GCSE Grade 8/9

Maths Booklet 6

Paper 1H
Non-Calculator

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1 Simplify fully $\dfrac{(6-\sqrt{5})(6+\sqrt{5})}{\sqrt{31}}$

You must show your working.

.....

(Total for Question 1 is 3 marks)

2 Prove algebraically that the difference between the squares of any two consecutive integers is equal to the sum of these two integers.

(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.

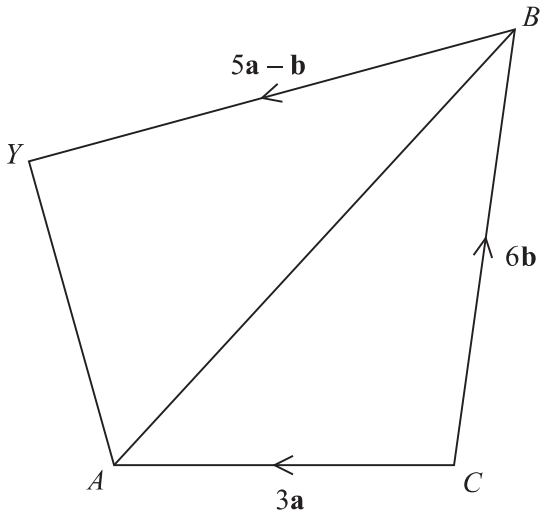
Jack takes at random two pens from the box.

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



CAYB is a quadrilateral.

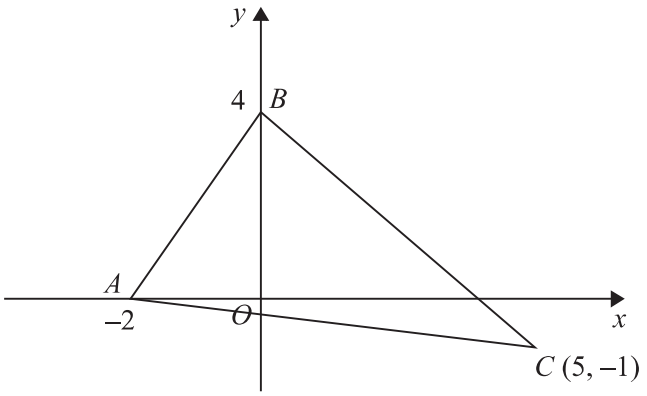
$\overrightarrow{CA} = 3\mathbf{a}$
$\overrightarrow{CB} = 6\mathbf{b}$
$\overrightarrow{BY} = 5\mathbf{a} - \mathbf{b}$

X is the point on *AB* such that $AX : XB = 1 : 2$

Prove that $\overrightarrow{CX} = \frac{2}{5}\overrightarrow{CY}$

(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

$$f(x) = 2x^3 - 4$$

(a) Show that $f^{-1}(50) = 3$

(2)

The functions g and h are given by

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

(b) Find the values of x for which

$$hg(x) = 3x^2 + x - 1$$

.....

(4)

(Total for Question 6 is 6 marks)

