



*Rewarding Learning*

ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2014

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## Mathematics

### Assessment Unit C1

*assessing*

### Module C1: AS Core Mathematics 1

[AMC11]

THURSDAY 22 MAY, MORNING

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#### TIME

1 hour 30 minutes.

#### INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number on the Answer Booklet provided.

Answer **all eight** questions.

Show clearly the full development of your answers.

Answers should be given to three significant figures unless otherwise stated.

**You are not permitted to use any calculating aid in this paper.**

#### INFORMATION FOR CANDIDATES

The total mark for this paper is 75

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

A copy of the **Mathematical Formulae and Tables booklet** is provided.

**Answer all eight questions.**

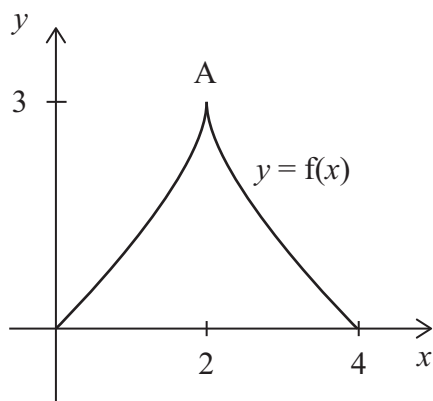
**Show clearly the full development of your answers.**

**Answers should be given to three significant figures unless otherwise stated.**

**You are not permitted to use any calculating aid in this paper.**

- 1 (a) Find the equation of the line which passes through the point  $(-3, 4)$  and is perpendicular to the line  $y = 7 - 2x$  [4]

- (b) Fig. 1 below shows a sketch of the graph of the function  $y = f(x)$



**Fig. 1**

Point A has coordinates  $(2, 3)$ .

Sketch, on separate diagrams, the graphs of:

- (i)  $y = 2f(x)$  [2]

- (ii)  $y = f(-x)$  [2]

clearly labelling the image of point A.

2 (a) Solve the simultaneous equations

$$\begin{aligned}2x + y + 3z &= 4 \\3x - y - 4z &= 5 \\x + 2y - 2z &= -6\end{aligned}$$

[7]

(b) Fig. 2 below shows a sketch of the curve with equation

$$y = q(x + p)^2$$

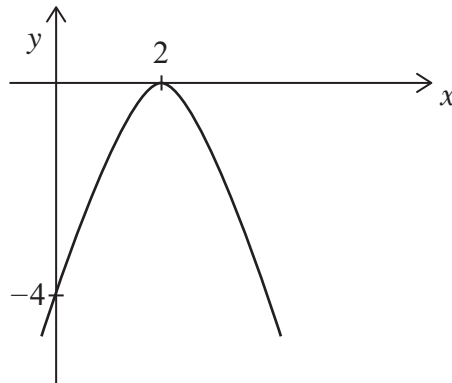


Fig. 2

Write down the values of  $p$  and  $q$ .

[2]

3 (a) Divide  $(x^3 - 3x^2 - 6x + 8)$  by  $(x + 2)$ , giving your answer as a product of linear factors.

[4]

(b) When the expression  $(3x^2 + 8ax - 12)$  is divided by  $(x - 2)$  the remainder is  $a^3$

Find the possible values of  $a$ .

[5]

4 (a) (i) Differentiate

$$x^3 - 6x^2 + 12x - 8 \quad [3]$$

(ii) Hence show that the curve

$$y = x^3 - 6x^2 + 12x - 8$$

has only one stationary point and determine its nature. [6]

(b) Find the range of values of  $x$  for which the function

$$f(x) = 4x + \frac{1}{x}$$

is increasing. [6]

5 (a) (i) Express

$$2x^2 - 8x + 1$$

in the form

$$a[(x - b)^2 - c] \quad [3]$$

(ii) Hence state the minimum value of

$$2x^2 - 8x + 1$$

and the value of  $x$  at which it occurs. [2]

(b) Solve

$$9^{x^2-1} = 27^{2x-1} \quad [6]$$

- 6 The height above the ground,  $h$  metres, of a football at time  $t$  seconds after it is kicked by a goalkeeper, can be modelled by the equation

$$h = -5t^2 + 20t + 0.5 \quad t \geq 0$$

Find the range of values of  $t$  for which the height of the ball above the ground is greater than 8 metres. [7]

- 7 Find the exact value of the gradient of the normal to the curve

$$y = 4 - 4x^{\frac{1}{2}} + x$$

at the point where  $x = 2$

Give your answer in the form  $a + b\sqrt{c}$ , where  $a$ ,  $b$  and  $c$  are positive integers. [10]

- 8 Show that there is no value of  $k$  such that the line

$$y - 1 = kx$$

is a tangent to the curve

$$y = x^2 \quad [6]$$

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**THIS IS THE END OF THE QUESTION PAPER**

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