

CLASS VIII: Maths
Chapter 11: Direct and Inverse Proportions

Questions and Solutions | Exercise 11.2 - NCERT Books

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.

Answer :

- (i) 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.
- (iii) No, these are not in inverse proportion because in more area, more quantity of crop may be harvested.
- (iv) These are in inverse proportion because with more speed, we may complete a certain distance in a lesser time.
- (v) These are in inverse proportion because if the population is increasing, then the area of the land per person will be decreasing accordingly.

Q2 :

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

Answer :

A table of the given information is as follows.

Number of winners	1	2	4	5	8	10	20
Prize for each winner (in Rs)	100000	50000	x_1	x_2	x_3	x_4	x_5

From the table, we obtain

$$1 \times 100000 = 2 \times 50000 = 100000$$

Thus, the number of winners and the amount given to each winner are inversely proportional to each other. Therefore,

$$1 \times 100000 = 4 \times x_1$$

$$x_1 = \frac{100000}{4} = 25000$$

$$1 \times 100000 = 5 \times x_2$$

$$x_2 = \frac{100000}{5} = 20000$$

$$1 \times 100000 = 8 \times x_3$$

$$x_3 = \frac{100000}{8} = 12500$$

$$1 \times 100000 = 10 \times x_4$$

$$x_4 = \frac{100000}{10} = 10000$$

$$1 \times 100000 = 20 \times x_5$$

$$x_5 = \frac{100000}{20} = 5000$$

Q3 :

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°

(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 :

A table of the given 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

From the given table, we obtain

$$4 \times 90^\circ = 360^\circ = 6 \times 60^\circ$$

Thus, the number of spokes and the angle between a pair of consecutive spokes are inversely proportional to each other. Therefore,

$$4 \times 90^\circ = x_1 \times 8$$

$$x_1 = \frac{4 \times 90^\circ}{8} = 45^\circ$$

Similarly, $x_2 = \frac{4 \times 90^\circ}{10} = 36^\circ$ and $x_3 = \frac{4 \times 90^\circ}{12} = 30^\circ$

Thus, the following table is obtained.

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 the pairs of consecutive spokes are in inverse proportion.

(ii) Let the angle between a pair of consecutive spokes on a wheel with 15 spokes be x . Therefore,

$$4 \times 90^\circ = 15 \times x$$

$$x = \frac{4 \times 90^\circ}{15} = 24^\circ$$

Hence, the angle between a pair of consecutive spokes of a wheel, which has 15 spokes in it, is 24° .

(iii) Let the number of spokes in a wheel, which has 40° angles between a pair of consecutive spokes, be y .

Therefore,

$$4 \times 90^\circ = y \times 40^\circ$$

$$y = \frac{4 \times 90}{40} = 9$$

Hence, the number of spokes in such a wheel is 9.

Q4 :

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 :

$$\text{Number of remaining children} = 24 - 4 = 20$$

Let the number of sweets which each of the 20 students will get, be x .

The following table is obtained.

Number of students	24	20
Number of sweets	5	x

If the number of students is lesser, then each student will get more number of sweets.

Since this is a case of inverse proportion,

$$24 \times 5 = 20 \times x$$

$$x = \frac{24 \times 5}{20} = 6$$

Hence, each student will get 6 sweets.

Q5 :

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 :

Let the number of days that the food will last if there were 10 more animals in the cattle be x . The following table is obtained.

Number of animals	20	$20 + 10 = 30$
Number of days	6	x

More the number of animals, lesser will be the number of days for which the food will last.

Hence, the number of days the food will last and the number of animals are inversely proportional to each other.

Therefore,

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

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

Thus, the food will last for 4 days.

Q6 :

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 :

Let the number of days required by 4 persons to complete the job be x .

The following table is obtained.

Number of days	4	x
Number of persons	3	4

If the number of persons is more, then it will take lesser time to complete the job.

Hence, the number of days and the number of persons required to complete the job are inversely proportional to each other.

Therefore,

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

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

Thus, the number of days required to complete the job is 3.

Q7 :

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 :

Let the number of boxes filled, by using 20 bottles in each box, be x.

The following table is obtained.

Number of bottles	12	20
Number of boxes	25	x

More the number of bottles, lesser will be the number of boxes.

Hence, the number of bottles and the number of boxes required to pack these are inversely proportional to each other.

Therefore,

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

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

Hence, the number of boxes required to pack these bottles is 15.

Q8 :

A factory required 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 :

Let the number of machines required to produce articles in 54 days be x . The following table is obtained.

Number of machines	42	x
Number of days	63	54

More the number of machines, lesser will be the number of days that it will take to produce the given number of articles. Thus, this is a case of inverse proportion. Therefore,

$$42 \times 63 = 54 \times x$$

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

Hence, the required number of machines to produce the given number of articles in 54 days is 49.

Q9 :

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 :

Let the time taken by the car to reach the destination, while travelling with a speed of 80 km/hr, be x hours.

The following table is obtained.

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

More the speed of the car, lesser will be the time taken by it to reach the destination.

Hence, the speed of the car and the time taken by the car are inversely proportional to each other. Therefore,

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

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

The time required by the car to reach the given destination is $1\frac{1}{2}$ hours.

Q10 :

Two persons could fit new windows in house in 3 days.

- One of the persons fell ill before the work started. How long would the job take now?
- How many persons would be needed to fit the windows in one day?

Answer :

(i) Let the number of days required by 1 man to fit all the windows be x . The following table is obtained.

Number of persons	2	1
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Number of days	3	x
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Lesser the number of persons, more will be the number of days required to fit all the windows. Hence, this is a case of inverse proportion. Therefore,

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

$$x = 6$$

Hence, the number of days taken by 1 man to fit all the windows is 6.

(ii) Let the number of persons required to fit all the windows in one day be y . The following table is formed.

Number of persons	2	y
Number of days	3	1

Lesser the number of days, more will be the number of persons required to fit all the windows. Hence, this is a case of inverse proportion. Therefore,

$$2 \times 3 = y \times 1$$

$$y = 6$$

Hence, 6 persons are required to fit all the windows in one day.

Q11 :

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 :

Let the duration of each period, when there are 9 periods a day in the school, be x minutes. The following table is obtained.

Duration of each period (in minutes)	45	x
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Number of periods	8	9
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If there is more number of periods a day in the school, then the duration of each period will be lesser. Hence, this is a case of inverse proportion. Therefore

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

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

Hence, in this case, the duration of each period will be 40 minutes.

