

**Mock Grade 8/9**

**Maths**  
**Booklet 2**

Paper 1H  
Non-Calculator

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**1** Given that

$$x^2 : (x + 4) = 2 : 3$$

find the possible values of  $x$ .

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

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2 Express  $\sqrt{72} - \sqrt{18}$  in the form of  $a\sqrt{2}$  where  $a$  is an integer.

.....  
(2)

(b) Express  $\left(\frac{1}{\sqrt{2}}\right)^5$  in the form of  $\frac{\sqrt{b}}{c}$  where  $b$  and  $c$  are integers.

.....  
(3)

(Total for Question 2 is 5 marks)

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3 Given that  $2x^2 - 8x + 1 = a(x - b)^2 - c$  for all values of  $x$ ,

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

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

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

$$c = \dots\dots\dots$$

(2)

(ii) Hence write down the coordinates of the turning point on the graph of  $y = 2x^2 - 8x + 1$

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

(1)

(Total for Question 3 is 3 marks)

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4  $h$  is inversely proportional to  $p^2$

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

Given that

$h = 12$  when  $p = 3$  and,

$t = 9$  when  $p = 6$ .

Find a formula for  $h$  in terms of  $t$ .

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(Total for Question 4 is 4 marks)

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

$$f(x) = 5x - 2 \quad \text{and} \quad g(x) = 2x^2 + 3$$

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

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

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

(b) show that  $6x^2 - 8x - 3 = 0$

(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  $\frac{4}{7}$

The counter is put back in the bag.

3 more red counters and 2 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  $\frac{9}{20}$

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

red counters.....

green counters.....

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(Total for Question 6 is 5 marks)

- 7  $y$  is directly proportional to the cube root of  $t$ .  
 $y = 20$  when  $t = 64$

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

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

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(Total for Question 7 is 4 marks)

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8 Work out the value of  $\frac{\left(15\frac{5}{8}\right)^{\frac{1}{3}} \div 22\frac{1}{2}}{3^{-2}}$

You must show all your working.

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(Total for Question 8 is 4 marks)

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9 Solve  $\frac{1}{3x-1} + \frac{2}{x-4} = 1$

Give your answer in the form  $\frac{p \pm \sqrt{q}}{3}$  where  $p$  and  $q$  are integers.

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(Total for Question 9 is 4 marks)

**10** The centre of a circle is the point with coordinates  $(-3, 5)$

The point  $A$  with coordinates  $(8, 9)$  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.

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(Total for Question 10 is 4 marks)

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