"Full Coverage": Direct & Indirect Proportion

This worksheet is designed to cover one question of each type seen in past papers, for each GCSE Higher Tier topic. This worksheet was automatically generated by the DrFrostMaths Homework Platform: students can practice this set of questions interactively by going to www.drfrostmaths.com/homework, logging on, *Practise → Past Papers/Worksheets* (or *Library → Past/Past Papers* for teachers), and using the 'Revision' tab.

Question 1

Categorisation: Establish a constant of proportionality for directly proportional quantities $y \propto x$, and find a y for a given x.

[Edexcel GCSE June2006-5H Q16a]

The time, T seconds, it takes a water heater to boil some water is directly proportional to the mass of water, m kg, in the water heater.

When $m = 250$, $T = 600$

Find T when $m = 400$

$T =$ .....

Question 2

Categorisation: Establish a constant of proportionality for directly proportional quantities $y \propto x$, and specify the formula for y in terms of x.

[Edexcel GCSE Nov2009-4H Q25a]

y is directly proportional to x .

When $x = 500$, $y = 10$

Find a formula for y in terms of x .

$y =$ .....

Question 3

Categorisation: Deal with directly proportional quantities involving a power.

[Edexcel GCSE Nov2008-4H Q22]

D is proportional to S^2. $D = 900$ when $S = 20$

Calculate the value of D when $S = 25$

.....

Question 4

Categorisation: Deal with directly proportional quantities involving a square root.

[Edexcel IGCSE Jan2016-4H Q18a]

y is directly proportional to $\sqrt{x}$

When $x = 49$, $y = 4$

Find a formula for y in terms of x .

$y =$ .....

Question 5

Categorisation: Establish a constant of proportionality for directly proportional quantities $y \propto x$, and find the value of x for a given y (rather than y for a given x).

[Edexcel IGCSE Jan2016-4H Q18b]

y is directly proportional to $\sqrt{x}$

When $x = 49$, $y = 4$

Calculate the value of x when $y = 12$

$x =$ .....

Question 6

Categorisation: Establish a constant of proportionality for inversely proportional quantities $y \propto x$, and find a y for a given x.

[Edexcel GCSE June2006-5H Q16b]

The time, T seconds, it takes a water heater to boil a constant mass of water is inversely proportional to the power, P watts, of the water heater.

When $P = 1400$, $T = 360$

Find the value of T when $P = 900$

$T =$ .....

Question 7

Categorisation: Deal with inversely proportional quantities involving a power.

[Edexcel GCSE Nov2016-1H Q24]

The intensity of the sound, I watts/m^2 , received from a loudspeaker is inversely proportional to the square of the distance, d metres, from the loudspeaker.

When $d = 2$, $I = 30$

Work out the value of I when $d = 10$

..... watt/m^2

Question 8

Categorisation: Establish a constant of proportionality for inversely proportional quantities $y \propto x$, and find the value of x for a given y (rather than y for a given x).

[Edexcel GCSE(9-1) Mock Set 2 Spring 2017 2H Q18]

T is inversely proportional to the cube of u .

When $u = 5$, $T = 0.0096$

Find the value of u when $T = 0.15$

$u =$ .....

Question 9

Categorisation: Understand that the notation $y \propto x$ means y is directly proportion to x and that $y = kx$

[Edexcel GCSE(9-1) Mock Set 1 Autumn 2016 - 2H Q10ii]

x	5	6
y	400	576

$$y \propto x^2$$

(ii) Write a formula for y in terms of x

.....

Question 10

Categorisation: Understand that the notation $y \propto \frac{1}{x}$ means that y is inversely proportional to x and that $y = \frac{k}{x}$

[Edexcel GCSE Jun2016-1H Q24]

Given that $y \propto \frac{1}{x^2}$, complete this table of values.

