| | |
|---|---|
| Surname | |
| Other Names | |
| Candidate's Signature | |

# GCSE 9 - 1 Questions

# Direct and Inverse Proportion 2

## 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) $R$ is inversely proportional to the square of $T$
and $R = 600$ when $T = 45$

**(a)** Express $R$ in terms of $T$

Answer _____ [3]

**(b)** Hence find the value of $R$ when $T = 900$

Answer _____ [1]

2) $F$ varies inversely as the square of $x$
When $x = 10$, $F = 6$

Express $F$ in terms of $x$

Answer _____ [3]

3) $y$ varies inversely as the square of $x$. When $x = 6$, $y = 6.75$

**(a)** Express $y$ in terms of $x$

Answer $y =$ _____ [3]

**(b)** Find the value of $y$ when $x = \frac{1}{3}$

Answer $y =$ _____ [1]

4) Given that $g$ is directly proportional to $t^2$, and that $g = 450$ when $t = 7{\cdot}5$,

*(a)* find an expression for $g$ in terms of $t$,

.....

.....

.....

.....

.....

.....

.....

[3]

*(b)* use the expression you found in *(a)* to complete the following table.

| $g$ | | 450 | 800 |
|---|---|---|---|
| $t$ | 2·5 | 7·5 | |

.....

.....

.....

[2]

5) A production line making chocolates sometimes develops a fault and shuts down.

The distance the chocolates travel towards the next process before shut down is $d$ metres.
The speed of the production line is $v$ m/s.

When the fault occurs, it is noticed that the distance the chocolates travel towards the next process, is inversely proportional to the square of the speed of the production line.

The fault last occurred when the distance the chocolates moved on towards the next process was 8 m and the speed of the production line was 4 m/s.

*(a)* Find an expression for $d$ in terms of $v$.

.....

.....

.....

.....

.....

.....

.....

[3]

*(b)* Calculate $d$ when $v = 6$ m/s.

.....

.....

.....

[2]

*(c)* Calculate $v$ when $d$ is 25 cm.

.....

.....

.....

.....

.....

[3]

6) There is a relationship between $x$ and $y$.
The table shows some values of $y$ for a number of values of $x$.

| $x$ | 1 | 2 | 4 |
|---|---|---|---|
| $y$ | 200 | 100 | 50 |

*(a)* Write down a relationship between $x$ and $y$ by completing the following statement. [2]

$y =$

.....

.....

.....

.....

.....

*(b)* Write down the value of $y$ when $x = 25$. [1]

.....

.....

.....

7) Silk is a natural fibre.
It is produced as a result of silkworms eating mulberry leaves.

*(a)*

**Facts**

104 kg of mulberry leaves, eaten by 3000 silkworms, will produce 1 kg of silk.

This means that:

208 kg of mulberry leaves, eaten by 6000 silkworms, will produce 2 kg of silk.

Use these facts to complete the statement below by inserting values correct to 3 significant figures. [3]

..... kg of mulberry leaves are eaten by ..... silkworms to produce 7·45 kg of silk.

.....

.....

*(b)* The typical width of a fibre of silk is 1 micrometre (μm).

1 μm = 1 millionth of a metre

Express 1 μm in metres in standard form. [2]

.....

.....

8) A farmer is planning to fertilize one of his fields.
The fertilizer he needs is sold in two different sized bags.

- Each size A bag covers an area of 40 $m^2$ and costs £13.
- Each size B bag covers an area of 70 $m^2$ and costs £20.

The farmer knows that 65 size A bags contain **exactly** enough fertilizer for the field.
The local supplier has only size B bags in stock.

Calculate the difference in the cost of buying 65 size A bags and the cost of buying the least number of size B bags needed to fertilize the field. [4]

9) It takes 6 hours for 8 tractors to plough an area of 35 acres.

What is the minimum number of tractors that will be needed to plough 19 acres in less than 5 hours?
You may assume that all the tractors work at the same rate and that all other conditions are similar. [4]

10) A printer takes 12 hours to complete a job printing 54000 advertising leaflets using his old print machine.
How long will he take to print another 72000 similar leaflets using a new machine that works twice as quickly as his old machine?

[3]

11) It is known that $c$ is directly proportional to the square of $d$, and $c = 18$ when $d = 1{\cdot}5$.

(a) Find an expression for $c$ in terms of $d$. [3]

(b) Calculate $c$ when $d = 2{\cdot}3$. [1]

(c) Calculate the possible values of $d$ when $c = 96$. [2]

12) When a ball is dropped, the distance it drops, $d$, is directly proportional to the square of its time of flight, $t$.
It is found that a ball takes 1 second to drop 4·9 metres.

*(a)* Find an expression for $d$ in terms of $t$. [3]

.....

.....

.....

.....

.....

.....

*(b)* Complete the following table. [3]

| Distance, $d$, in metres | 4·9 | | 28·2 |
|---|---|---|---|
| Time of flight, $t$, in seconds | 1 | 2 | |

.....

.....

.....

.....

.....

.....