Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2014

Mathematics

Assessment Unit C1

assessing

Module C1: AS Core Mathematics 1

[AMC11]

MV18

THURSDAY 22 MAY, MORNING

TIME

1 hour 30 minutes, plus your additional time allowance.

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 at the end of each question indicate the marks awarded to each question or part question.
A copy of the **Mathematical Formulae and Tables booklet** is provided.

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(Questions start overleaf)

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 marks]

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

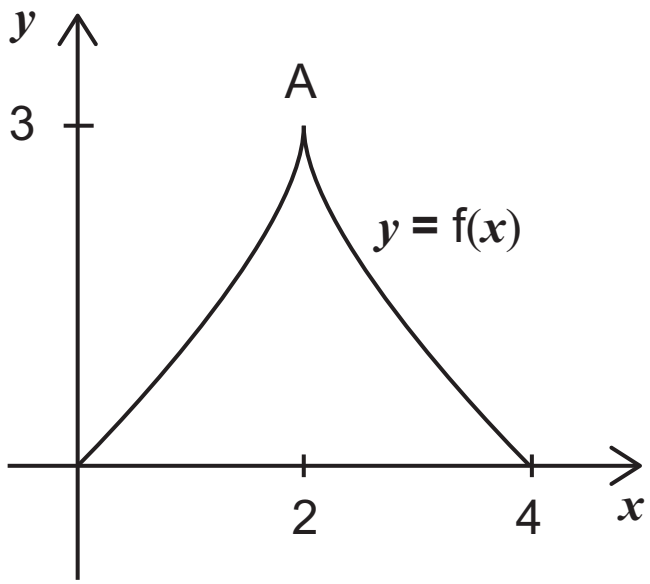

Fig. 1

Point A has coordinates (2, 3).
Sketch, on separate diagrams, the graphs of:

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

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

clearly labelling the image of point A.

2 **(a)** Solve the simultaneous equations [7 marks]

$$2x + y + 3z = 4$$
$$3x - y - 4z = 5$$
$$x + 2y - 2z = -6$$

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

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

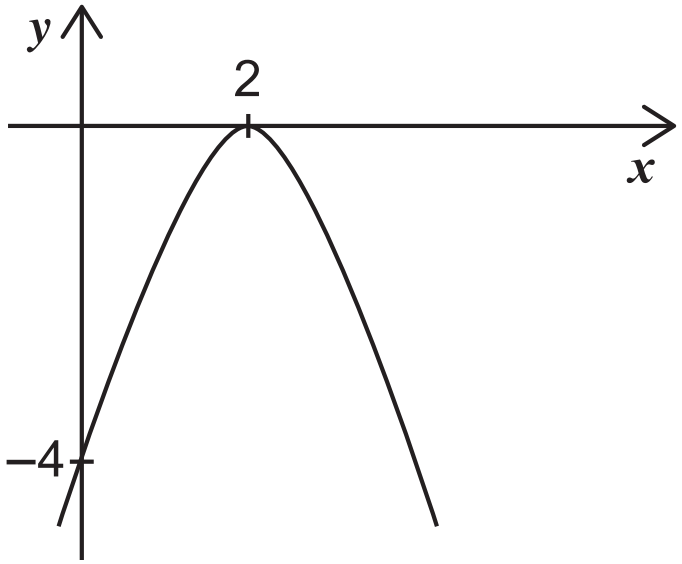

Fig. 2

Write down the values of p and q. [2 marks]

3 **(a)** Divide $(x^3 - 3x^2 - 6x + 8)$ by $(x + 2)$, giving your answer as a product of linear factors. [4 marks]

(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 marks]

4 **(a)** **(i)** Differentiate

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

(ii) Hence show that the curve

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

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

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

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

is increasing. [6 marks]

5 **(a)** **(i)** Express

$2x^2 - 8x + 1$

in the form

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

(ii) Hence state the minimum value of

$2x^2 - 8x + 1$

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

(b) Solve

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

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

$h = -5t^2 + 20t + 0.5 \qquad t \geqslant 0$

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

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 marks]

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

$$y - 1 = kx$$

is a tangent to the curve

$y = x^2$ [6 marks]

THIS IS THE END OF THE QUESTION PAPER