CHAPTER – 13

DIRECT AND INVERSE PROPORTIONS

EXERCISE – 13.2

Question - 1

Which of the following are in inverse proportion?
(i) The number of workers on a job and the time to complete the job.
(ii) The time taken for a journey and the distance travelled in a uniform speed.
(iii) Area of cultivated land and the crop harvested.
(iv) The time taken for a fixed journey and the speed of the vehicle.
(v) The population of a country and the area of land per person.

Answer:

(i) Yes, these are in inverse proportion because if there are more workers, then it will take lesser time to complete that job.

 (ii) No, these are not in inverse proportion because in more time, we may cover more distance with a uniform speed. It is a direct Proportion.

(iii) No, these are not in inverse proportion because in more area, more quantity of crop may be harvested. It is a direct Proportion.

 (iv) Yes, these are in inverse proportion because with more speed, we may complete a certain distance in a lesser time.

(v) Yes, these are in inverse proportion because if the population in increasing, then area of the land per person will be decreasing accordingly.

Question – 2

In a Television game show, the prize money of Rs 1,00,000 is to be divided equally amongst the winners. Complete the following table and find whether the prize money given to an individual winner is directly or inversely proportional to the number of winners?

Number of winners	1	2	4	5	8	10	20
Prize for each winner (in Rs)	1,00,000	50,000	...	...	...	...	...

Answer:

A table of the given information is as follows:

Number of winners	1	2	4	5	8	10	20
Prize of each winner (in Rs.)	1,00,000	50,000	X1	X2	X3	X4	X5

From the table, we obtain:

$1 \times 100,000 = 2 \times 50,000 = 100,000$

Thus, the number of winners and amount given to an individual winner is inversely proportional.

Therefore,

$1 \times 100{,}000 = x1 \times 4$

$\rightarrow x1 = 25{,}000$

$1 \times 100{,}000 = x2 \times 5$

$\rightarrow x2 = 20{,}000$

$1 \times 100{,}000 = x3 \times 8$

$\rightarrow x3 = 12500$

$1 \times 100{,}000 = x4 \times 10$

$\rightarrow x4 = 10{,}000$

$1 \times 100{,}000 = x5 \times 20$

$\rightarrow x5 = 5{,}000$

Question – 3

Rehman is making a wheel using spokes. He wants to fix equal spokes in such a way that the angles between any pair of consecutive spokes are equal. Help him by completing the

Number of spokes	4	6	8	10	12
Angle between a pair of consecutive spokes	90°	60°	...	...	...

following table.

(i) Are the number of spokes and the angles formed between the pairs of consecutive spokes in inverse proportion?

(ii) Calculate the angle between a pair of consecutive spokes on a wheel with 15 spokes.

(iii) How many spokes would be needed, if the angle between a pair of consecutive spokes is 40°?

Answer:

(i) The table of the required information is as follows:

Number of spokes	4	6	8	10	12
Angle between a pair of consecutive spokes	90°	60°	x_1	x_2	x_3

$4 \times 90° = 6 \times 60° = 360°$

Therefore, the number of spokes and the angles formed between the pairs of consecutive spokes is in inverse proportion.

$x_1 = \dfrac{360°}{8} = 45°$

$x_2 = \dfrac{360°}{10} = 36°$

$x_3 = \dfrac{360°}{12} = 30°$

(ii) $4 \times 90° = 15 \times$ angle

Angle $= 24°$

the angle between a pair of consecutive spokes on a wheel with 15 spokes is 24°

(iii) $4 \times 90° = 40° \times$ spokes

→ spokes $= 9$

9 spokes would be needed, if the angle between a pair of consecutive spokes is 40°

Question – 4

If a box of sweets is divided among 24 children, they will get 5 sweets each. How many would each get, if the number of the children is reduced by 4?

Answer:

According to the question:

a box of sweets is divided among 24 children, they will get 5 sweets each

total no of sweets = 24 × 5 = 120

the number of the children is reduced by 4.

Now, total no of children = 24 – 4 = 20

Sweets get by each children = $\frac{120}{20}$ = 6

Question – 5

A farmer has enough food to feed 20 animals in his cattle for 6 days. How long would the food last if there were 10 more animals in his cattle?

Answer:

A farmer has enough food to feed 20 animals in his cattle for 6 days.

More the number of animals, the lesser will be the number of days food lasts.

Therefore, the number of animals and number of days are inversely proportional to each other.

Hence,

$20 \times 6 = 30 \times x$

$x = \frac{20 \times 6}{30} = 2 \times 2$

→x = 4 days

Now, food will last in 4 days.

Question – 6

A contractor estimates that 3 persons could rewire Jasminder's house in 4 days. If, he uses 4 persons instead of three, how long should they take to complete the job?

Answer:

If the number of persons be more, it will take less time to complete the job

Therefore,

The number of persons and time required to complete the work are inversely proportional to each other.

Hence,

$3 \times 4 = 4 \times x$ {let x be the number of days required to complete the work by 4 persons}

→x = 3 days

Question – 7

A batch of bottles were packed in 25 boxes with 12 bottles in each box. If the same batch is packed using 20 bottles in each

box, how many boxes would be filled?

Answer:

A batch of bottles were packed in 25 boxes with 12 bottles in each box.

1 box contains 12 bottles, so 25 boxes will contain = 25 x 12 bottles

Total no of bottles = $25 \times 12 = 300$

If the same batch is packed using 20 bottles in each box

Now the total number of bottles = 300
And each box contains 20 bottles.

Then, no of boxes = $300/20 = 15$

Question – 8

A factory requires 42 machines to produce a given number of articles in 63 days. How many machines would be required to produce the same number of articles in54 days?

Answer:

The more the no of machines, the less days will be required to produce a given no of articles.

Therefore, the no of machines and no of days are in inverse proportion.

Hence,

42 × 63 = 54 × x {x be the no of machines required to produce a given no of articles in 54 days}

→x = 49

Question – 9

A car takes 2 hours to reach a destination by travelling at the speed of 60 km/h. How long will it take when the car travels at the speed of 80 km/h?

Answer:

Distance = speed × time

Therefore, speed and time are inversely proportional

This means that,
Speed × Time = Constant 2 × 60 = 80 × t { t be the time required to cover a given distance at 80 km/hr}

$t = \frac{2 \times 60}{80} = \frac{3}{2} = 1.5\ hr$

→ t = 1.5 hr

Question – 10

Two persons could fit new windows in a house in 3 days.
(i) One of the persons fell ill before the work started. How long would the job take now?

(ii) How many persons would be needed to fit the windows in one day?

Answer:

(i) If the number of persons be more, it will take less time to complete the job. Now, one of the persons fell ill before the work started.

Persons left = 2 − 1 = 1

Therefore,

The number of persons and time required to complete the work are inversely proportional to each other.

Therefore,

2 × 3 = 1 × t (t be the time required to fit the windows by 1 person}

→t = 6 days

(ii) If the number of persons be more, it will take less time to complete the job. Now, one of the persons fell ill before the work started.

Therefore,

The number of persons and time required to complete the work are inversely proportional to each other

Let n be the numbers of persons required to complete the work in 1 day.

2 × 3 = 1 × n

→ n = 6 persons

Question – 11

A school has 8 periods a day each of 45 minutes duration. How long would each period be, if the school has 9 periods a day, assuming the number of school hours tube the same?

Answer:

A school has 8 periods a day each of 45 minutes duration.

Total time = 8 × 45 minutes

if the school has 9 periods a day.

Then duration of period = (8 × 45)/ 9

= 40 minutes