

Proportion

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Worked example

y is directly proportional to x :

When $y = 20, x = 2$

Find y when $x = 5$

Find x when $y = 200$

Your turn

b is directly proportional to a :

When $b = 30, a = 5$

$$b = 6a$$

Find b when $a = 2$

$$b = 12$$

Find a when $b = 3000$

$$a = 500$$

Worked example

y is directly proportional to the square of x :

When $y = 36, x = 3$

Find y when $x = 5$

Find x when $y = 400$

Your turn

b is directly proportional to the square of a :

When $b = 12, a = 2$

$$b = 3a^2$$

Find b when $a = 3$

$$b = 27$$

Find a when $b = 300$

$$a = \pm 10$$

Worked example

y is directly proportional to the cube of x :

When $y = 32, x = 2$

Find y when $x = 5$

Find x when $y = 108$

Your turn

b is directly proportional to the cube of a :

When $b = 54, a = 3$

$$b = 2a^3$$

Find b when $a = 4$

$$b = 128$$

Find a when $b = 16$

$$a = 2$$

Worked example

y is directly proportional to the square root of x :

When $y = 36, x = 16$.

Find y when $x = 25$

Find x when $y = 900$

Your turn

b is directly proportional to the square root of a :

When $b = 36, a = 144$

$$b = 3\sqrt{a}$$

Find b when $a = 49$

$$b = 21$$

Find a when $b = 243$

$$a = \pm 9$$

Worked example

A recipe for making 12 muffins requires ingredients including:

300 *g* flour

150 *g* sugar

250 *ml* milk

How much flour is needed to make 18 muffins?

How much sugar is needed to make 4 muffins?

Your turn

A recipe for making 10 muffins requires ingredients including:

240 *g* flour

180 *g* sugar

200 *ml* milk

How much milk is needed to make 30 muffins? **600 *ml***

How much flour is needed to make 2 muffins? **48 *g***

Worked example

y is inversely proportional to x :

When $y = 5, x = 2$

Find y when $x = 5$

Find x when $y = 0.5$

Your turn

b is inversely proportional to a :

When $b = 10, a = 3$

$$b = \frac{30}{a}$$

Find b when $a = 5$

$$b = 6$$

Find a when $b = 0.25$

$$a = 120$$

Worked example

y is inversely proportional to the square of x :

When $y = 6, x = 10$

Find y when $x = 5$

Find x when $y = 1.5$

Your turn

b is inversely proportional to the square of a :

When $b = 6, a = 5$

$$b = \frac{150}{a^2}$$

Find b when $a = 10$

$$b = 1.5$$

Find a when $b = 6$

$$a = \pm 5$$

Worked example

y is inversely proportional to the cube of x :

When $y = 8, x = 10$

Find y when $x = 2$

Find x when $y = 93.75$

Your turn

b is inversely proportional to the cube of a :

When $b = 5, a = 2$

$$b = \frac{40}{a^3}$$

Find b when $a = 10$

$$b = 0.04$$

Find a when $b = 0.625$

$$a = 4$$

Worked example

y is inversely proportional to the square root of x :

When $y = 4, x = 25$.

Find y when $x = 4$

Find x when $y = 2.5$

Your turn

b is inversely proportional to the square root of a :

When $b = 4, a = 9$

$$b = \frac{12}{\sqrt{a}}$$

Find b when $a = 16$

$$b = 3$$

Find a when $b = 6$

$$a = 4$$

Worked example

It takes 12 people 8 days to complete a job. Assuming each person works at the same rate, how long would it take 3 people to complete the same job?

Your turn

It takes 10 people 16 days to complete a job. Assuming each person works at the same rate, how long would it take 5 people to complete the same job?

32 days

Worked example

I buy 8 pens for £1.84. How much is 1 pen?

If 8 pens cost £1.12, how much are 12 pens?

A pack of 4 pens in shop *A* costs £1.32. A pack of 5 pens in shop *B* costs £1.60. Which pack is better value for money?

Your turn

I buy 6 pens for £1.62. How much is 1 pen?
27p

If 6 pens cost £1.14, how much are 8 pens?
£1.52

A pack of 5 pens in one shop costs £1.20. A pack of 4 pens in a different shop costs £1. Which pack is better value for money?

Shop A

Worked example

A , B and C are three variables.
 A is directly proportional to C^2
 A is also directly proportional to B^3

$$C = 94 \text{ when } B = 0.5$$

Find B when $C = 730$

Your turn

D , E and F are three variables.
 D is directly proportional to F^2
 D is also directly proportional to E^3

$$C = 47 \text{ when } B = 0.25$$

Find B when $C = 365$
 0.980 (3 sf)

Worked example

A is directly proportional to B^2
Find the percentage increase in A
when B is increased by 10%

Your turn

A is directly proportional to B^2
Find the percentage increase in A
when B is increased by 20%

44%