

Direct Inverse Proportion

GCSE Maths · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

6 bags of compost cost £27. How much do 10 bags cost?

Step 1 · Cost of 1 bag

$$27 \div 6 = \text{£}4.50$$

Step 2 · $\times 10$

$$\text{£}45$$

Answer: £45

Check: 10 is $\frac{5}{3}$ of 6, and $27 \times \frac{5}{3} = 45$ ✓

2. Now try one with the steps

4 builders take 9 days to build a wall. How long would 6 builders take, working at the same rate?

Step 1 · Total work

Step 2 · $\div 6$

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. 3 notebooks cost £4.20. How much do 7 notebooks cost? [2]

2. A recipe for 4 people uses 300 g of rice. How much rice is needed for 10 people, in g? [2]

3. 3 pumps empty a tank in 8 hours. How long do 4 pumps take, in hours? [2]

4. A car uses 6 litres of fuel for 75 km. How far can it go on 20 litres, in km? [2]

5. A journey takes 3 hours at 60 km/h. How long does it take at 45 km/h, in hours? [2]

6. Which graph shows direct proportion: a straight line through the origin or a curve that never touches the axes? [1]

7. y is directly proportional to x . $y = 15$ when $x = 3$. Find y when $x = 8$. [2]

8. y is inversely proportional to x . $y = 6$ when $x = 4$. Find y when $x = 3$. [2]

9. $y \propto x^2$. $y = 50$ when $x = 5$. Find y when $x = 3$. [3]

10. $y \propto x^2$. $y = 50$ when $x = 5$. Find x when $y = 128$ ($x > 0$). [3]

11. y is inversely proportional to x^2 . $y = 4$ when $x = 3$. Find y when $x = 6$. [3]

12. y is directly proportional to $\sqrt{x}$. $y = 12$ when $x = 9$. Find y when $x = 25$. [3]

13. $y \propto x^3$. If x is doubled, what happens to y ? [2]

14. y is inversely proportional to x . If x is multiplied by 5, what happens to y ? [1]

15. The time t to fill a pool is inversely proportional to the number of hoses n . With 3 hoses it takes 10 hours. Write a formula for t in terms of n . [2]

4. Before you hand it in

Treating inverse proportion: more workers → more days

Ask: does one go up while the other goes down? Then multiply to find the total ($k = xy$) and divide.

$y \propto x^2$ with $y = 36$ at $x = 3$, so $k = 12$

$$36 = k \times 3^2 = 9k, \text{ so } k = 4.$$

Stopping at k

After finding k , write the full formula, then substitute the new value.

Any straight line means direct proportion

Only straight lines THROUGH THE ORIGIN show direct proportion. $y = 2x + 3$ is not proportional.