Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2011

Mathematics

Assessment Unit C1

assessing

Module C1: AS Core Mathematics 1

[AMC11]

AMC11

THURSDAY 26 MAY, MORNING

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

$$\begin{aligned} x + 2y + 3z &= 2 \\ x - y + 6z &= 9 \\ 2x - y + 3z &= 13 \end{aligned}$$ [7]

3 **(a)** Solve the equation

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

(b) Simplify as far as possible

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

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

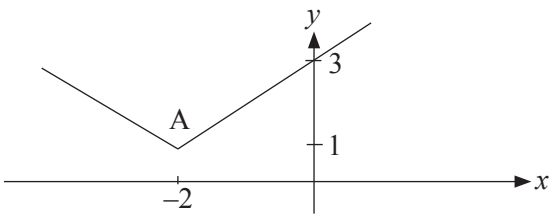

Fig. 1

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

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

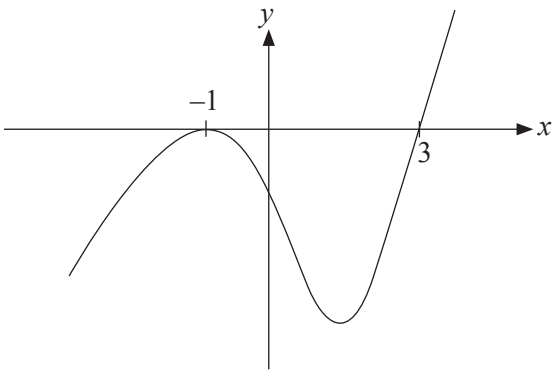

Fig. 2

(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.

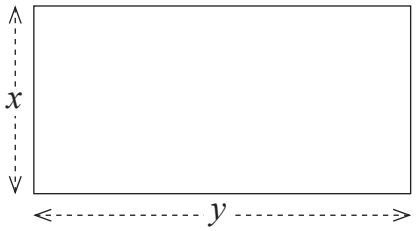

Fig. 3

The floor has an area of 16.5 m^2 and a perimeter of 17 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 192π 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

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

THIS IS THE END OF THE QUESTION PAPER