NCERT Solution For Class 8 Maths Chapter 13 Direct and Inverse Proportions

Exercise 13.1 Page No: 208

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:

Charges per hour:
C1 = 60/4 = Rs. 15

C2 = 100/8 = Rs. 12.50

C3 = 140 / 12 = Rs. 11.67

C4 = 180/24 = Rs.7.50

Here, the charges per hour are not same, i.e., $C1 \neq C2 \neq C3 \neq C4$

Therefore, the parking charges are not in direct proportion 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 the ratio of parts of red pigment and parts of base be a/b .

Case 1: Here, a1= 1, b1= 8

a1/b1 = 1/8 = k (say)

Case 2: When a2 = 4 , b2 = ?

$$k = \frac{a_2}{b_2}$$

b2 = a2/k = 4/ (1/8) = 4 x 8 = 32

Case 3: When a3 = 7 , b3 = ?

$$k = \frac{a_3}{b_3}$$

b3 = a3/k = 7/ (1/8) = 7 x 8 = 56

Case 4: When a4=12 , b4=?

$$k = \frac{a_4}{b_4}$$

b4= a4/k = 12/ (1/8) = 12*8 = 96

Case 5: When a5=20 , b5= ?

$$k = \frac{a_5}{b_5}$$

b5= a5/k = 20 / (1/8) = 20 x 8 = 160

Combine results for all the cases, we have

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

3. In Question 2 above, 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 the parts of red pigment mix with 1800 mL base be x.

Parts of red pigment	1	x
Parts of base	75	1800

Since it is in direct proportion.

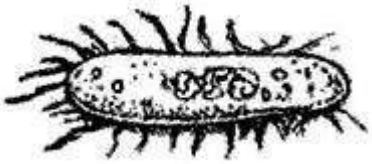
$$\therefore \frac{1}{75} = \frac{x}{1800}$$

$$\Rightarrow 75 \times x = 1 \times 1800$$

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

Hence with base 1800 mL, 24 parts red pigment should be mixed.

4. 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.
Here ratio of hours and bottles are in direct proportion.

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

⇨ 6x = 5 x 840

⇨ x = $\frac{5\times840}{6} = 700$

Hence machine will fill 700 bottles in five hours.

5. 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:

Let enlarged length of bacteria be x .
Actual length of bacteria = 5/50000 = 1/ 10000 cm = 10^-4 cm

Length	5	x
Enlarged length	50,000	20,000

Here length and enlarged length of bacteria are in direct proportion.

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

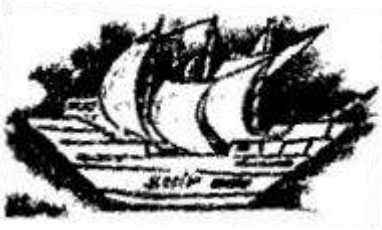
$$\Rightarrow x\times 50000 = 5\times 20000$$

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

x = 2cm

Hence the enlarged length of bacteria is 2 cm.

6. 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 if the ship is 28 m, how long is the model ship?



Solution:
Let the length of model ship be x .

Length of actual ship (in m)	12	28
Length of model ship (in cm)	9	x

Here length of mast and actual length of ship are in direct proportion.

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

$$\Rightarrow x\times 12 = 28\times 9$$

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

x =21 cm

Hence length of the model ship is 21 cm.

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

Solution:

(i) Let sugar crystals be x.

Weight of sugar (in kg)	2	5
No. of crystals	9×10^6	x

Here, weight of sugar and number of crystals are in direct proportion.

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

$$\Rightarrow x\times2=5\times9\times10^6$$

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

$$=22.5\times10^6=2.25\times10^7$$

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

Weight of sugar (in kg)	2	1.2
No. of crystals	9×10^6	x

(ii) Let sugar crystals be x.
Here weight of sugar and number of crystals are in direct proportion.

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

$$\Rightarrow x\times2=1.2\times9\times10^6$$

$$x = \frac{1.2 \times 9 \times 10^5}{2}$$

$$= 0.6 \times 9 \times 10^5 = 5.4 \times 10^5$$

Hence the number of sugar crystals is 5.4 x 10^6

8. 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 distance covered in the map be x.

Actual distance (in km)	18	72
Distance covered in map (in cm)	1	x

Here actual distance and distance covered in the map are in direct proportion.

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

$$\Rightarrow x \times 18 = 72 \times 1$$

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

x = 4 cm

Hence distance covered in the map is 4 cm.

9. 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:

Here height of the pole and length of the shadow are in direct proportion.
And 1 m = 100 cms

5 m 60 cm = 5 x 100 + 60 = 560 cm

3 m 20 cm = 3 x 100 + 20 = 320 cm

10 m 50 cm = 10 x 100 + 50 = 1050 cm

5 m = 5 x 100 = 500 cm

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

Height of pole (in cm)	560	1050
Length of shadow (in cm)	320	x

$$\frac{560}{320}=\frac{1050}{x}$$

$$\Rightarrow x\times 560=1050\times 320$$

$$x=\frac{1050\times 320}{560}$$

x= 600 cm = 6m

Hence length of the shadow of another pole is 6 m.

(ii) Let the height of the pole be x.

Height of pole (in cm)	560	x
Length of shadow (in cm)	320	500

$$\frac{560}{320}=\frac{x}{500}$$

$$\Rightarrow x\times 320=560\times 500$$

$$x=\frac{560\times 500}{320}$$

= 875 cm = 8 m 75 cm

Hence height of the pole is 8 m 75 cm.

10. 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 distance covered in 5 hours be x km.
1 hour = 60 minutes

Therefore, 5 hours = 5 x 60 = 300 minutes

Distance (in km)	14	x
Time (in minutes)	25	300

Here distance covered and time in direct proportion.

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

$\Rightarrow 25x = 300(14)$

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

x = 168

Therefore, a truck can travel 168 km in 5 hours.