

Lesson 8

Proportionality : GCSE

8.1 Test

Calculator needed !

Question 1

$$y = \frac{36}{x^2}$$

- (i) Tick which applies ☐ y is directly proportional to the square of x
 ☐ y is inversely proportional to the square of x
- (ii) What is the constant of the proportionality ?
- (iii) When $x = 3$, what is y ?
- (iv) When $x = 6$, what is y ?
- (v) If the value of x was increased, would the value of y increase or decrease ?

[10 marks]

Question 2

Write down the equation described by,

y is directly proportional to the square root of x

The constant of the proportionality is 7

[4 marks]

Question 3

" m is inversely proportional to the square of h "

Which one of the following is a correct translation into maths of the above words ?

$$m \propto \sqrt{h}$$

$$m \propto h^2$$

$$m \propto \frac{1}{\sqrt{h}}$$

$$m \propto \frac{1}{h^2}$$

[3 marks]

Question 4

"p is directly proportional to the square root of g"

Which one of the following is a correct translation into maths of the above words ?

$$p \propto g^2$$

$$p \propto \sqrt{g}$$

$$p \propto \frac{1}{\sqrt{g}}$$

$$p \propto \frac{1}{g^2}$$

[3 marks]

Question 5

$$y = 20x^3$$

- (i) Tick which applies ☐ y is directly proportional to the cube of x
 ☐ y is inversely proportional to the cube of x
- (ii) What is the constant of the proportionality ?
- (iii) When $x = 1$, what is y ?
- (iv) When $x = 3$, what is y ?
- (v) When $x = 10$, what is y ?
- (vi) If the value of x was increased, would the value of y increase or decrease ?

[12 marks]

Question 6

- (i) Write down the equation described by,
y is inversely proportional to x
The constant of the proportionality is 81

- (ii) When $x = 9$, what is y ?
- (iii) When $x = 27$, what is y ?
- (iv) Is inverse proportion best described by ☐ "MORE is MORE"
or ☐ "MORE is LESS"

[8 marks]

Question 7

The formula for the area of a triangle is $A = \frac{1}{2} b h$.

- (i)** Tick which applies
- ☐ A is directly proportional to b
- ☐ A is inversely proportional to b
- ☐ A is directly proportional to h
- ☐ A is inversely proportional to h
- (ii)** What is the constant of the proportionality?

[6 marks]

Question 8

- (i) Write down the equation described by,
 y is directly proportional to the square of x
 The constant of the proportionality is k
- (ii) If $y = 18$ when x is 3, what is the value of k ?
- (iii) Rewrite your part (i) answer with k replaced with its constant fixed value.
- (iv) When x is 15, what is y ?

[8 marks]

Question 9

The power loss, P , in an electrical wire is directly proportional to the square of the current, I , flowing through it.

- (i) Express " P is **directly** proportional to the square of I " as a proportionality.
- (ii) If, in a given wire, $P = 400$ when $I = 5$ find the constant of the proportionality.
- (iii) Write down a formula relating P and I .
- (iv) Use your formula to determine the value of P when $I = 10$.

[8 marks]

Question 10

Old examination question

(i) Express " T is **inversely** proportional to N " as a proportionality.

_____ [2 marks]

(ii) It is estimated that it will take 4 hours for 6 men to dig a hole.
By letting $T = 4$ when $N = 6$ find the constant of the proportionality.

_____ [2 marks]

(iii) Write down a formula relating T and N .

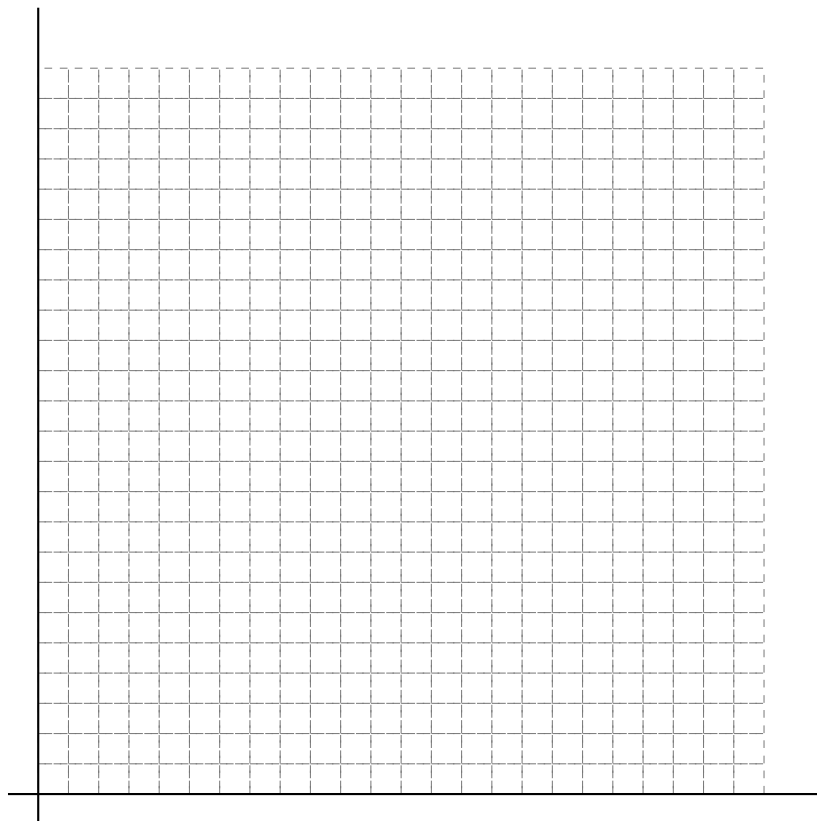
_____ [2 marks]

