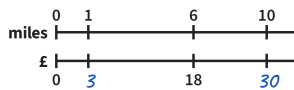


Direct Proportion: Worded Problems

1

The cost, C pounds, of a taxi journey is directly proportional to the distance, d miles. A journey of 6 miles costs £18.
(a) Find a formula for C in terms of d .
(b) Find the cost of a journey of 10 miles.

Start with $C \propto d$



$$C = kd, 18 = 6k, k = 3$$

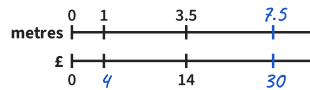
$$(a) C = 3d$$

$$(b) C = 3 \times 10 = \underline{\underline{£30}}$$

2

The cost, C pounds, of fabric is directly proportional to its length, L metres. 3.5 metres costs £14.
(a) Find a formula for C in terms of L .
(b) How much fabric can you buy for £30?

Start with $C \propto L$



$$C = kL, 14 = 3.5k, k = 4$$

$$(a) C = 4L$$

$$(b) 30 = 4L, L = \frac{30}{4} = \underline{\underline{7.5 \text{ metres}}}$$

3

The number of euros, E , is directly proportional to the number of pounds, P . £50 buys €60.
(a) Find a formula for E in terms of P .
(b) How many euros do you get for £240?

Start with $E \propto P$

$$E = kP, 60 = 50k, k = 1.2$$

$$(a) E = 1.2P$$

$$(b) E = 1.2 \times 240 = \underline{\underline{£288}}$$

4

The number of pages, N , a printer prints is directly proportional to the time, t minutes. It prints 200 pages in 8 minutes.
(a) Find a formula for N in terms of t .
(b) How many pages does it print in 15 minutes?

Start with $N \propto t$

$$N = kt, 200 = 8k, k = 25$$

$$(a) N = 25t$$

$$(b) N = 25 \times 15 = \underline{\underline{375 \text{ pages}}}$$

5

Wages, W pounds, are directly proportional to hours worked, h . 5 hours earns £60.
(a) Find a formula for W in terms of h .
(b) How many hours earn £150?

$$W = kh, 60 = 5k, k = 12$$

$$(a) W = 12h$$

$$(b) 150 = 12h, h = \frac{150}{12} = \underline{\underline{12.5 \text{ hours}}}$$

6

The distance, d km, a car travels is directly proportional to the fuel used, F litres. It travels 150 km on 10 litres.
(a) Find a formula for d in terms of F .
(b) How far does it travel on 7 litres?

$$d = kF, 150 = 10k, k = 15$$

$$(a) d = 15F$$

$$(b) d = 15 \times 7 = \underline{\underline{105 \text{ km}}}$$

7

The mass of rice, R grams, needed is directly proportional to the number of people, n . 4 people need 300 g.
(a) Find a formula for R in terms of n .
(b) How much rice is needed for 10 people?

$$R = kn, 300 = 4k, k = 75$$

$$(a) R = 75n$$

$$(b) R = 75 \times 10 = \underline{\underline{750 \text{ g}}}$$

8

The extension of a spring, e cm, is directly proportional to the force applied, F newtons. A force of 15 N gives an extension of 6 cm.
(a) Find a formula for e in terms of F .
(b) Find the extension for a force of 25 N.

$$e = kF, 6 = 15k, k = 0.4$$

$$(a) e = 0.4F$$

$$(b) e = 0.4 \times 25 = \underline{\underline{10 \text{ cm}}}$$

9

The cost, C pounds, of petrol is directly proportional to the volume bought, V litres. 20 litres costs £28.
(a) Find a formula for C in terms of V .
(b) How many litres can you buy for £49?

$$C = kV, 28 = 20k, k = 1.4$$

$$(a) C = 1.4V$$

$$(b) 49 = 1.4V, V = \frac{49}{1.4} = \underline{\underline{35 \text{ litres}}}$$

10

The real distance, D km, is directly proportional to the distance on a map, m cm. 4 cm on the map represents 10 km.
(a) Find a formula for D in terms of m .
(b) Two towns are 6.4 cm apart on the map. How far apart are they really?

