Mock Grade 8/9

Maths Booklet 6

Paper 1H
Non-Calculator

www.ggmaths.co.uk

1 Simplify fully $\dfrac{(4 + 2\sqrt{3})(4 - 2\sqrt{3})}{\sqrt{11}}$

You must show your working.

(Total for Question 1 is 3 marks)

---

2 Prove algebraically that the sum of the squares of any three consecutive odd numbers always leaves a remainder of 11 when divided by 12.

(Total for Question 2 is 4 marks)

---

3 There are 10 pens in a box.

There are x red pens in the box.
All the other pens are blue.

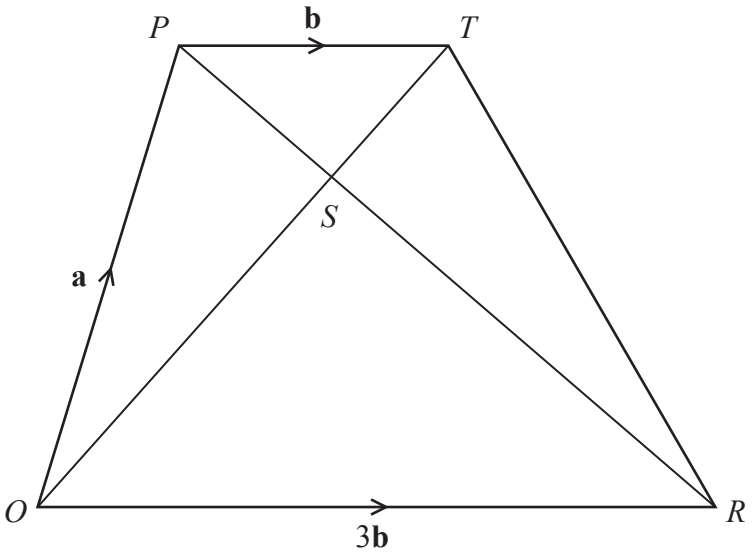
Jack takes at random two pens from the box.

Find an expression, in terms of x, for the probability that Jack takes one pen of each colour.
Give your answer in its simplest form.

.....

(Total for Question 3 is 5 marks)

4



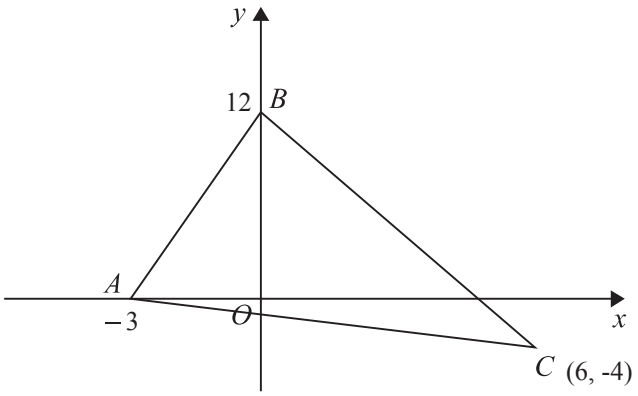
OPTR is a trapezium.

$\overrightarrow{OP} = \mathbf{a}$
$\overrightarrow{PT} = \mathbf{b}$
$\overrightarrow{OR} = 3\mathbf{b}$

S is the point on *PR* such that *PS* : *SR* = 1 : 3
Find *OS : ST*.

(Total for Question 4 is 5 marks)

5



Find an equation of the line that passes through C and is perpendicular to AB.

.....

(Total for Question 5 is 4 marks)

6 The function f is given by

$$f(x) = -2x^3 + 12$$

(a) Show that $f^{-1}(28) = -2$

(2)

The functions g and h are given by

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

(b) Find the values of x for which

Find $hg(x)$

.....

(4)

(Total for Question 6 is 6 marks)

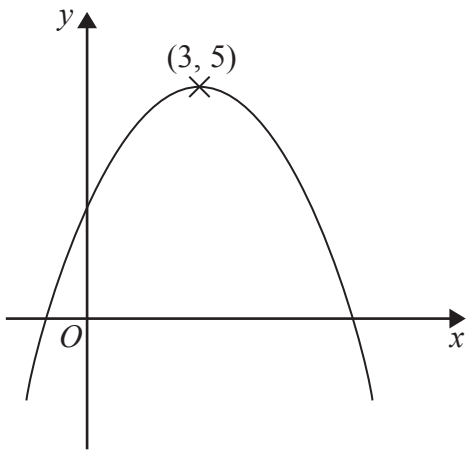
7 Given that $8^{-\frac{3}{4}} = 16^{\frac{2}{3}} \times 2^{3x-1}$

find the exact value of x.

$x =$ .....

(Total for Question 7 is 3 marks)

8



The diagram shows part of the curve with equation $y = f(x)$.
The coordinates of the maximum point of the curve are (3, 5).

(a) Write down the coordinates of the maximum point of the curve with equation

(i) $y = f(x + 3)$

(..... , ...)

(ii) $y = 2f(x)$

(..... , ...)

(iii) $y = f(3x)$

(..... , ...)

(3)

The curve with equation $y = f(x)$ is transformed to give the curve with equation $y = f(x) - 4$

(b) Describe the transformation.

.....

(1)

(Total for Question 8 is 4 marks)

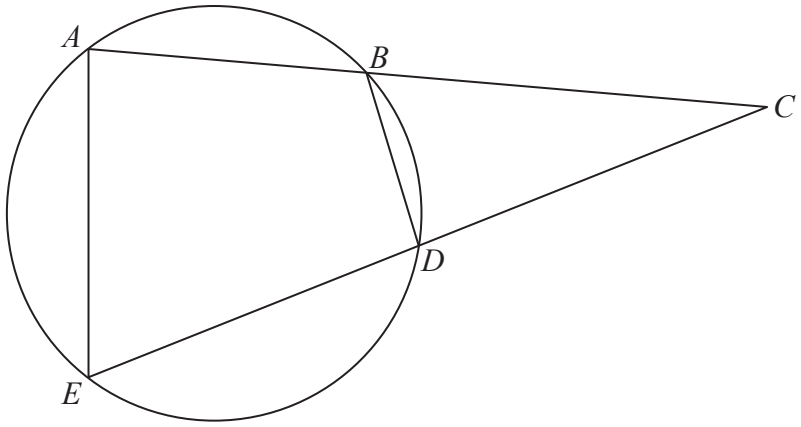
9 Sketch the graph of

$$y = 3x^2 - 12x - 8$$

showing the coordinates of the turning point and the exact coordinates of any intercepts with the coordinate axes.

(Total for Question 9 is 5 marks)

10 A, B, C and D are four points on a circle.



ABC and EDC are straight lines.

Prove that triangle BCD is similar to triangle ECA.
You must give reasons for your working.

(Total for Question 10 is 4 marks)