(iv) Use your formula to complete the following table:

N	1	2	3	4	6	8	12	24
T								

[2 marks]

(v) Plot a graph of inverse proportion for the "men digging hole".



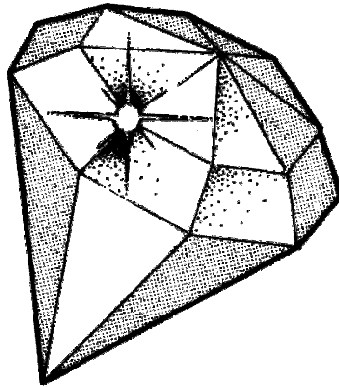
[2 marks]

Question 11

Like all great classes, Mrs Davies' decide to buy her a Christmas present.
They have discovered that Mrs Davies likes diamonds.

The value, V , of a diamond is **directly** proportional to the **square** of its weight W .
In other words,

$$V \propto W^2$$



- a) Use the fact that a diamond weighing 10 grams is worth £200 to help you write down a formula that relates the value of a diamond to its cost.

$$V = \underline{\hspace{2cm}} \quad [2 \text{ marks }]$$

- b) Show how you would use your part (a) formula to determine the value of a diamond weighing 30 grams.

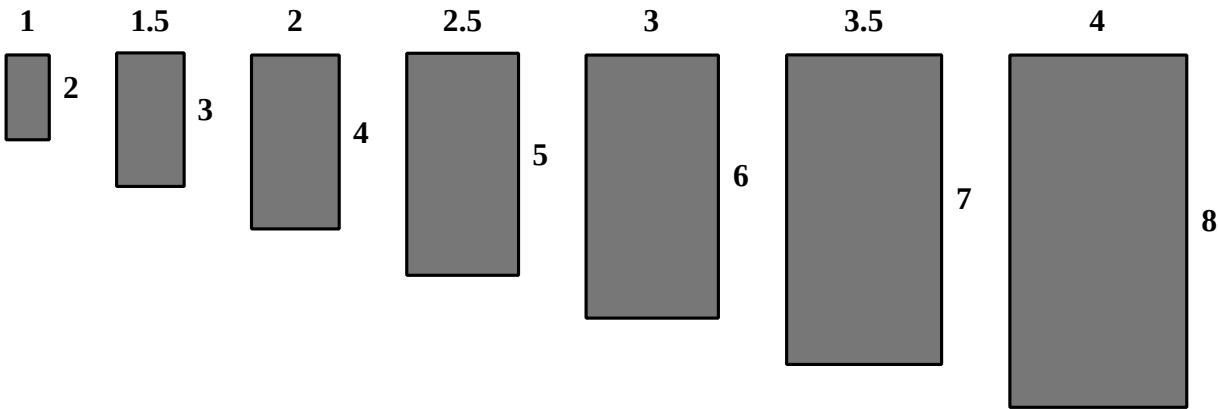
$$\underline{\hspace{2cm}} \quad [2 \text{ marks }]$$

- c) The class decide to spend £5000.
What is the weight of the diamond that Mrs Davies can look forward to receiving on Christmas day ?

