CBSE NCERT Solutions for Class 8 Mathematics Chapter 13

Back of Chapter Questions

EXERCISE 13.1

1.   Following are the car parking charges near a railway station upto

4 hours	Rs. 60
8 hours	Rs. 100
12 hours	Rs. 140
24 hours	Rs 180

Check if the parking charges are in direct proportion to the parking time.

Solution:

We can observe that,

$$\frac{4}{60} \neq \frac{8}{100} \neq \frac{12}{140} \neq \frac{24}{180}$$

Hence, the parking charges are not directly proportional to the parking time.

2.   A mixture of paint is prepared by mixing 1 part of red pigments with 8 parts of base. In the following table, find the parts of base that need to be added.

Parts of red pigment	1	4	7	12	20
Parts of base	8	….	….	….	….

Solution:

Let us assume the parts of red pigment to be x and the parts of base to be y.

Given that the paint is prepared by mixing 1 part of red pigments with 8 parts of base.

We can observe that $y = 8x$.

Therefore, the table can be filled as follows:

$$\frac{4}{32}, \frac{7}{56}, \frac{12}{96}, \frac{20}{160}$$

A mixture of paint is prepared by mixing 1 part of red pigments with 8 parts of base. If 1 part of a red pigment requires 75 mL of base, how much red pigment should we mix with 1800 mL of base?

Solution:

Let us assume the quantity of red pigment to be mixed with 1800mL of base to be x.

Parts of red pigment	1	x
Parts of be (in mL)	75	1800

Since these quantities are in direct proportion, the value of x can be found out as shown below:

$$x = \frac{1 \times 1800}{75}$$

Therefore, $x = 24$ mL.

3. A machine in a soft drink factory fills 840 bottles in six hours. How many bottles will it fill in five hours?

Solution:

Let the number of bottles filled in five hours be x.

The following information can be tabulated as follows:

Number of bottles	840	6
Time taken (In hours)	6	5

Since the number of bottles and the time taken to fill them are in direct proportion, the value of x can be calculated as follows:

$$x = \frac{840 \times 5}{6}$$

$$x = 700$$

Hence, 700 bottles can be filled in 5 hours.

4. A photograph of a bacteria enlarged 50,000 times attains a length of 5 cm as shown in the diagram. What is the actual length of the bacteria? If the photograph is enlarged 20,000 times only, what would be its enlarged length?

Solution:

The actual length of the bacteria $= \frac{5}{50000}$ cm $= 10^{-4}$ cm.

Let us assume the length of the bacteria when enlarged 20,000 times to be x.

The above information can be tabulated as follows:

Enlarged length (in cm)	5	x

Enlarged photograph	50 000	20 000

Since these values are directly proportional to each other, the value of x can be calculated as follows:

$$x = \frac{5 \times 20000}{50000} = 2$$

Hence the enlarged length is 2 cm.

5. In a model of a ship, the mast is 9 cm high, while the mast of the actual ship is 12 m high. If the length of the ship is 28 m, how long is the model ship?

Solution:

Let the length of the model ship be x. The given data can be tabulated as follows.

	Height of mast	Length of ship
Model ship	9 cm	x
Actual ship	12 m	28 m

Since, the heights of the model ship and the actual ship are directly proportional to each other, the value of x can be calculated as follows

$$x = \frac{9 \times 28}{12} = 21$$

Hence, the height of the model ship is 21 cm.

6. Suppose 2 kg of sugar contains 9×10^6 crystals. How many sugar crystals are there in (i) 5 kg of sugar? (ii) 1.2 kg of sugar?

Solution:

Let x and y be the number of crystals in 5 kg and 1.2 kg of sugar respectively. The given data can be tabulated as follows:

No. of crystals	9×10^5	x	y
Sugar (in kg)	2	5	1.2

Since these values are directly proportional to each other, x and y can be found as follows:

$$x = \frac{9 \times 10^5 \times 5}{2} = 2.25 \times 10^7$$

Hence, 5 kg of sugar contains 2.25×10^7 number of crystals.

$$y = \frac{9 \times 10^5 \times 1.2}{2} = 5.4 \times 10^6$$

Hence, 1.2 kg of sugar contains 5.4×10^6 number of crystals.

7. Rashmi has a road map with a scale of 1 cm representing 18 km. She drives on a road for 72 km. What would be her distance covered in the map?

Solution:

Let us assume the distance on map to be x. The given data can be tabulated as follows.

Distance covered on road in (in km)	18	72
Distance represented on map (in an)	1	x

Since, these values are directly proportional to each other, the value of x can be calculated as follows:

$$x = \frac{1 \times 72}{18} = 4$$

Hence, the distance represented on the map is 4cm.

8. A 5 m 60 cm high vertical pole casts a shadow 3 m 20 cm long. Find at the same time (i) the length of the shadow cast by another pole 10 m 50 cm high (ii) the height of a pole which casts a shadow 5 m long

Solution:

Let us consider x m to be the length of the pole whose shadow is of length 10 m 50 cm. Let us consider y m be the length of the pole whose shadow is 5 m long. The above data can be tabulated as follows.

Length of pole (in m)	5.6	10.5	y
Length of its shadow (in m)	3.2	x	5

Since, the tabulated values are directly proportional to each other, the values of x and y can be calculated as follows:

$$x = \frac{3.2 \times 10.5}{5.6} = 6$$

Hence, the length of the shadow cast by another pole 10 m 50 cm high is 6 m.

$$y = \frac{5 \times 5.6}{3.2} = 8.75$$

Hence, the height of a pole which casts a shadow 5 m long is 8.75 m.

