

Direct Proportion: $y = kx$ *extend*

ANSWERS 

1



y is directly proportional to x^2 .
 x is increased by 20%.
 Find the percentage increase in y .

$$k(1.2x)^2 = 1.44kx^2$$

44%

Answer

2



a is directly proportional to b^2 , and b is directly proportional to $\sqrt{c}$.
 When $c = 16$, $b = 6$ and $a = 96$.
 Find a when $c = 25$.

$$b = 1.5\sqrt{c}, \text{ so } b = 7.5$$

$$a = \frac{8}{3}b^2, \frac{8}{3} \times 7.5^2 = 150$$

$a = 150$

Answer

3



y is directly proportional to x^2 , with x positive. When $x = p$, $y = 18$.
 When $x = p + 2$, $y = 32$. Find p .

$$\frac{18}{p^2} = \frac{32}{(p+2)^2}$$

$$\text{square roots: } \frac{3}{p} = \frac{4}{p+2}, 3p+6 = 4p$$

$p = 6$

Answer

4



y is directly proportional to x^3 .
 Show that when x is increased by 50%,
 y is more than trebled.

$$k(1.5x)^3 = 3.375kx^3$$

y is multiplied by 3.375

Reason

5



The power, P watts, of a wind turbine is directly proportional to the cube of the wind speed, v m/s. At 6 m/s it gives 540 W. Find the wind speed that gives 2 kW, to 3 significant figures.

$$540 = 216k, k = 2.5$$

$$v^3 = 2000 \div 2.5 = 800$$

9.28 m/s

Answer

6



The cost of painting a cube is directly proportional to its surface area.
 Painting a cube with a volume of 27 m^3 costs £108. Find the cost of painting a cube with a volume of 64 m^3 .

sides 3 m and 4 m

$$108 \times \frac{16}{9} = 192$$

£192

Answer

7



y is directly proportional to x^n .
 When $x = 2$, $y = 12$, and when $x = 4$,
 $y = 96$. Find n , then find y when $x = 5$.

doubling x multiplies y by $8 = 2^3$

$$k = 1.5, 1.5 \times 5^3$$

$n = 3, y = 187.5$

Answer

8



p is directly proportional to q^2 , and q is inversely proportional to r .
 Prove that p is inversely proportional to r^2 .

$$p = aq^2 \text{ and } q = \frac{b}{r}$$

$$p = a\left(\frac{b}{r}\right)^2 = \frac{ab^2}{r^2}, \text{ a constant over } r^2$$

$$p = \frac{ab^2}{r^2}$$

Proof