NCERT solutions for class 8 maths Direct and Inverse proportions Ex 13.1

Q1. Following are he car parking charges near a railway station up to:

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.

Ans. Charges per hour:

$$C_1 = \frac{60}{4} = \text{Rs.}15$$

$$C_2 = \frac{100}{8} = \text{Rs.}12.50$$

$$C_3 = \frac{140}{12} = \text{Rs.}11.67$$

$$C_4 = \frac{180}{24} = \text{Rs.}7.50$$

Here, the charges per hour are not same,

i.e., $C_1 \neq C_2 \neq C_3 \neq C_4$

Therefore, the parking charges are not in direct proportion to the parking time.

Q2. 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	----	----	----	----

Ans. Let the ratio of parts of red pigment and parts of base be $\frac{a}{b}$.

Here $a_1 = 1, b_1 = 8$

$$\Rightarrow \frac{a_1}{b_1} = \frac{1}{8} = k \text{ (say)}$$

When $a_2 = 4, b_2 = ?$

$$k = \frac{a_2}{b_2} \Rightarrow b_2 = \frac{a_2}{k} = \frac{4}{\frac{1}{8}} = 4 \times 8 = 32$$

When $a_3 = 7, b_3 = ?$

$$k = \frac{a_3}{b_3} \Rightarrow b_3 = \frac{a_3}{k} = \frac{7}{\frac{1}{8}} = 7 \times 8 = 56$$

When $a_4 = 12, b_4 = ?$

$$k = \frac{a_4}{b_4} \Rightarrow b_4 = \frac{a_4}{k} = \frac{12}{\frac{1}{8}} = 12 \times 8 = 96$$

When $a_5 = 20, b_5 = ?$

$$k = \frac{a_5}{b_5} \Rightarrow b_5 = \frac{a_5}{k} = \frac{20}{\frac{1}{8}} = 20 \times 8 = 160$$

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

Q3. 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?

Ans. 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.

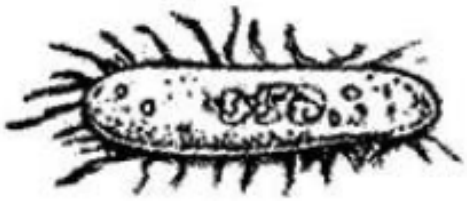
$$\therefore \frac{1}{75} = \frac{x}{1800}$$

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

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

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

Q4. A machine in a soft drink factory fills 840 bottles in six hours. How many bottles will it fill in five hours?



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

Hours	1	x
Bottles	75	1800

Here ratio of hours and bottles are in direct proportion.

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

$$\Rightarrow 6 \times x = 5 \times 840$$

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

Hence machine will fill 700 bottles in five hours.

Q5. 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?

Ans. Let enlarged length of bacteria be x.

Actual length of bacteria

$$= \frac{5}{50000} = \frac{1}{10000} \text{ cm} = 10^{-4} \text{ cm}$$

Length	5	x
Enlarged length	50,000	20,000

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

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

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

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

Hence the enlarged length of bacteria is 2 cm.

Q6. 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?

Ans. 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.

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

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

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

Hence length of the model ship is 21 cm.

Q7. 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?

Ans. (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.

$$\therefore \frac{2}{9 \times 10^6} = \frac{5}{x}$$

$$\Rightarrow x \times 2 = 5 \times 9 \times 10^6$$

$$\Rightarrow x = \frac{5 \times 9 \times 10^6}{2}$$

$$= 22.5 \times 10^6 = 2.25 \times 10^7$$

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.

$$\therefore \frac{2}{9 \times 10^6} = \frac{1.2}{x}$$

$$\Rightarrow x \times 2 = 1.2 \times 9 \times 10^6$$

$$\Rightarrow x = \frac{1.2 \times 9 \times 10^6}{2}$$

$$= 0.6 \times 9 \times 10^6 = 5.4 \times 10^6$$

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

Q8. 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?

Ans. 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.

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

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

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

Hence distance covered in the map is 4 cm.

Q9. 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.

Ans. Here height of the pole and length of the shadow are in direct proportion.

And 1 m = 100 cm

5 m 60 cm = 5 × 100 + 60 = 560 cm

3 m 20 cm = 3 × 100 + 20 = 320 cm

10 m 50 cm = 10 × 100 + 50 = 1050 cm

5 m = 5 × 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

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

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

$$\Rightarrow x = \frac{1050 \times 320}{560} = 600 \text{ cm} = 6 \text{ m}$$

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

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

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

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

$= 875$ cm $= 8$ m 75 cm

Hence height of the pole is 8 m 75 cm.

Q10. A loaded truck travels 14 km in 25 minutes. If the speed remains the same, how far can it travel in 5 hours?

Ans. Let distance covered in 5 hours be x km.

$\because$ 1 hour = 60 minutes

$\therefore$ 5 hours = $5 \times 60 = 300$ minutes

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

Here distance covered and time in direct proportion.

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

$$\Rightarrow x \times 25 = 14 \times 300$$

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

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