# 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 1:

(i) The number of workers and the time to complete the job is in inverse proportion because less workers will take more time to complete a work and more workers will take less time to complete the same work.

(ii) Time and distance covered in direct proportion.

(iii) It is a direct proportion because more are of cultivated land will yield more crops.

(iv) Time and speed are inverse proportion because if time is less, speed is more.

(v) It is a inverse proportion. If the population of a country increases, the area of land per person decreases.

## Question 2:

In a Television game show, the prize money of ₹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:

| **No. of winners** | **1** | **2** | **4** | **5** | **8** | **10** | **20** |
|---|---|---|---|---|---|---|---|
| **Prize for each winner (in ₹)** | 1,00,000 | 50,000 | ---- | ---- | ---- | ---- | ---- |

## Answer 2:

Here number of winners and prize money are in inverse proportion because winners are increasing, prize money is decreasing.

When the number of winners are 4, each winner will get = $\frac{100000}{4}$ = ₹25,000

When the number of winners are 5, each winner will get = $\frac{100000}{5}$ = ₹20,000

When the number of winners are 8, each winner will get = $\frac{100000}{8}$ = ₹12,500

When the number of winners are 10, each winner will get = $\frac{100000}{10}$ = ₹10,000

When the number of winners are 20, each winner will get = $\frac{100000}{20}$ = ₹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 following table:

| No. of spokes | 4 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|
| Angle between a pair of consecutive spokes | 90° | 60° | ---- | ---- | ---- |

(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 $40^\circ$ ?

## Answer 3:

Here the number of spokes are increasing and the angle between a pair of consecutive spokes is decreasing. So, it is a inverse proportion and angle at the centre of a circle is $360^\circ$.

When the number of spokes is 8,

then angle between a pair of consecutive spokes = $\frac{360^\circ}{8} = 45^\circ$

When the number of spokes is 10,

then angle between a pair of consecutive spokes= $\frac{360^\circ}{10} = 36^\circ$

When the number of spokes is 12,

then angle between a pair of consecutive spokes= $\frac{360^\circ}{12} = 30^\circ$

| No. of spokes | 4 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|
| Angle between a pair of consecutive spokes | 90° | 60° | 45° | 36° | 30° |

(i) Yes, the number of spokes and the angles formed between a pair of consecutive spokes is in inverse proportion.

(ii) When the number of spokes is 15, then angle between a pair of consecutive spokes = $\frac{360^\circ}{15} = 24^\circ$.

(iii) The number of spokes would be needed = $\frac{360^\circ}{40^\circ} = 9$

## 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 4:

$\because$ Each child gets = 5 sweets, $\therefore$ 24 children will get 24 x 5 = 120 sweets

Total number of sweets = 120

If the number of children is reduced by 4, then children left = 24 – 4 = 20

Now each child will get sweets = $\frac{120}{20}$ = 6 sweets

## 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 5:

Let the number of days be $x$. Total number of animals = 20 + 10 = 30

| **Animals** | **20** | **30** |
|---|---|---|
| **Days** | 6 | $x$ |

Here, the number of animals and the number of days are in inverse proportion.

$$\therefore \quad \frac{20}{30}=\frac{x}{6} \quad \Rightarrow 30\times x=20\times 6 \quad \Rightarrow x=\frac{20\times 6}{30}=4$$

Hence, the food will last for four 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 6:

Let time taken to complete the job be $x$.

| **Persons** | **3** | **4** |
|---|---|---|
| **Days** | 4 | $x$ |

Here the number of persons and the number of days are in inverse proportion.

$$\therefore \quad \frac{3}{4}=\frac{x}{4} \quad \Rightarrow 4\times x=3\times 4 \quad \Rightarrow x=\frac{3\times 4}{4}=3 \text{ days}$$

Hence, they will complete the job in 3 days.

## Question 7:

A batch of bottles was 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 7:

Let the number of boxes be $x$.

| **No. of bottles in each box** | **12** | **20** |
|---|---|---|
| **Boxes** | 25 | $x$ |

Here the number of bottles and the number of boxes are in inverse proportion.

$$\therefore \quad \frac{12}{20}=\frac{x}{25} \quad \Rightarrow x\times 20=12\times 25 \quad \Rightarrow x=\frac{12\times 25}{20}=15$$

Hence, 15 boxes would be filled.

## 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 in 54 days?

## Answer 8:

Let the number of machines required be $x$.

| **Days** | **63** | **54** |
|---|---|---|
| **Machines** | 42 | $x$ |

Here, the number of machines and the number of days are in inverse proportion.

$$\therefore \quad \frac{63}{54}=\frac{x}{42} \quad \Rightarrow x\times 54=63\times 42 \quad \Rightarrow x=\frac{63\times 42}{54}=49$$

Hence, 49 machines would be required.

## Question 9:

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

## Answer 9:

Let the number of hours be $x$.

| **Speed (in km/hr)** | **60** | **80** |
|---|---|---|
| **Time (in hours)** | 2 | $x$ |

Here, the speed of car and time are in inverse proportion.

$$\therefore \quad \frac{60}{80}=\frac{x}{2} \quad \Rightarrow x\times 80=60\times 2 \quad \Rightarrow x=\frac{60\times 2}{80}=\frac{3}{2}=1\frac{1}{2} \text{ hrs.}$$

Hence, the car will take $1\frac{1}{2}$ hours to reach its destination.

## 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 10:

(i) Let the number of days be $x$.

| **Persons** | **2** | **1** |
|---|---|---|
| **Days** | 3 | $x$ |

Here, the number of persons and the number of days are in inverse proportion.

$$\therefore \quad \frac{2}{1}=\frac{x}{3} \quad \Rightarrow x\times 1=2\times 3 \quad \Rightarrow x=\frac{2\times 3}{1}=6 \text{ days}$$

(ii) Let the number of persons be $x$.

| **Persons** | **2** | $x$ |
|---|---|---|
| **Days** | 3 | 1 |

Here, the number of persons and the number of days are in inverse proportion.

$$\therefore \quad \frac{2}{x}=\frac{1}{3} \quad \Rightarrow x\times 1=2\times 3 \quad \Rightarrow x=\frac{2\times 3}{1}=6 \text{ persons}$$

## 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 to be the same?

## Answer 11:

Let the duration of each period be $x$.

| **Period** | **8** | **9** |
|---|---|---|
| **Duration of period (in minutes)** | 45 | $x$ |

Here the number of periods and the duration of periods are in inverse proportion.

$$\therefore \quad \frac{8}{9}=\frac{x}{45} \quad \Rightarrow x\times 9=8\times 45 \quad \Rightarrow x=\frac{8\times 45}{9}=40 \text{ minutes}$$

Hence, the duration of each period would be 40 minutes.