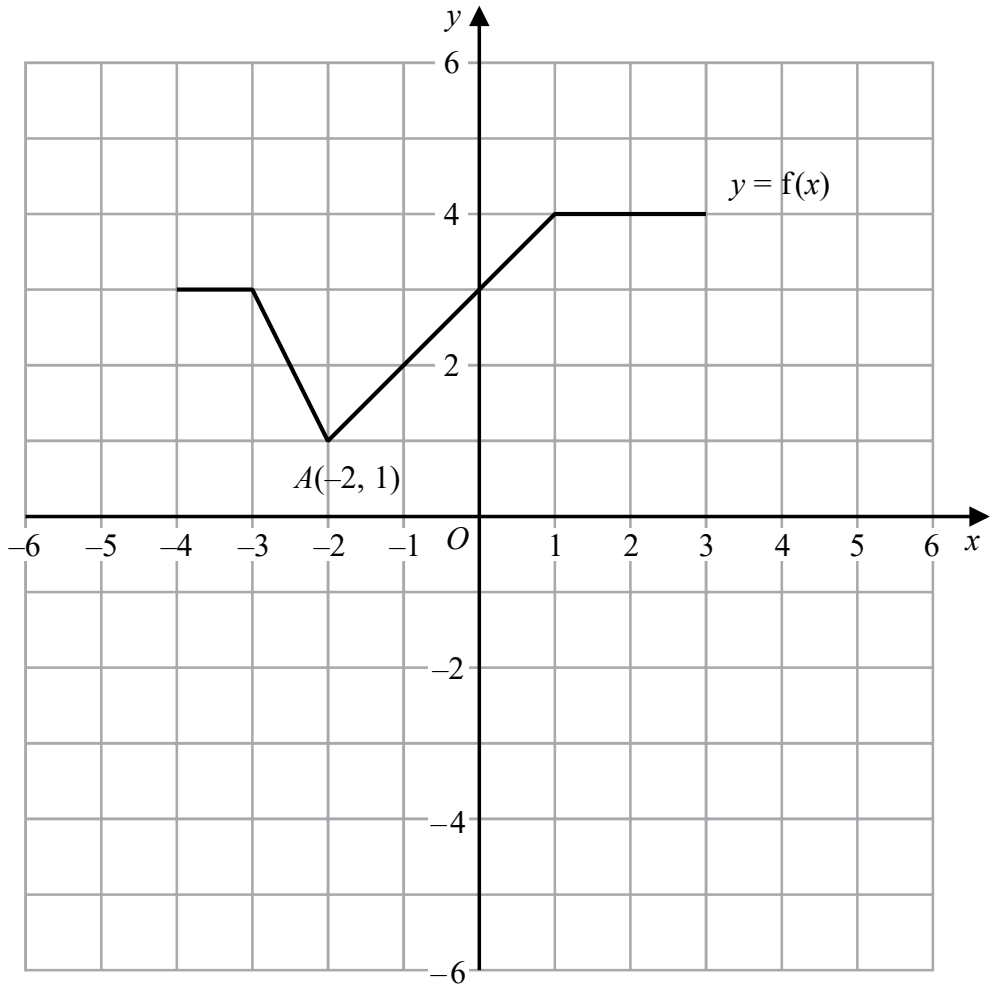
7 Given that $9^{-\frac{1}{2}} = 27^{\frac{1}{4}} \div 3^{x+1}$

find the exact value of x.

$x =$ .....

(Total for Question 7 is 3 marks)

8 The graph of $y = f(x)$ is shown on the grid.



(a) On the grid, draw the graph with equation $y = f(x + 1) - 3$

(2)

Point $A(-2, 1)$ lies on the graph of $y = f(x)$.

When the graph of $y = f(x)$ is transformed to the graph with equation $y = f(-x)$, point A is mapped to point B.

(b) Write down the coordinates of point B.

(..... , ...)

(1)

(Total for Question 8 is 3 marks)

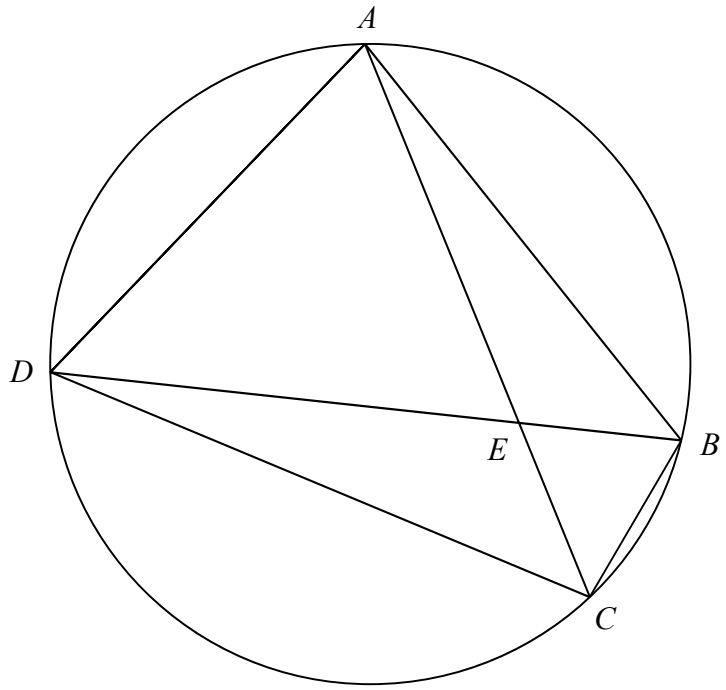
9 Sketch the graph of

$$y = 2x^2 - 8x - 5$$

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.



AEC and DEB are straight lines.

Triangle AED is an equilateral triangle.

Prove that triangle ABC is congruent to triangle DCB.

(Total for Question 10 is 4 marks)