NCERT Solutions for Class 8 Maths Chapter 13 - Direct and Indirect proportions

Chapter 13 - Direct and Indirect proportions Exercise Ex. 13.1

Solution 1

A table of the given information is formed as

Number of hours	4	8	12	24
Parking charges (in Rs)	60	100	140	180

The ratio of parking charges to the respective number of hours (Rs/ hour) can be calculated as

$$\frac{60}{4}=15,\ \frac{100}{8}=\frac{25}{2},\ \frac{140}{12}=\frac{35}{3},\ \frac{180}{24}=\frac{15}{2}$$

As each ratio is not same, therefore, the parking charges are not in a direct proportion to the parking time.

Solution 2

The given mixture of paint is prepared by mixing 1 part of red pigments with 8 parts of base. For more parts of red pigments, the parts of the base will also be more. Therefore, the parts of red pigments and the parts of base are in direct proportion. The given information in the form of a table is as follows.

Parts of red pigment	1	4	7	12	20
Parts of base	8	x_1	x_2	x_3	x_4

According to direct proportion,

$$\frac{x_1}{4} = \frac{8}{1} \Rightarrow x_1 = 4 \times 8 = 32$$

$$\frac{x_2}{7} = \frac{8}{1} \Rightarrow x_2 = 7 \times 8 = 56$$

$$\frac{x_3}{12} = \frac{8}{1} \quad \Rightarrow x_3 = 8 \times 12 = 96$$

$$\frac{x_4}{20} = \frac{8}{1} \quad \Rightarrow x_4 = 8 \times 20 = 160$$

The table can be drawn as follows.

Parts of red pigment	1	4	7	12	20
Parts of base	8	32	56	96	160

Solution 3

Let the parts of red pigment required to mix with 1800 mL of base be x.

The given information in the form of a table is as follows.

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

The parts of red pigment and the parts of base are in direct proportion.

Therefore, we obtain

$$\frac{1}{75} = \frac{x}{1800}$$
$$\Rightarrow x = \frac{1 \times 1800}{75}$$
$$\Rightarrow x = 24$$

Thus, 24 parts of red pigments should be mixed with 1800 mL of base.

Solution 4

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

The given information in the form of a table is as follows.

Number of bottles	840	x
Time taken (in hours)	6	5

The number of bottles and the time taken to fill these bottles are in direct proportion.
Therefore, we obtain

$$\frac{840}{6} = \frac{x}{5}$$
$$x = \frac{840 \times 5}{6} = 700$$

Thus, 700 bottles will be filled in 5 hours.

Solution 5

Let the actual length of bacteria be x cm and the enlarged length of bacteria be y cm, if the photograph is enlarged for 20,000 times.

The given information in the form of a table is as follows.

Length of bacteria (in cm)	5	x	y
Number of times photograph of Bacteria was enlarged	50000	1	20000

The number of times the photograph of bacteria was enlarged and the length of bacteria are in direct proportion.

Therefore, we obtain

$$\frac{5}{50,000} = \frac{x}{1}$$

$$\Rightarrow x = \frac{1}{10000} = 10^{-4}$$

Hence, the actual length of bacteria is 10^{-4} cm.

Let the length of bacteria when the photograph of bacteria is enlarged 20, 000 times be y.

$$\frac{5}{50,000} = \frac{y}{20,000}$$

$$y = \frac{20,000 \times 5}{50,000} = 2$$

Hence, the enlarged length of bacteria is 2 cm.

Solution 6

Let the length of the mast of the model ship be x cm.

The given information in the form of a table is as follows:

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

We know that the dimensions of the actual ship and the model ship are directly proportional to each other.

Therefore, we obtain:

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

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

Thus, the length of the model ship is 21 cm.

Solution 7

(i) Let the number of sugar crystals in 5 kg of sugar be x.

The given information in the form of a table is as follows.

Amount of sugar (in kg)	2	5
Number of crystals	9×10^6	x

The amount of sugar and the number of crystals it contains are directly proportional to each other. Therefore, we obtain

$$\frac{2}{9\times10^6} = \frac{5}{x}$$

$$x = \frac{5\times9\times10^6}{2} = 2.25\times10^7$$

Hence, the number of sugar crystals is 2.25×10^7.

(ii) Let the number of sugar crystals in 1.2 kg of sugar be y. The given information in the form of a table is as follows.

Amount of sugar (in kg)	2	1.2
Number of crystals	9×10^6	y

$$\frac{2}{9\times10^6} = \frac{1.2}{y}$$

$$y = \frac{1.2\times9\times10^6}{2} = 5.4\times10^6$$

Hence, the number of sugar crystals is 5.4×10^6.

Solution 8

Let the distance represented on the map be x cm.

The given information in the form of a table is as follows.

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

The distances covered on road and represented on map are directly proportional to each other. Therefore, we obtain

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

$$\Rightarrow x = \frac{72}{18} = 4$$

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

Solution 9

(i) Let the length of the shadow of the other pole be x m.

1 m = 100 cm

The given information in the form of a table is as follows.

Height of pole (in m)	5.60	10.50
Length of shadow (in m)	3.20	x

More the height of an object, more will be the length of its shadow.

Thus, the height of an object and length of its shadow are directly proportional to each other. Therefore, we obtain

$$\frac{5.60}{3.20} = \frac{10.50}{x}$$

$$\Rightarrow x = \frac{10.50 \times 3.20}{5.60} = 6$$

Hence, the length of the shadow will be 6 m.

(ii) Let the height of the pole be y m.

The given information in the form of a table is as follows.

Height of pole (in m)	5.60	y
Length of shadow (in m)	3.20	5

The height of the pole and the length of the shadow are directly proportional to each other. Therefore,

$$\frac{5.60}{3.20} = \frac{y}{5}$$

$$y = \frac{5 \times 5.60}{3.20} = 8.75$$

Thus, the height of the pole is 8.75 m or 8 m 75 cm.

Solution 10

Let the distance travelled by the truck in 5 hours be x km.

We know, 1 hour = 60 minutes

$\therefore$ 5 hours = (5×60) minutes = 300 minutes

The given information in the form of a table is as follows.

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

The distance travelled by the truck and the time taken by the truck are directly proportional to each other. Therefore,

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

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

Hence, the distance travelled by the truck is 168 km.

Chapter 13 - Direct and Indirect proportions Exercise Ex. 13.2

Solution 1

(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.

Solution 2

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,

$1 \times 100000 = 4 \times x_1$

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

$1 \times 100000 = 5 \times x_2$

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

$1 \times 100000 = 8 \times x_3$

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

$1 \times 100000 = 10 \times x_4$

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

$1 \times 100000 = 20 \times x_5$

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

Solution 3

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

$4 \times 90° = 360° = 6 \times 60°$

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

$4 \times 90° = x_1 \times 8$

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

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

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,

$4 \times 90° = 15 \times x$

$$x = \frac{4 \times 90°}{15} = 24°$$

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,

$4 \times 90° = y \times 40°$

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

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

Solution 4

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.

Solution 5

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.

Solution 6

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.

Solution 7

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.

Solution 8

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.

Solution 9

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.

Solution 10

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
Number of days	3	x

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.

Solution 11

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
Number of periods	8	9

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.