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

Solution:

Let us assume that the distance travelled by the truck in 5 hours to be x km.

We know that,1 hour = 60 minute

∴ 5 hours = (5 × 60) minutes = 300 minutes

The given information can be tabulated as follows.

Distance travelled (in km)	14	x
Time (in min)	25	300

Since, the tabulated values are directly proportional to each other, the value of x can be calculated as follows:

$$x = \frac{14 \times 300}{25} = 168$$

Hence, the truck can travel 168 km in 300 min.

EXERCISE 13.2

10. 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.

Solution:

(i)   More the number of workers, less time it takes to complete the job. Hence, they are in inverse proportion.

(ii)   With uniform speed, it is possible to cover more distance in more time.

Hence, they are in direct proportion.

(iii)   More the area, more is the crop harvested.

Hence, they are in direct proportion.

(iv)   More the speed, less is the time taken.

Hence, they are in inverse proportion.

(v)   More the population, less is the area per person.

Hence, they are in inverse proportion.

11. In a Television game show, the prize money of rupees 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 ₹)	1,00,000	50,000	….	….	….	….	….

Solution:

As the number of winners increase, the prize amount per winner decreases. Hence, they are in inverse proportion.

The values are found as follows:

$\therefore \ 4 \times x = 1 \times 100000$

$\Rightarrow x = \dfrac{100000}{4} = 25000$

Thus, for 4 it is 25000

$5 \times y = 1 \times 100000$

$\Rightarrow y = \dfrac{100000}{5} = 20000$

Therefore, for 5 it is 20000.

$8 \times z = 1 \times 100000$

$\Rightarrow z = \dfrac{100000}{8} = 12500$

12. 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°?

Solution:

Let us assume the values to be determined to be 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 table, we can observe that

$4 \times 90^0 = 360^0 = 6 \times 60^0$

Hence, this is an inverse proportion.

The unknown values can be found as follows

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

$x_1 = \dfrac{4 \times 90^o}{8} = 45^o$

Similarly, $x_2 = \dfrac{4 \times 90^0}{10} = 36^0$ and

$x_3 = \dfrac{4 \times 90^o}{12} = 30^o$

The updated table is as shown below

Number of spokes	4	6	8	10	12

Angle between a pair of consecutive spokes	90º	60º	45º	36º	30º

Yes, the number of spokes and the angles formed between the pairs of consecutive spokes are in inverse proportion.

Let the angle between a pair of consecutive spokes on a wheel with 15 spokes be x, then

$$x = \frac{4 \times 90º}{15} = 24º$$

Let the number of spokes in a wheel which has 40º angles between a pair of consecutive spokes be y, then

$$y = \frac{4 \times 90º}{40} = 9º$$

13.   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?

Solution:

Given, 1 box of sweet is divided among 24 children

Number of children after reducing by 4 is $24 - 4 = 20$

Let us assume each of them get x number of sweets.

The above can be tabulated as follows:

Number of students	24	20
Number of sweets	5	x

More the number of students, lesser the number of sweets each of them get.

Hence, they are in inverse proportion.

The value of x can be calculated as follows:

$$x = \frac{24 \times 5}{50} = 6$$

Hence, each of them will get 6 sweets.

14.   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?

Solution:

Number of cattle $= 20 + 10 = 30$

Let x be the number of days the food lasts

Number of animals	20	30
Number of days	6	x

More the cattle, lesser the number of days the food will last, hence these are in inverse proportion.

The value of x is calculated as below:

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

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

Hence, the food will last for 4 days.

15. 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?

Solution:

Assume the number of days as x.

The data is tabulated as follows:

Number of days	4	x
Number of persons	3	4

More the number of workers, less is the number of days required to complete the work.

Hence, they are in inverse proportion, and the value of x is calculated as follows:

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

Therefore, 4 workers will take 3 days to complete the job.

16. 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?

Solution:

If 20 bottles are packed together, let x be the number of boxes. The data is tabulated as follows:

Number of	25	x

boxes		
Number of bottles per box	12	20

If a greater number of bottles are packed in a box, lesser will be the number of boxes required.

Hence it is inverse proportion and the value of x is calculated as follows:

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

Hence, 15 boxes will be filled.

17.   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?

Solution:

Let x be the number of machines required.

The tabulated data is as below:

Number of machines	42	x
Number of days	63	54

More the number of machines, less is the number of days required.

Hence, they are in inverse proportion.

The value of x is calculated as follows:

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

Therefore, 49 machines are required to produce the same number of articles in 54 days.

18.   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?

Solution:

Let the time taken to reach a certain place at 80 km/h be x.

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

More the speed, less it the time required.

Hence, they are in inverse proportion and the value of x can be calculated as shown:

$$x = \frac{2 \times 60}{80} = 1.5$$

Therefore, it takes 1.5 hours to reach at 80km/h.

19. 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?

Solution:

(i) Let x be the number of days required

Number of persons	2	1
Number of days	3	x

Clearly, this is an inverse proportion.

$x = 2 \times 3 = 6$

Hence, it will take 6 days if one person works.

(ii) Let the number of people be y

Number of persons	2	Y
Number of days	3	1

Clearly, this is an inverse proportion.

$y = 2 \times 3 = 6$

Therefore, it will take 6 people to fit the window in one day.

20. 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?

Solution:

Let the duration of a period be x.

The given data can be tabulated as follows:

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

Assuming the number of school hours to be the same, more is the duration of each period, less is the number of periods.

Hence, they are in inverse proportion.

The value of x is calculated as shown:

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

Hence, each of the 9 periods will be for 40 minutes of duration.