



SpeedLabs

MATHS

CBSE 8th

TEEVRA EDUTECH PVT. LTD.

Direct and Inverse Proportion

Exercise 13.2

Q.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.

Sol:

- (i) The number of workers and the time to complete the job is inverse proportion. Since, less workers will take more time and more workers will take less time, so it is a case of inverse proportion.
- (ii) Time and distance covered is a direct proportion.
- (iii) Direct proportion, since more area of cultivated land will yield more crops.
- (iv) Time and speed are inverse proportion. Since, time is less, speed will be more.
- (v) It is a inverse proportion. If the population of a country increases, the area of land per person decreases.

Q.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)	100000	50000

Sol: Here, number of winners and prize money are in inverse proportion.
Since, winners are increasing, prize money is decreasing, so it is a case of inverse proportion.

When the number of winners are 4, each winner will get

$$= \frac{100000}{4} = \text{Rs } 25000$$

When the number of winners are five, 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

$$= \frac{100000}{10} = 10000$$

When the number of winners are 20, each winner will get

$$= \frac{100000}{20} = 5000.$$

Number of winners	1	2	4	5	8	10	20
Prize for each winner (in Rs)	100000	50000	25000	20,000	12,500	10,000	5,000

Q.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.

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

- Are the number of spokes and the angles formed between the pairs of consecutive spokes in inverse proportion?
- Calculate the angle between a pair of consecutive spokes on a wheel with 15 spokes.
- How many spokes would be needed, if the angle between a pair of consecutive spokes is 40°?

Sol: Here, in this problem, 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°.

When, the number of spokes is 8, then angle between a pair 360° of consecutive spokes = $\frac{360^\circ}{8} = 45^\circ$.

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

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

Number 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 inverse proportion.

(ii) When there are 15 spokes, then the angle between a pair of consecutive spokes on a wheel

$$= \frac{360^\circ}{15} = 24^\circ$$

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

Q.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?

Sol: Each child gets = 5 sweets.

24 children will get = $24 \times 5 = 120$ sweets.

Total number of sweets = 120.

If the number of children is reduced by 4, then left children = $24 - 4 = 20$.

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

Q.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?

Sol: Let the number of days be x .

Total number of animals = $20 + 10 = 30$

Number of students	24	20
Number of sweets	5	x

If the number of animals increases then the number of days decreases. Therefore, it is a case of inverse proportion.

$$\therefore 20 \times 6 = 30 \times x$$

$$\text{or } 30 \times x = 20 \times 6 \quad (\because x_1y_1 = x_2y_2)$$

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

Hence, the food will last for four days.

Q.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?

Sol: Let time taken to complete the job be x .

Number of days	4	x
Number of persons	3	4

If number of persons increases, the number of days decreases.

Therefore, it is a matter of inverse proportion.

$$\therefore 3 \times 4 = 4 \times x$$

$$\text{or } 4 \times x = 3 \times 4 \quad (\because x_1y_1 = x_2y_2)$$

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

Hence, they will complete the job in 3 days

Q.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?

Sol: Let the number of boxes be x .

Number of bottles	12	20
Number of boxes	25	x

Here, number of bottles increases and the number of boxes decreases.

So, it is a case of inverse proportion.

$$\therefore 12 \times 25 = 20 \times x \quad (\because x_1y_1 = x_2y_2)$$

$$\Rightarrow 20 \times x = 12 \times 25$$

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

Hence, 15 boxes would be filled.

Q.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?

Sol: Let the number of machines required be x .

Number of machines	42	x
Number of days	63	54

Here, days are decreasing, the number of machines are increasing, and therefore, it is a case of inverse proportion.

$$\therefore 63 \times 42 = 54 \times x \quad (\because x_1y_1 = x_2y_2)$$

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

Hence, 49 machines would be required.

Q.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?

Sol: Let the number of hours be x .

Speed (in km/hr)	60	80
Time taken (in hours)	2	x

In this problem, if speed of the car decreases, time increases and if speed increases, time decreases. So, it is a case of inverse proportion.

$$\therefore 60 \times 2 = 80 \times x \quad (\because x_1 y_1 = x_2 y_2)$$

$$\Rightarrow 80 \times x = 60 \times 2$$

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

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

Q.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?

Sol: (i) Let number of days be x .

Number of persons	2	1
Number of days	3	x

$$\therefore 2 \times 3 = 1 \times x \quad (\because x_1 y_1 = x_2 y_2)$$

$$\Rightarrow 1 \times x = 2 \times 3$$

$$\Rightarrow x = 2 \times 3 = 6 \text{ days.}$$

(ii) Let the number of persons be x .

Number of persons	2	x
Number of days	3	1

$$\therefore 2 \times 3 = x \times 1 \quad (\because x_1 y_1 = x_2 y_2)$$

$$\Rightarrow x \times 1 = 2 \times 3$$

$$\Rightarrow x = 2 \times 3 = 6 \text{ persons.}$$

Q.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?

Sol: Let the duration of each period be x .

Duration of each period (in minutes)	45	x
Number of periods	8	9

If the period increases then the duration of period decreases.

So, it is a case of inverse proportion.

$$\therefore 8 \times 45 = 9 \times x \quad (\because x_1 y_1 = x_2 y_2)$$

$$\Rightarrow 9 \times x = 8 \times 45$$

$$\Rightarrow x = \frac{45 \times 8}{9} = 40$$

Hence, duration of each period would be 40 minutes.