



*Rewarding Learning*

ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2011

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## Mathematics

### Assessment Unit C1

*assessing*

### Module C1: AS Core Mathematics 1

[AMC11]

THURSDAY 26 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** The straight line

$$y = 5 - 2x$$

crosses the  $x$ -axis at the point A.

**(i)** Find the coordinates of A.

[1]

The straight line

$$3x + 5y = 15$$

crosses the  $y$ -axis at the point B.

**(ii)** Find the coordinates of B.

[1]

**(iii)** Find the equation of the line parallel to AB passing through the point  $(1, -5)$ .

[4]

**2** Solve the simultaneous equations

$$x + 2y + 3z = 2$$

$$x - y + 6z = 9$$

$$2x - y + 3z = 13$$

[7]

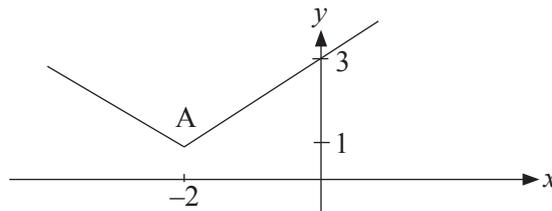
3 (a) Solve the equation

$$25^{x-1} = 5\sqrt{5} \quad [5]$$

(b) Simplify as far as possible

$$\frac{2 + \sqrt{5}}{3 - \sqrt{5}} + \frac{5}{3 + \sqrt{5}} \quad [5]$$

(c) The graph of the function  $y = f(x)$  is sketched in **Fig. 1** below.



**Fig. 1**

Point A has coordinates  $(-2, 1)$ .

Sketch the graph of  $y = -f(x)$  clearly labelling the image of point A. [2]

4 (a) Find the equation of the normal to the curve

$$y = 4x^2 - 2x^3 - 1$$

at the point where  $x = 2$  [7]

(b) If

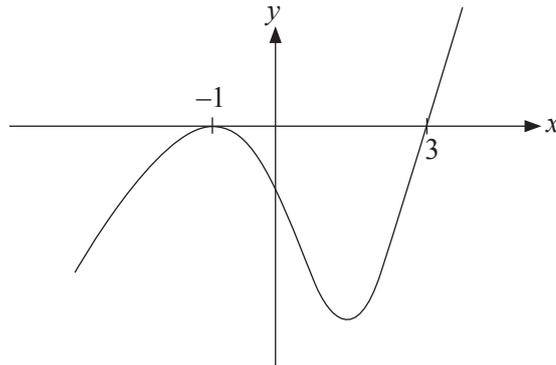
$$y = 8\sqrt{x}$$

show that [5]

$$\left[\frac{dy}{dx}\right]^2 + y\left[\frac{d^2y}{dx^2}\right] = 0$$

5 The diagram in **Fig. 2** below shows the curve with equation

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



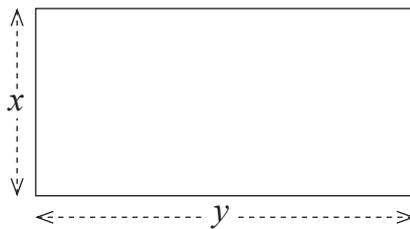
**Fig. 2**

(i) Write down the values of  $p$  and  $q$ . [3]

The curve crosses the  $y$ -axis at  $C$ .

(ii) Find the coordinates of  $C$ . [2]

6 The floor of a rectangular greenhouse has length  $x$  m and width  $y$  m, as shown in **Fig. 3** below.



**Fig. 3**

The floor has an area of  $16.5 \text{ m}^2$  and a perimeter of  $17 \text{ m}$ .  
Form two equations and solve them to find the dimensions of the floor of the greenhouse. [8]

7 Crisps are sold in packets in the shape of a **closed** cylinder, of radius  $r$  cm and height  $h$  cm. The surface area of the **closed** cylinder must be  $192\pi \text{ cm}^2$

(i) Write down an expression for  $h$  in terms of  $r$ . [3]

(ii) Show that the volume of the cylinder can be expressed as

$$V = 96\pi r - \pi r^3 \quad [3]$$

(iii) Find the dimensions of the cylinder which give the maximum volume. [7]

8 (a) Find the value of  $a$  for which

$$x^2 - 4x + a$$

is always positive. [4]

(b) Find the range of values  $k$  can take for

$$2x^2 + (k + 2)x - k = 0$$

to have two real distinct roots. [8]

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

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