

**GCSE Grade 8/9**

**Maths**  
**Booklet 2**

Paper 1H  
Non-Calculator

[www.ggmaths.co.uk](http://www.ggmaths.co.uk)

1 Given that

$$x^2 : (3x + 5) = 1 : 2$$

find the possible values of  $x$ .

.....  
(Total for Question 1 is 4 marks)



2 (a) Express  $\sqrt{3} + \sqrt{2}$  in the form  $\sqrt{a}$  where  $a$  is an integer.

.....  
(2)

(b) Express  $\left(\frac{1}{\sqrt{3}}\right)^7$  in the form  $\frac{\sqrt{b}}{c}$  where  $b$  and  $c$  are integers.

.....  
(3)

(Total for Question 2 is 5 marks)



3 Given that  $x^2 - 6x + 1 = (x - a)^2 - b$  for all values of  $x$ ,

(i) find the value of  $a$  and the value of  $b$ .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

(2)

(ii) Hence write down the coordinates of the turning point on the graph of  $y = x^2 - 6x + 1$

$$(\dots\dots\dots, \dots\dots\dots)$$

(1)

(Total for Question 3 is 3 marks)



4  $h$  is inversely proportional to  $p$

$p$  is directly proportional to  $\sqrt{t}$

Given that  $h = 10$  and  $t = 144$  when  $p = 6$   
find a formula for  $h$  in terms of  $t$

(Total for Question 4 is 4 marks)



5 The functions  $f$  and  $g$  are such that

$$f(x) = 3x - 1 \quad \text{and} \quad g(x) = x^2 + 4$$

(a) Find  $f^{-1}(x)$

$$f^{-1}(x) = \dots\dots\dots (2)$$

Given that  $fg(x) = 2gf(x)$ ,

(b) show that  $15x^2 - 12x - 1 = 0$

(5)

(Total for Question 5 is 7 marks)



- 6 There are only  $r$  red counters and  $g$  green counters in a bag.

A counter is taken at random from the bag.

The probability that the counter is green is  $\frac{3}{7}$

The counter is put back in the bag.

2 more red counters and 3 more green counters are put in the bag.

A counter is taken at random from the bag.

The probability that the counter is green is  $\frac{6}{13}$

Find the number of red counters and the number of green counters that were in the bag originally.

red counters.....

green counters.....

(Total for Question 6 is 5 marks)



- 7  $y$  is directly proportional to the square root of  $t$ .  
 $y = 15$  when  $t = 9$

$t$  is inversely proportional to the cube of  $x$ .  
 $t = 8$  when  $x = 2$

Find a formula for  $y$  in terms of  $x$ .  
Give your answer in its simplest form.

.....  
(Total for Question 7 is 4 marks)





8 Work out the value of  $\frac{\left(5\frac{4}{9}\right)^{-\frac{1}{2}} \times \left(4\frac{2}{3}\right)}{2^{-3}}$

You must show all your working.

(Total for Question 8 is 4 marks)



9 Solve  $\frac{1}{2x-1} + \frac{3}{x-1} = 1$

Give your answer in the form  $\frac{p \pm \sqrt{q}}{2}$  where  $p$  and  $q$  are integers.

(Total for Question 9 is 4 marks)



- 10** The centre of a circle is the point with coordinates  $(-1, 3)$

The point  $A$  with coordinates  $(6, 8)$  lies on the circle.

Find an equation of the tangent to the circle at  $A$ .

Give your answer in the form  $ax + by + c = 0$  where  $a$ ,  $b$  and  $c$  are integers.

(Total for Question 10 is 4 marks)