$$\underline{\hspace{2cm}} \quad [2 \text{ marks }]$$

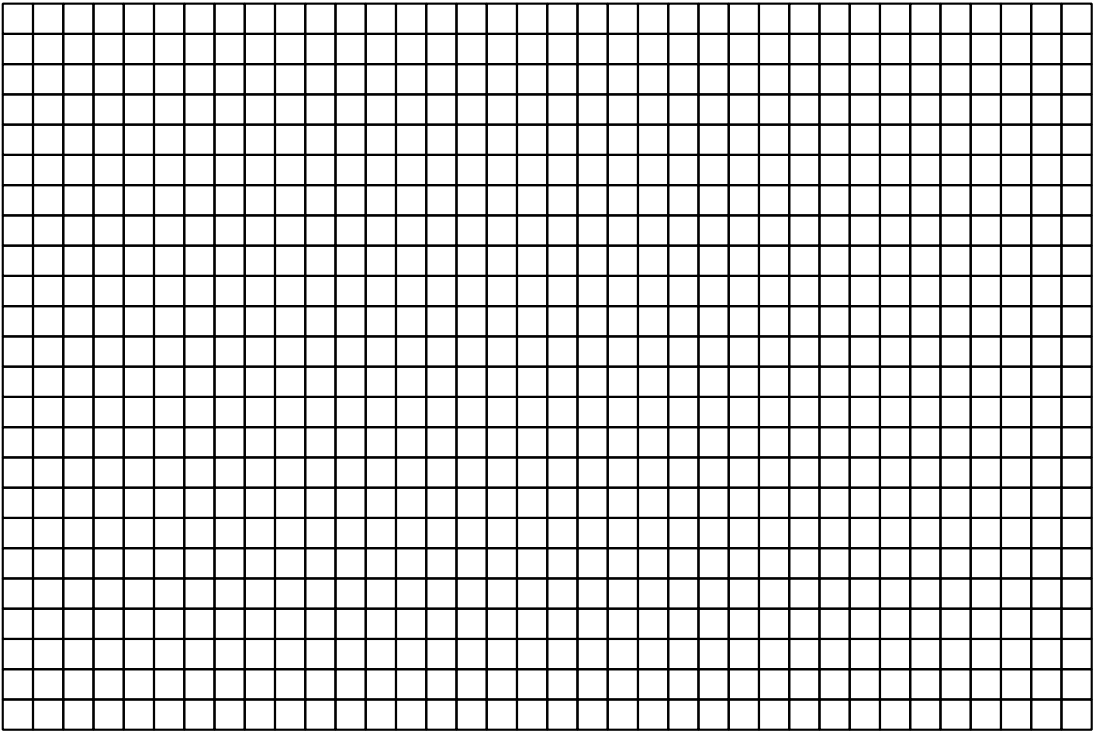
Question 12

Consider rectangles in which the height is double the width of side length.
For each of these rectangles, work out the perimeter and the area, and use the table below to summarise your results.



Measurements	1 by 2	1.5 by 3	2 by 4	2.5 by 5	3 by 6	3.5 by 7	4 by 8
Area							
Perimeter							

Plot a graph of your results.
Place Area on the x-axis, and Perimeter on the y-axis.



The Prof writes that :

$$P = k \sqrt{A}$$

[8 marks]

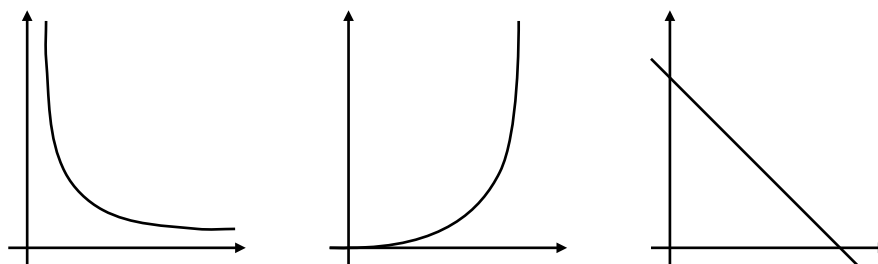
The formula for the area of a circle is $A = \pi r^2$

[8 marks]

Question 14

Indicate which one of the following graphs could represent the relation :

"m is directly proportional to the square of h"

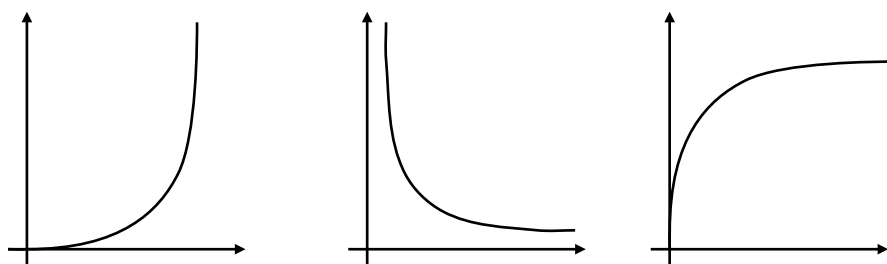


[3 marks]

Question 15

Indicate which one of the following graphs could represent the relation :

"m is inversely proportional to h"



[3 marks]