

1 Direct proportion

x kg of rice costs £ y .

- a) Write an expression for the cost of 5 kg.
b) Pack A is 750 g for £2.85. Pack B is 1.2 kg for £4.50 with 25% extra free. Which is better value? Show why.

a) £ $\frac{5y}{x}$

b) A: $2.85 \div 0.75 = \text{£}3.80$ a kg

B: $4.50 \div 1.5 = \text{£}3.00$ a kg, so B

4 Direct proportion: $y = kx$

- a) y is directly proportional to x^2 . x goes up by 50%.
By what percentage does y go up?
b) y is directly proportional to $\sqrt{x}$. When $x = 8$, $y = 6$.
Find the exact value of y when $x = 50$.

a) $1.5^2 = 2.25$, so up 125%

b) $k = \frac{6}{\sqrt{8}}$, $y = 6 \times \sqrt{\frac{50}{8}} = 6 \times \frac{5}{2} = 15$

6 Inverse proportion: $y = \frac{k}{x}$

y is inversely proportional to x^2 . When $x = a$, $y = 18$.
When $x = a + 4$, $y = 2$. a is positive.

- a) Find a .
b) Find a formula for y in terms of x .

a) $18a^2 = 2(a + 4)^2$, so $3a = a + 4$, $a = 2$

b) $k = 18 \times 4 = 72$, $y = \frac{72}{x^2}$

2 Inverse proportion

With n workers a job takes 15 hours. With 2 more workers it takes 3 hours less. They all work at the same rate.

- a) Find n .
b) How long would 4 workers take?

a) $15n = 12(n + 2)$, $3n = 24$, $n = 8$

b) $15 \times 8 = 120$, $120 \div 4 = 30$ hours

3 Proportion equations

- a) Show that y is inversely proportional to x^2 .
b) Find x when $y = 0.8$, for $x > 0$.

x	1	2	4	5
y	80	20	5	3.2

a) $x^2y = 80$ every time, $y = \frac{80}{x^2}$

b) $x^2 = 80 \div 0.8 = 100$, $x = 10$

5 Proportion: worded problems

The power, P kW, of a wind turbine is directly proportional to the cube of the wind speed, v m/s. At 10 m/s, $P = 1500$.

- a) The wind speed falls by 20%. By what percentage does the power fall?
b) Find the wind speed for 3000 kW, to 3 significant figures.

a) $0.8^3 = 0.512$, so it falls 48.8%

b) $P = 1.5v^3$, $v^3 = 2000$, $v = 12.6$ m/s

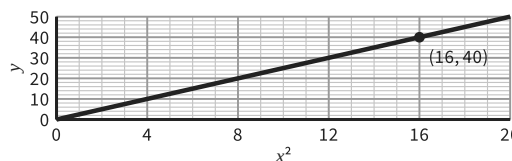
Proportion 2

revision mat answers

7 Direct proportion graphs

The graph shows y against x^2 , not x .

- a) Write a formula for y in terms of x .
b) Find x when $y = 90$, for $x > 0$.



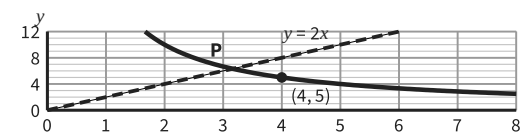
a) $40 \div 16 = 2.5$, $y = 2.5x^2$

b) $x^2 = 90 \div 2.5 = 36$, $x = 6$

8 Inverse proportion graphs

y is inversely proportional to x . The curve passes through (4, 5).

- a) The line $y = 2x$ meets the curve at P. Find P exactly.
b) The line $y = mx$ meets it where $x = 2$. Find m .



a) $xy = 20$, $2x^2 = 20$, $P(\sqrt{10}, 2\sqrt{10})$

b) $y = 10$, $10 = 2m$, $m = 5$