

GCSE Maths: Direct and inverse proportion (Higher): answers

GCSE Maths - Units and Compound Measures - Higher - Lesson 16.7

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch16-units-compound-measures/higher/direct-and-inverse-proportion/

Exercise 16I Direct proportion Calculator allowed

1 In each table, decide whether y is directly proportional to x . If it is, write down the value of k .

(a) x : 2, 3, 5 and y : 6, 9, 15

Answer: Yes, directly proportional ($k = 3$)

(b) x : 1, 2, 3 and y : 4, 8, 11

Answer: No, not directly proportional

(c) x : 4, 6, 10 and y : 10, 15, 25

Answer: Yes, directly proportional ($k = 2.5$)

(d) x : 2, 4, 6 and y : 5, 8, 11

Answer: No, not directly proportional

2 y is directly proportional to x . When $x = 2$, $y = 6$. Find y when:

(a) $x = 5$

Answer: 15

(b) $x = 8$

Answer: 24

(c) $x = 10$

Answer: 30

3 A recipe for 4 people uses 300 g of flour. How much flour is needed for 10 people?

Answer: 750 g

4 In each part y is directly proportional to x . Find the missing value.

(a) When $x = 3$, $y = 12$. Find y when $x = 10$.

Answer: 40

(b) When $x = 5$, $y = 35$. Find y when $x = 8$.

Answer: 56

(c) When $x = 8$, $y = 20$. Find x when $y = 35$.

Answer: 14

(d) When $x = 6$, $y = 9$. Find y when $x = 14$.

Answer: 21

- 5 The extension e cm of a spring is directly proportional to the force F newtons pulling it. A force of 12 N gives an extension of 3 cm. Find (a) the extension for a force of 20 N, (b) the force needed for an extension of 7.5 cm.
- (a) Extension for 20 N
Answer: 5 cm
- (b) Force for 7.5 cm
Answer: 30 N
- 6 The cost C pounds of n tickets is given by $C = 12.5n$. (a) What does 12.5 represent? (b) Find the cost of 8 tickets. (c) How many tickets can be bought for £200?
- (a) Meaning of 12.5
Answer: The cost of one ticket (£12.50)
- (b) Cost of 8
Answer: £100
- (c) Tickets for £200
Answer: 16 tickets
- 7 Pay is directly proportional to the hours worked. For 15 hours Lena is paid £127.50. Work out (a) her pay for 22 hours, (b) the number of hours she works for pay of £204.
- (a) Pay for 22 hours
Answer: 187 pounds
- (b) Hours for £204
Answer: 24 hours
- 8 A map is drawn so that 2 cm on the map represents 5 km on the ground. Find (a) the real distance for 7.5 cm on the map, (b) the length on the map for a real distance of 32.5 km.
- (a) Real distance
Answer: 18.75 km
- (b) Map length
Answer: 13 cm
- 9 A taxi company charges £3 plus £2 for every mile. Pat says "The cost is directly proportional to the distance." Show that Pat is wrong.
Answer: 1 mile costs £5 but 2 miles cost £7, not £10
- 10 Pat says "y is proportional to x because y goes up when x goes up." The table shows x: 1, 2, 3 and y: 3, 5, 7. Is Pat correct?
Answer: No: $y \div x$ is 3, 2.5, 2.33... (not constant)
- 11 Printing 250 leaflets costs £17.50. Work out the cost of printing 600 leaflets at the same rate.
Answer: £42
- 12 y is directly proportional to x. Show that if x is increased by 20%, then y is also increased by 20%.
Answer: New $y = k \times 1.2x = 1.2y$, an increase of 20%

13 y is directly proportional to x . When $x = 5$, $y = 3$. (a) Write y in terms of x . (b) Find x when $y = 2.4$.

(a) Equation

Answer: $y = 0.6x$

(b) Find x

Answer: 4

14 A machine fills 360 bottles in 45 minutes. At the same rate, how many hours will it take to fill 2400 bottles?

Answer: 5 hours

Exercise 16J Inverse proportion

Calculator allowed

1 In each table, decide whether y is inversely proportional to x . If it is, write down k .

(a) x : 1, 2, 3, 4 and y : 24, 12, 8, 6

Answer: Yes, inversely proportional ($k = 24$)

(b) x : 2, 4, 5 and y : 10, 5, 3

Answer: No, not inversely proportional

(c) x : 2, 5, 10 and y : 15, 6, 3

Answer: Yes, inversely proportional ($k = 30$)

(d) x : 1, 2, 3 and y : 10, 8, 6

Answer: No, not inversely proportional

2 The number of days d a job takes is inversely proportional to the number of workers n . With 6 workers the job takes 10 days. How many days does it take with:

(a) 4 workers

Answer: 15 days

(b) 12 workers

Answer: 5 days

(c) 15 workers

Answer: 4 days

(d) 5 workers

Answer: 12 days

3 A journey of 180 km takes 3 hours at 60 km/h. For a fixed distance, time t hours is inversely proportional to speed v km/h. Find the time at:

(a) 90 km/h

Answer: 2 hours

(b) 45 km/h

Answer: 4 hours

(c) 120 km/h

Answer: 1.5 hours

4 y is inversely proportional to x and $y = 24$ when $x = 1$. Find the missing values.

(a) Find y when $x = 2$

Answer: 12

(b) Find y when $x = 3$

Answer: 8

(c) Find y when $x = 4$

Answer: 6

(d) Find y when $x = 8$

Answer: 3

5 Say whether each pair of quantities is in direct proportion, inverse proportion, or neither. Give a reason.

(a) The number of taps filling a bath (all the same) and the time to fill it

Answer: Inverse proportion

(b) A child's age and the child's height

Answer: Neither

(c) The time for a 100 km journey and the speed

Answer: Inverse proportion

(d) The number of people sharing £60 and the amount each gets

Answer: Inverse proportion

(e) The number of books bought and the total cost at £4.50 each

Answer: Direct proportion

6 A bag of 60 sweets is shared equally between n children, so each child gets s sweets, where s is inversely proportional to n . When $n = 10$, $s = 6$. Find (a) s when $n = 12$, (b) n when $s = 4$.

(a) Sweets each for 12 children

Answer: 5

(b) Children when each gets 4

Answer: 15

7 y is inversely proportional to x . Explain what happens to y when x is multiplied by 4.

Answer: y is divided by 4

8 The volume V litres of a gas is inversely proportional to the pressure P kPa. When $P = 150$, $V = 12$. Find V when $P = 200$.

Answer: 9 litres

9 y is inversely proportional to x . When $x = 8$, $y = 5$. Find the value of y when $x = 20$.

Answer: 2

- 10** y is proportional to $1/x$. When $x = 0.5$, $y = 40$. Find x when $y = 16$.

Answer: 1.25

- 11** The force F newtons between two magnets is inversely proportional to the distance d cm between them. When $d = 4$, $F = 30$. (a) Write a formula for F in terms of d . (b) Find F when $d = 6$. (c) Find d when $F = 12$.

- (a) Formula

Answer: $F = \frac{120}{d}$

- (b) F when $d = 6$

Answer: 20 N

- (c) d when $F = 12$

Answer: 10 cm

- 12** 10 workers can build a wall in 12 days. After 4 days, 2 of the workers leave. How many more days will it take to finish the wall?

Answer: 10 days