming the proportionality constant to be 1)}$$

$$\text{Change in x} \Rightarrow 100x+12x$$

Change in y ⇒ 100y-20y

The new z value becomes $z = \frac{100x+12x}{100y-20y}$

$$z = \frac{112x}{80y}$$

Change in z value = New z value – Initial z value

$$\Rightarrow \frac{112x}{80y} - \frac{x}{y}$$

$$\Rightarrow \frac{32x}{80y}$$

Percentage increase in z = $\frac{\text{Change in z}}{\text{Initial value of z}} \times 100$

$$\Rightarrow \frac{\frac{32x}{80y}}{\frac{x}{y}} \times 100$$

⇒ 40%

∴ Percentage increase in z is 40%

Q. 10. If x + 1 men will do the work in x + 1 days, find the number of days that (x + 2) men can finish the same work.

Answer : Given: Number of days required for x+1 men to do the work = x + 1

To find: Number of days required for x+2 men to do the work

Formula: $\frac{x_1}{x_2} = \frac{y_2}{y_1}$

Substituting $x_1 = x+1$, $y_1 = x+1$ $x_2 = x+2$ in the formula,

$$\frac{x+1}{x+2} = \frac{y_2}{x+1}$$

$$\Rightarrow \frac{(x+1)^2}{x+2} = y_2$$

$$\Rightarrow \frac{x^2+2x+1}{x+2} = y_2$$

$x+2$) x^2+2x+1 (x

x^2+2x

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0 + 1

Gives $y_2 = x\frac{1}{x+1}$ days

∴ Number of days required for x+2 men to complete the work is $x\frac{1}{x+1}$ days

Q. 11. Given a rectangle with a fixed perimeter of 24 meters if we increase the length by 1m the width and area will vary accordingly. Use the following table of values to look at how the width and area vary as the length varies.

What do you observe? Write your observations in your note books

Length (in cm)	1	2	3	4	5	6	7	8	9
Width (in cm)	11	10	....	....	....	....	....	....	....
Area (in cm^2)	11	20	....	....	....	....	....	....	....

Answer : Given: Perimeter of the rectangle P = 2(l+b) = 24m

To find: Variation of width and area with length if perimeter is fixed.

Area = l x b

Add length and breadth and multiplying by 2 should give 24.

(Note: All lengths are in cm, all areas are in cm^2)

$l = 3, P = 24 \Rightarrow 2(l+b) = 24 = 2(3+b) \Rightarrow b = 9, A = 27$

$l = 4, P = 24 \Rightarrow 2(l+b) = 24 = 2(4+b) \Rightarrow b = 8, A = 32$

$l = 5, P = 24 \Rightarrow 2(l+b) = 24 = 2(5+b) \Rightarrow b = 7, A = 35$

$l = 6, P = 24 \Rightarrow 2(l+b) = 24 = 2(6+b) \Rightarrow b = 6, A = 36$

$l = 7, P = 24 \Rightarrow 2(l+b) = 24 = 2(7+b) \Rightarrow b = 5, A = 35$

$l = 8, P = 24 \Rightarrow 2(l+b) = 24 = 2(8+b) \Rightarrow b = 4, A = 32$

$l = 9, P = 24 \Rightarrow 2(l+b) = 24 = 2(9+b) \Rightarrow b = 3, A = 27$

Observation: Length and breadth are inversely proportional to each other if perimeter is kept constant. Area first increases with length then decreases.

Length (in cm)	1	2	3	4	5	6	7	8	9
Width (in cm)	11	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**
Area (in cm^2)	11	20	**27**	**32**	**35**	**36**	**35**	**32**	**27**

Exercise 10.4

Q. 1. Rice costing Rs 480 is needed for 8 members for 20 days. What is the cost of rice required for 12 members for 15 days?

Answer : Given: Cost of Rice for 8 members for 20 days = Rs. 480

To find: Cost of Rice for 12 members for 15 days.

Cost of Rice for 8 members for 1 day = Rs. $\frac{480}{20}$ = Rs.24

Cost of Rice for 1 member for 1 day = Rs. $\frac{24}{8}$ = Rs. 3

Cost of Rice for 12 members for 1 day = Rs. 3 x 12 = Rs. 36

Cost of Rice for 12 members for 15 days = Rs. 36 x 15 = Rs.540

∴ Cost of Rice for 12 members for 15 days is Rs. 540

Q. 2. 10 men can lay a road 75 km. long in 5 days. In how many days can 15 men lay a road 45 km. long?

Answer : 1 men can lay a road in 5 days = 75/10 = 7.5 km
Now, 15 men lay a road of 45 km1 men can lay a road of = 45/15 = 3 km. According to the question,

$$Number\ of\ days\ = \frac{3}{7.5} \times 5\ = 2\ days$$

Q. 3. 24 men working at 8 hours per day can do a piece 20 men of work in 15 days. In how many days can 20 men working at 9 hours per day do the same work?

Answer : Given: Number of men working 8 hours a day for 15 days = 24
24 men working at 8 hours per day can do the work in 15 days Amount of work = 24 x 8 x 15 = 2880 man-hour. Find the number of days needed for 20 men working 9 hours a day: Time number of man-hour = 20 x 9 = 180Number of days needed = 2880 ÷ 180 = 16 days Hence, 20 men working on 9 hours can complete the work in 16 days.

Q. 4. 175 men can dig a canal 3150 m long in 36 days. How many men are required to dig a canal 3900 m. long in 24 days?

Answer : Given: Number of days required for 175 men to dig a canal 3150m long = 36

To find: Number of men required to dig a canal of 3900m in 24 days.

Formula: $\frac{W}{WF \times T}$ = Constant where W = Work, WF = Workforce, T = Time

$$\frac{W_1}{WF_1 \times T_1} = \frac{W_2}{WF_2 \times T_2}$$

$$\frac{3150}{175 \times 36} = \frac{3900}{WF_2 \times 24}$$

$$\frac{3900 \times 175 \times 36}{3150 \times 24} = WF_2$$

Gives $WF_2 = 325$

∴ Number of men required to dig a canal of 3900m in 24 days is 325

Q. 5. If 14 typists typing 6 hours a day can take 12 days to complete the manuscript of a book, then how many days will 4 typists, working 7 hours a day, can take to do the same job?

Answer : Given: Number of days required for 14 typists to type the manuscript 6 hours a day = 12 days

To find: Number of days required for 4 typists to type working 7 hours a day.

14 typists work 72 hours to complete the manuscript of a work.

⇒14 typists complete $\frac{1}{72}$ of the manuscript in 1 hour.

⇒ 1 typist completes $\frac{1}{72 \times 14} = \frac{1}{1008}$ of the manuscript in 1 hour.

$\Rightarrow$ 4 typists complete $4\times\frac{1}{1008} = \frac{1}{252}$ of the work in 1 hour.

$\Rightarrow$ 4 typists complete $6\times\frac{1}{252} = \frac{1}{42}$ of the work in 6 hours per day

$\Rightarrow$It will take $\frac{1}{\frac{1}{42}}$ = 42 days for 4 typists to complete the whole manuscript.

$\therefore$ Number of days required for 4 typists to type working 7 hours a day is 42 days.