



Direct proportion

About 40 minutes Calculator allowed 38 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks] **A2** From chapter 17 [2 marks]
- Dev, Eve and Fay share some money in the ratio 5 : 3 : 9. Eve gets £87. How much more does Fay get than Dev?
- The curve $y = x^2 + bx + c$ crosses the x -axis at $(-4, 0)$ and $(1, 0)$. Find the values of b and c .

Answer

Answer

- A3** From chapter 17 [2 marks] **A4** From chapter 17 [2 marks]
- A rectangle has length $(x + 1)$ cm and width $(x - 6)$ cm. Its area is 60 cm^2 . Find the value of x .
- Solve $3x^2 - 4x - 2 = 0$. Give your answers in simplified surd form.

Answer

Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

 y is directly proportional to x . When $x = 8$, $y = 52$. Find y when $x = 13$.**Hint** Write $y = kx$, find k , then use the formula.

- B1** W is directly proportional to h . [3 marks]
When $h = 15$, $W = 54$. Find W when $h = 40$.

Answer

EXAMPLE 2

y is directly proportional to x^2 . When $x = 4$, $y = 56$. Find the positive value of x when $y = 126$.

Hint Find k in $y = kx^2$, then solve for x^2 and take the square root.

B2 E is directly proportional to v^2 . When $v = 6$, $E = 90$. Find the positive value of v when $E = 250$. [3 marks]

Answer

c Practice

C1 y is directly proportional to $\sqrt{x}$. [2 marks]
When $x = 49$, $y = 21$. Find y when $x = 121$.

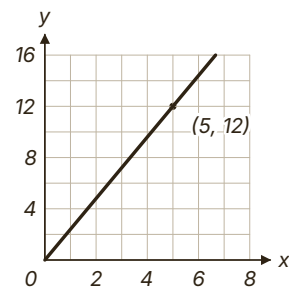
Answer

C2 y is directly proportional to x^3 . x is multiplied by 4. What number is y multiplied by? [1 mark]

Answer

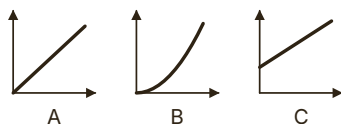
C3 Three pairs of values are $(2, 7)$, $(5, 17.5)$ and $(8, 28)$. Is y directly proportional to x ? Give a reason. [2 marks]

C4 The graph shows that y is directly proportional to x . Write y in terms of x . [2 marks]



Answer

C5 y is directly proportional to x^2 . [2 marks]
Which sketch, A, B or C, shows this? Give a reason.



C6 y is directly proportional to x^3 . [3 marks]
When $x = 2$, $y = 20$. Find y when $x = 4$, and find x when $y = 540$.

Answer $y = \dots\dots$ $x = \dots\dots$

D Exam-style questions

- D1** Ben says, " y is directly proportional to x^2 , so when x is multiplied by 3, y is multiplied by 6." [2 marks]

Explain why Ben is wrong, and say what y is multiplied by.

- D2** The braking distance, d metres, of a car is directly proportional to the square of its speed, v km/h. At 50 km/h the braking distance is 15 m.

- (a) Find a formula for d in terms of v . [2 marks]

Answer

- (b) Find the braking distance at 70 km/h. [1 mark]

Answer

- (c) Find the speed when the braking distance is 54 m. Give your answer to 3 significant figures. [2 marks]

Answer

- (d) The speed is increased by 10%. Work out the percentage increase in the braking distance. [2 marks]

Answer

Total for D2: 7 marks

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** y is directly proportional to $\sqrt{x}$. By what percentage must x be increased to make y increase by 30%? [3 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Write x in terms of y instead.
- Hint 2** $y = k\sqrt{x}$ gives $x = \frac{y^2}{k^2}$, so x is proportional to y^2 .
- Hint 3** y is multiplied by 1.3, so x is multiplied by $1.3^2 = 1.69$.
That is an increase of 69%.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can write a direct proportion as a formula and find the constant k . ☐ ☐ ☐

I can use $y = kx^2$ or $y = k\sqrt{x}$ in both directions. ☐ ☐ ☐

I can tell from a table or a graph whether y is directly proportional to x . ☐ ☐ ☐