$$D = km, 10 = 4k, k = 2.5$$

$$(a) D = 2.5m$$

$$(b) D = 2.5 \times 6.4 = \underline{\underline{16 \text{ km}}}$$

11

The cost, C pounds, of mobile data is directly proportional to the amount, G gigabytes. 3 GB costs £12.
(a) Find a formula for C in terms of G .
(b) How much data can you buy for £30?

$$C = kG, 12 = 3k, k = 4$$

$$(a) C = 4G$$

$$(b) 30 = 4G, G = \frac{30}{4} = \underline{\underline{7.5 \text{ GB}}}$$

12

Pay, P pounds, is directly proportional to hours worked, h . 8 hours earns £108.
(a) Find a formula for P in terms of h .
(b) How many hours earn £202.50?

$$P = kh, 108 = 8k, k = 13.5$$

$$(a) P = 13.5h$$

$$(b) 202.5 = 13.5h, h = \frac{202.5}{13.5} = \underline{\underline{15 \text{ hours}}}$$

Direct Proportion: Worded Problems *further practice*

13

The volume of water, V litres, from a hose is directly proportional to the time, t minutes. 30 litres flow in 4 minutes.

(a) Find a formula for V in terms of t .
(b) How long does it take to fill a 165 litre paddling pool?

$$30 = 4k, k = 7.5, 165 \div 7.5$$

$$(a) V = 7.5t$$

$$(b) 22 \text{ minutes}$$

14

M is directly proportional to h . Complete the table.

h	6	15	18	0.8
M	21	52.5	63	2.8

$$k = 21 \div 6 = 3.5, M = 3.5h$$

15

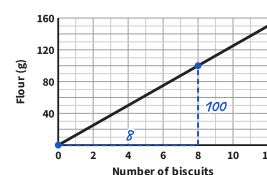
The mass, W kg, of a steel cable is directly proportional to its length, L metres. A 250 cm length of the cable has a mass of 1.8 kg. Find the mass of 40 m of the cable.

$$250 \text{ cm} = 2.5 \text{ m}, 1.8 \div 2.5 = 0.72, 0.72 \times 40$$

$$\text{Answer } 28.8 \text{ kg}$$

16

F grams of flour make n biscuits, and $F \propto n$. Use the graph to find a formula for F in terms of n , then the flour for 30 biscuits.

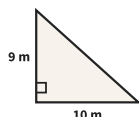


$$8 \text{ biscuits need } 100 \text{ g}, 100 \div 8 = 12.5$$

$$\text{Answer } F = 12.5n, 375 \text{ g}$$

17

The cost, $£C$, of laying turf is directly proportional to the area, $A \text{ m}^2$. Turf for a rectangular lawn 6 m by 4.5 m costs £202.50. How much does turf for this triangular lawn cost?



$$6 \times 4.5 = 27 \text{ m}^2, 202.50 \div 27 = 7.5, \frac{1}{2} \times 10 \times 9 = 45 \text{ m}^2, 7.5 \times 45$$

$$\text{Answer } £337.50$$

18

The cost, $£C$, of hiring an e-scooter is directly proportional to the time, t minutes. A 25 minute ride costs £3 more than a 10 minute ride. How much does a 40 minute ride cost?

$$15 \text{ minutes cost } £3, 3 \div 15 = 0.2, 0.2 \times 40$$

$$\text{Answer } £8$$

19

The number of bricks in a wall is directly proportional to its area. A wall of area 20 m^2 uses 1200 bricks. A builder lays 1200 bricks in 8 hours, and her time is directly proportional to the number of bricks. How long does it take her to build a wall 3 m high and 11 m long?

$$33 \text{ m}^2, 60 \text{ bricks per m}^2 \text{ so } 1980 \text{ bricks}, 1980 \div 150$$

$$\text{Answer } 13.2 \text{ hours}$$

20

A is directly proportional to B . Kai says that when B increases by 20%, A also increases by 20%. Is Kai right? Explain.

$$A = kB, k \times 1.2B = 1.2 \times kB = 1.2A$$

$$\text{Answer } \text{Yes, } A \text{ is multiplied by } 1.2$$