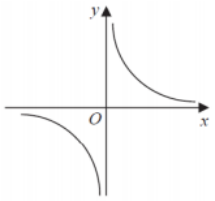
x	1	2	5	10
y	.....	.....	4	1

Question 11

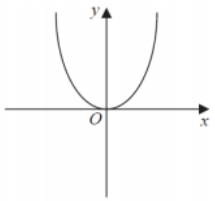
Categorisation: Identify graphs associated with directly and inversely proportional relationships.

[Edexcel Specimen Papers Set 1, Paper 1H Q16]

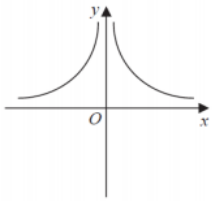
These graphs show four different proportionality relationships between y and x.



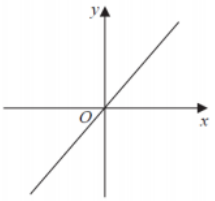
Graph A



Graph B



Graph C



Graph D

Match each graph with a statement in the table below.

Proportionality relationship	Graph letter
y is directly proportional to x	.....
y is inversely proportional to x	.....
y is proportional to the square of x	.....
y is inversely proportional to the square of x	.....

Question 12

Categorisation: Relate more than two proportional variables.

[Edexcel IGCSE May2015-3H Q22]

A, r and T are three variables. A is proportional to T^2 A is also proportional to r^3

$T = 47$ when $r = 0.25$. Find r when $T = 365$.

Give your answer correct to 3 significant figures.

$r =$ .....

Question 13

Categorisation: Deal with proportional variables when both variables are raised to a power/root. (Note: This has never appeared in an Edexcel GCSE exam)

y squared is directly proportional to the cube root of x .

When $y = 4$, $x = 125$.

Find the value of y when $x = 27$.

Give your answer correct to 2 decimal places.

.....

Question 14

Categorisation: Identify when variables are inversely proportional in context.

[Edexcel GCSE(9-1) Mock Set 2 Spring 2017 1H 1F Q22a, Q5a]

It takes 12 men 5 days to complete a job.

(a) Work out how many days it would take 3 men to complete the same job.

..... days

Question 15

Categorisation: Deal with proportionality involving rates.

[Edexcel GCSE(9-1) Mock Set 1 Autumn 2016 - 1H Q9]

A company orders a number of bottles from a factory.

The 8 machines in the factory could make all the bottles in 5 days.
All the machines work at the same rate.

For 2 days, only 4 machines are used to make the bottles.
From the 3rd day, all 8 machines are used to make the bottles.

Work out the total number of days taken to make all the bottles.

..... days

Question 16

Categorisation: Scale ingredients to determine the quantity of items that can be produced.

[Edexcel IGCSE May2016-3H Q1b]

Here are the ingredients needed to make 12 muffins.

Ingredients to make 12 muffins
300 g flour
150 g sugar
250 ml milk
100 g butter
2 eggs

James makes some muffins.
He uses 625 ml of milk. How many muffins did he make?

.....

Question 17

Categorisation: Scale ingredients to determine the amount of one ingredient required.

[Edexcel IGCSE May2016-3H Q1a]

Here are the ingredients needed to make 12 muffins.

Ingredients to make 12 muffins
300 g flour
150 g sugar
250 ml milk
100 g butter
2 eggs

Sarah makes 60 muffins.

Work out how much sugar she uses.

..... g

Answers

Question 1

$T = 960$

Question 2

$y = \frac{x}{50}$

Question 3

1406.25

Question 4

$y = \frac{4}{7}\sqrt{x}$

Question 5

$x = 441$

Question 6

$T = 560$

Question 7

1.2 watt/m^2

Question 8

$u = 2$

Question 9

$y = 16x^2$

Question 10

100, 25

Question 11

D, A, B, C

Question 12

$r =$ 0.980

Question 13

3.10

Question 14

20 days

Question 15

6 days

Question 16

30

Question 17

750 g