

Surname	
Other Names	
Candidate's Signature	

GCSE 9 - 1 Questions

Direct and Inverse Proportion 1

Calculator Allowed

INSTRUCTIONS TO CANDIDATES

Write your name in the space provided.

Write your answers in the spaces provided in this question paper.

Answer ALL questions.

Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

You should have a ruler, compass and protractor where required.

Total Marks :

1) y varies as the cube of x

$$y = 108 \text{ when } x = 3$$

(a) Express y in terms of x

Answer _____ [2]

(b) Find the value of x when $y = 500$

Answer _____ [2]

2) The resistance to motion of a car is proportional to the **square** of the speed of the car. The resistance is 4000 Newtons at a speed of 20 m/s, what will the resistance be at a speed of 40 m/s?

Answer _____ Newtons [3]

- 3) A magnet is at a distance, d cm from a metal object.
The force, F newtons, exerted by the magnet on the metal object is inversely proportional to the square of the distance d .

When $d = 5$, $F = 8$

- (a) Express F in terms of d .

Answer _____ [3]

- (b) Explain what happens to F when d is doubled.

Answer _____ [1]

- 4) It is known that a is proportional to b .
The table shows some values for a and b .

a	b
7.5	3
30	12
40	16

Use the information given in the table to complete the following equations. [3]

$$a = \dots \times b$$

$$b = \dots \times a$$

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5) Results of an experiment have demonstrated that there is a relationship between two variables, f and g .
It has been shown that f is inversely proportional to the square of g .

(a) Which one of the following statements best describes the results of this experiment?
You must explain your answer. [2]

- Statement A: 'As g increases f increases at an even faster rate.'
- Statement B: 'As g reduces, f also reduces.'
- Statement C: 'As g increases, f decreases.'
- Statement D: 'Variables f and g both change at the same rate.'

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(b) It was found that when $f = 4$, $g = 5$.
Write down an equation, in terms of f and g , expressing the relationship found in the experiment. [3]

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(c) Use the equation to complete the following table. [2]

g	$\frac{1}{2}$	5
f	4	0.01

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- 6) Daniel has found a relationship between two variables, x and y . Daniel states that

$$y = \frac{8}{x^2}$$

Daniel is trying to find the value of x that meets the above relationship and the following rule:

This value of x has a y -value that is half the value of y when $x = \frac{1}{2}$.

Find the positive value of x that meets this rule.

[4]

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7) It is known that p is proportional to q .
When $p = 48$ we know that $q = 0.6$.

Calculate

- the value of p when $q = 12$
- the value of q when $p = 9.6$

[4]

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$p = \dots\dots\dots$ when $q = 12$

$q = \dots\dots\dots$ when $p = 9.6$

8)(a) It takes eight workers six days to lay paving slabs to make a 230 metre straight path.

(i) Express the length of the path in millimetres, giving your answer in standard form.

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[2]

(ii) How long would it take 3 workers to make the path?
You may assume that all workers work at the same rate.

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[2]

(b) It takes x workers d days to lay paving slabs to make a straight path.
Write an equation to give the time T , in days, that it would take w workers, working at the same rate, to make a path of the same length.

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[3]

9) Equal-sized trucks were hired to carry 250 tons of soil from one building site to another.

On the first day, it took 10 hours for 3 of these trucks to move 100 tons of soil.

On the second day, 5 of these trucks were used to move the remaining 150 tons of soil.

How long did it take to complete the work on the second day?

You may assume that all other conditions remained the same for both days.

[3]

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10) Given that y is inversely proportional to x^2 , and that $y = 10$ when $x = 6$, find the values of x when $y = 4$. [5]

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- 11) (a) You are given that y is inversely proportional to x^2 , and that $y = 50$ when $x = 3$.
Find an expression for y in terms of x . [3]

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- (b) Use the expression you found in (a) to complete the following table. [1]

x	$\frac{1}{2}$	3
y		50

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- 12) Given that p is inversely proportional to r^2 , and that $p = 6$ when $r = 3$, find an expression for p in terms of r . [3]

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13) Given that y is inversely proportional to x , and that $y = 4$ when $x = 3$,

(a) find an expression for y in terms of x . [3]

(b) use the expression you found in (a) to complete the following table. [2]

x	3	0.25	
y	4		$\frac{1}{5}$
