Direct Proportion: y = kx

ANSWERS

1

y is directly proportional to x. When $x = 3$, $y = 18$. Find y when $x = 8$.

x	3	8
y	18	48

× 6

Statement $y \propto$ x

Replace ∝ with = k $y = k$ x

Substitute 18 $= k \times$ 3

Find k $k =$ 6

Formula $y =$ 6 x

Use it $y =$ 6 × 8

48

$y =$ _____

2

y is directly proportional to x. When $x = 5$, $y = 35$. Find y when $x = 12$.

x	5	12
y	35	84

× 7

Statement $y \propto x$

Replace ∝ with = k $y = k$ x

Substitute 35 $= k \times$ 5

Find k $k =$ 7

Formula $y =$ 7 x

Use it $y =$ 7 × 12

84

$y =$ _____

3

y is directly proportional to x. When $x = 2$, $y = 13$. Find y when $x = 9$.

x	2	9
y	13	58.5

× 6.5

Statement $y \propto x$

Replace ∝ with = k $y = k$ x

Substitute 13 $= k \times$ 2

Find k $k =$ 6.5

Formula $y =$ 6.5 x

Use it $y =$ 6.5 × 9

58.5

$y =$ _____

4

y is directly proportional to x. When $x = 16$, $y = 12$. Find y when $x = 10$.

x	16	10
y	12	7.5

× 0.75

Statement $y \propto x$

Replace ∝ with = k $y = k$ x

Substitute 12 $= k \times$ 16

Find k $k =$ 0.75

Formula $y =$ 0.75 x

Use it $y =$ 0.75 × 10

7.5

$y =$ _____

5

P is directly proportional to Q.
When $Q = 12$, $P = 42$. Find Q when $P = 63$.

Statement $P \propto Q$

Replace ∝ with = k $P = kQ$

Substitute $42 = k \times 12$

Find k $k = 3.5$

Formula $P = 3.5Q$

Use it $63 = 3.5Q$, $Q = 18$

$Q =$ 18

6

The cost, C pounds, of cheese is directly proportional to its mass, m kg.
0.4 kg costs £5.20.

(a) Find a formula for C in terms of m.
(b) Find the cost of 1.5 kg.

$5.2 = k \times 0.4$, $k = 13$

(a) $C = 13m$

(b) $C = 13 \times 1.5$

Answer (a) $C = 13m$ (b) £19.50

7

y is directly proportional to x.
Complete the table, then write y in terms of x.

x	4	10	16
y	10	25	40

$k = 10 \div 4 = 2.5$

Formula $y = 2.5x$

8

y is directly proportional to x. When $x = 5$, $y = 20$. Sam says that when $x = 8$, $y = 23$, because y is always 15 more than x.
Explain Sam's mistake, then find the right value of y.

Proportional means multiply, not add

$k = 20 \div 5 = 4$, $y = 4 \times 8$

$y =$ 32

Direct Proportion: y = kx *further practice*

ANSWERS

9

y is directly proportional to x.
When $x = 4.5$, $y = 7.2$. Find y when $x = 11$.

$7.2 = 4.5k$, $k = 1.6$

$y = 1.6 \times 11$

$y =$ 17.6

10

The area, A m², a tin of paint covers is directly proportional to the volume of paint, V litres. 3 litres cover 39 m². How many litres are needed to cover 91 m²?

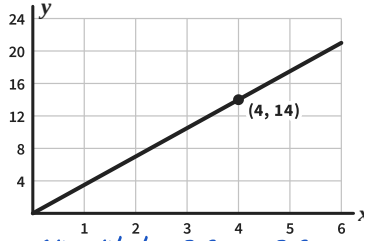
$39 = 3k$, $k = 13$, $A = 13V$

$91 = 13V$

Answer 7 litres

11

The graph shows y against x.
y is directly proportional to x.
Find a formula for y in terms of x, then find y when $x = 30$.



$14 = 4k$, $k = 3.5$, $y = 3.5x$

$y = 3.5 \times 30$

$y =$ 105

12

The cost of rope, C pounds, is directly proportional to its length, L metres. At shop A, 6 m costs £8.10. At shop B, 15 m costs £19.50. Write a formula for each shop. Which shop is better value?

A: $C = 1.35L$

B: $C = 1.3L$

Answer Shop B (£1.30 a metre)

13

The distance a cyclist rides at a steady speed, d km, is directly proportional to the time, t minutes. She rides 9 km in 24 minutes. How far does she ride in 1 hour 20 minutes?

$9 = 24k$, $k = 0.375$

80 minutes: $d = 0.375 \times 80$

Answer 30 km

14

a is directly proportional to b, and b is directly proportional to c. $a = 12$ when $b = 3$, and $b = 10$ when $c = 4$.
Find a when $c = 6$.

$a = 4b$, $b = 2.5c$

$c = 6$: $b = 15$, $a = 4 \times 15$

$a =$ 60

15

y is directly proportional to x.
When $x = a$, $y = 12$. When $x = a + 5$, $y = 32$. Find k and a.

x went up 5 and y went up 20

so $k = 20 \div 5 = 4$, $12 = 4a$

Answer $k = 4$, $a = 3$

16

Is y directly proportional to x?
Explain how you know.

x	3	5	8
y	10.5	17.5	27

$y \div x = 3.5, 3.5, 3.375$

k is not the same each time

Answer No