Direct proportion: worded problems

ANSWERS

1

The cost of rope is directly proportional to its length. 4 m of rope cost £12.
How much do 9 m cost?

Metres	Cost (£)
0	0
4	12
1	3
9	27

÷ 4, × 9 (Metres); ÷ 4, × 9 (Cost)

Answer £27

2

The cost of cinema tickets is directly proportional to the number bought.
6 tickets cost £48. How much do 5 tickets cost?

Tickets	Cost (£)
0	0
6	48
1	8
5	40

÷ 6, × 5 (Tickets); ÷ 6, × 5 (Cost)

Answer £40

3

The mass of some bags of sand is directly proportional to the number of bags.
8 bags have a mass of 200 kg.
Find the mass of 3 bags.

Bags	Mass (kg)
0	0
8	200
1	25
3	75

÷ 8, × 3 (Bags); ÷ 8, × 3 (Mass)

Answer 75 kg

4

The cost, C pounds, of hiring a canoe is directly proportional to the time, t hours.
3 hours cost £21.
(a) Find a formula for C in terms of t.
(b) Find the cost of 5 hours.

Hours	Cost (£)
0	0
3	21
1	7

÷ 3 (Hours); ÷ 3 (Cost)

(a) $C = 7t$

(b) $C = 7 \times 5 = £35$

5

The distance, d km, a train travels is directly proportional to the time, t hours.
In 2 hours it travels 150 km.
(a) Find a formula for d in terms of t.
(b) How far does it travel in 3 hours?

Hours	Kilometres
0	0
2	150
1	75

÷ 2 (Hours); ÷ 2 (Kilometres)

(a) $d = 75t$

(b) $d = 75 \times 3 = 225$ km

6

The mass of flour, F grams, is directly proportional to the number of cakes, n.
6 cakes need 270 g of flour.
(a) Find a formula for F in terms of n.
(b) How much flour do 10 cakes need?

Cakes	Flour (g)
0	0
6	270
1	45

÷ 6 (Cakes); ÷ 6 (Flour)

(a) $F = 45n$

(b) $F = 45 \times 10 = 450$ g

7

The cost, C pounds, of hiring a scooter is directly proportional to the time, t hours.
2 hours cost £18.
(a) Find a formula for C in terms of t.
(b) For how long can you hire it with £63?

Hours	Cost (£)
0	0
2	18
1	9

÷ 2 (Hours); ÷ 2 (Cost)

(a) $C = 9t$

(b) $63 = 9t$

$t = 63 \div 9 = 7$ hours

8

The cost, C pounds, of petrol is directly proportional to the volume, V litres.
20 litres cost £31.
(a) Find a formula for C in terms of V.
(b) How many litres can you buy with £46.50?

Litres	Cost (£)
0	0
20	31
1	1.55

÷ 20 (Litres); ÷ 20 (Cost)

(a) $C = 1.55V$

(b) $46.50 = 1.55V$

$V = 46.50 \div 1.55 = 30$ litres

Direct proportion: worded problems *further practice*

ANSWERS

9

The cost, C pounds, of carpet is directly proportional to its area, A m^2.
5 m^2 of carpet cost £85.
(a) Find a formula for C in terms of A.
(b) Find the cost of 12 m^2.

$85 \div 5 = 17$ for 1 m^2

$C = 17 \times 12 = £204$

Answer (a) $C = 17A$ (b) £204

10

The volume of water, V litres, from a tap is directly proportional to the time, t minutes. In 3 minutes 24 litres come out. How long does it take to fill a 100 litre tank?

$V = 8t$

$100 = 8t$, $t = 100 \div 8 = 12.5$

Answer 12.5 minutes

11

y is directly proportional to x.
Complete the table.

x	2	5	8	12
y	7	17.5	28	42

$7 \div 2 = 3.5$, so $y = 3.5x$

Answer 17.5, 8, 42

12

The number of euros, E, is directly proportional to the number of pounds, P. £50 buys 58 euros.
(a) Find a formula for E in terms of P.
(b) How many euros does £175 buy?

$58 \div 50 = 1.16$ for £1

$E = 1.16 \times 175 = 203$

Answer (a) $E = 1.16P$ (b) 203 euros

13

The distance, d miles, a car can travel is directly proportional to the fuel, f litres. On 8 litres it travels 92 miles.
How much fuel does it need to travel 161 miles?

$d = 11.5f$

$161 = 11.5f$, $f = 161 \div 11.5 = 14$

Answer 14 litres

14

The cost, C pounds, of wire is directly proportional to its length, L metres.
4 m cost £10. Ali says $C = 0.4L$.
Explain his mistake and write the right formula.

He worked out $4 \div 10$, metres for £1

The cost of 1 m is $10 \div 4 = £2.50$

Answer $C = 2.5L$

15

The mass of flour, F grams, is directly proportional to the number of biscuits, n. 12 biscuits need 300 g of flour. Jo has 1 kg of flour.
How many biscuits can she make?

$F = 25n$, and 1 kg = 1000 g

$1000 = 25n$, $n = 40$

Answer 40 biscuits

16

A plumber charges £40 for 1 hour and £70 for 2 hours. Sam says the charge is directly proportional to the time, so $C = 40t$. Is Sam right? Explain.

2 hours would cost £80, not £70

£40 an hour, then £35 an hour

Answer No