Direct proportion: y = kx

ANSWERS

1

y is directly proportional to x.
When $x = 4$, $y = 12$. Write a formula for y in terms of x.

$y \propto x$ $\quad y = kx$

$12 = k \times 4$

$k = \frac{12}{4} = 3$

$y = 3x$

2

y is directly proportional to x.
When $x = 5$, $y = 35$. Write a formula for y in terms of x.

$y \propto x$ $\quad y = kx$

$35 = k \times 5$

$k = \frac{35}{5} = 7$

$y = 7x$

3

A is directly proportional to r.
When $r = 6$, $A = 54$. Write a formula for A in terms of r.

$A \propto r$ $\quad A = kr$

$54 = k \times 6$

$k = \frac{54}{6} = 9$

$A = 9r$

4 *Notice the change!*

y is directly proportional to x.
When $x = 3$, $y = 18$. Find y when $x = 7$.

$y \propto x$ $\quad y = kx$

$18 = k \times 3$

$k = \frac{18}{3} = 6$

$y = 6x$

$y = 6 \times 7 = 42$

5

y is directly proportional to x.
When $x = 8$, $y = 40$. Find y when $x = 11$.

$y \propto x$ $\quad y = kx$

$40 = k \times 8$

$k = \frac{40}{8} = 5$

$y = 5x$

$y = 5 \times 11 = 55$

6

P is directly proportional to Q.
When $Q = 7$, $P = 28$. Find P when $Q = 9$.

$P = kQ$

$28 = k \times 7$

$k = 28 \div 7 = 4$

$P = 4 \times 9 = 36$

$P =$ 36

7 *Notice the change!*

y is directly proportional to x.
When $x = 2$, $y = 16$. Find x when $y = 56$.

$y \propto x$ $\quad y = kx$

$16 = k \times 2$

$k = \frac{16}{2} = 8$

$y = 8x$

$56 = 8 \times x$

$x = \frac{56}{8} = 7$

8

The cost, C pounds, of concert tickets is directly proportional to the number of tickets, n. 5 tickets cost £30.
How many tickets cost £72?

$C = kn$

$30 = k \times 5$

$k = 30 \div 5 = 6$

$n = 72 \div 6 = 12$

Answer: 12 tickets

Direct proportion: y = kx *further practice*

ANSWERS

9

y is directly proportional to x.
When $x = 6$, $y = 54$. Find y when $x = 4$.

$54 = k \times 6$

$k = 54 \div 6 = 9$

$y = 9 \times 4 = 36$

Answer: $y = 36$

10

y is directly proportional to x.
When $x = 4$, $y = 10$. Find y when $x = 6$.

$10 = k \times 4$

$k = 10 \div 4 = 2.5$

$y = 2.5 \times 6 = 15$

Answer: $y = 15$

11

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

x	2	5	7
y	8	20	30

$8 \div 2 = 4$, $20 \div 5 = 4$

$30 \div 7$ is not 4

Answer: No

12

The distance, d km, a cyclist rides is directly proportional to the time, t hours. She rides 45 km in 3 hours.
How far does she ride in 5 hours?

$45 = k \times 3$

$k = 45 \div 3 = 15$

$d = 15 \times 5 = 75$

Answer: 75 km

13

y is directly proportional to x.
When $x = 6$, $y = 9$. Find x when $y = 24$.

$9 = k \times 6$

$k = 9 \div 6 = 1.5$

$x = 24 \div 1.5 = 16$

Answer: $x = 16$

14

The mass, m grams, of a piece of wire is directly proportional to its length, L cm. 20 cm of wire has a mass of 50 g.
How long is a piece with a mass of 175 g?

$50 = k \times 20$

$k = 50 \div 20 = 2.5$

$L = 175 \div 2.5 = 70$

Answer: 70 cm

15

y is directly proportional to x.
When $x = 5$, $y = 20$. Sam says that when $x = 8$, $y = 23$, because x went up by 3. Explain Sam's mistake and find the right value of y.

Sam added, but $y = kx$ multiplies

$k = 4$, $y = 4 \times 8 = 32$

Answer: $y = 32$

16

y is directly proportional to x.
When $x = 6$, $y = 15$. Find the value of x for which y is 21 more than x.

$y = 2.5x$

$2.5x = x + 21$

$1.5x = 21$

Answer: $x = 14$