Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2012

Mathematics

Assessment Unit C1

assessing

Module C1: AS Core Mathematics 1

[AMC11]

AMC11

THURSDAY 24 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 **(a)** Simplify as far as possible

$$\frac{(x+5)(x-1)-x(x-6)}{2x-1}$$ [4]

(b) **Fig. 1** below shows a sketch of the graph of the function $y = \mathrm{f}(x)$

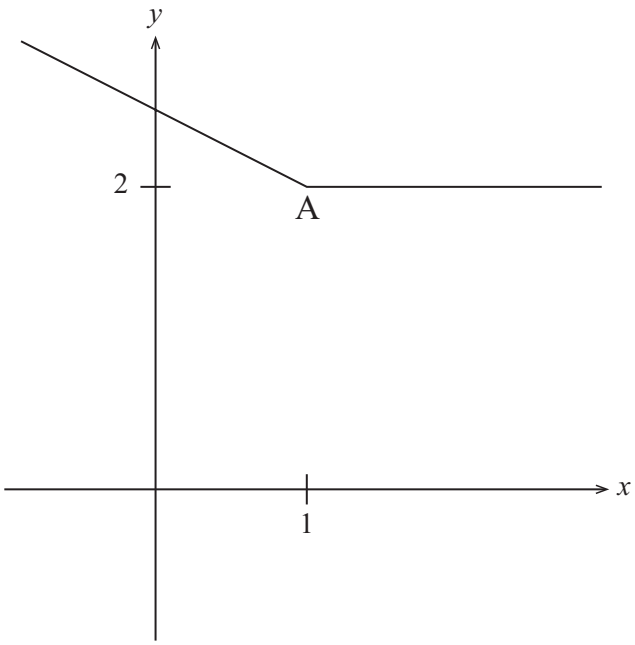

Fig. 1

Point A has coordinates (1, 2).

Sketch, on separate diagrams, the graphs of:

(i) $y = \mathrm{f}(x-1)$ [2]

(ii) $y = \mathrm{f}(-x)$ [2]

clearly labelling the image of the point A.

2 A stationery shop sells pencils, rulers and erasers.

The cost of a pencil is x pence.
The cost of a ruler is y pence.
The cost of an eraser is z pence.

Lesley bought 3 pencils, 2 rulers and 1 eraser.
She paid £1.80
Ben bought 4 pencils, 1 ruler and 1 eraser.
He paid £1.55
Daniel bought 5 pencils, 3 rulers and 1 eraser.
He paid £2.65

By forming and solving three simultaneous equations find the values of x, y and z. [9]

3 **(a)** A straight line passes through the points A $(-1, 1)$ and B $(5, 13)$.

(i) Find the gradient of AB. [2]

(ii) Hence find the equation of the line through A perpendicular to AB. [3]

(b) Find $\frac{dy}{dx}$ where

$$y = 4x^3 - x^{-\frac{1}{3}}$$ [2]

4 **Fig. 2** below shows a curve and straight line which meet at the points C and D.

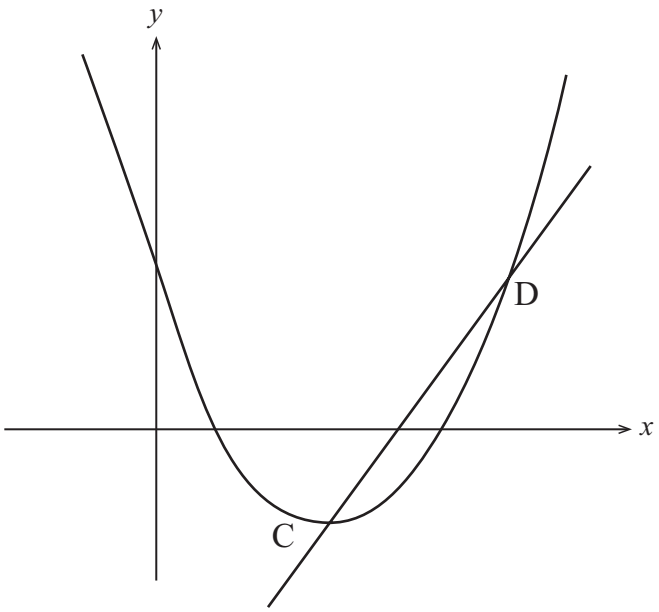

Fig. 2

The curve has equation $y = x^2 - 4x + 3$
The straight line has equation $y = 2x - 5$

(i) Find the coordinates of C and D. [5]

(ii) Hence find the **exact** length of CD. [3]

5 **(a)** If

$$f(x) = 2x^3 + 7x^2 + 2x - 3$$

(i) Show that $f(-1) = 0$ [1]

(ii) Hence factorise fully $f(x)$. [5]

(iii) Hence solve the equation

$$2x^3 + 7x^2 + 2x - 3 = 0$$ [3]

(b) The area of a triangle is $(9+2\sqrt{3})$ cm^2
The length of the base is $\sqrt{3}$ cm.
Find the perpendicular height of the triangle, giving your answer in the form $(a\sqrt{b} + c)$. [5]

6 A runner took part in a 30 km road race.
He ran the first 17 km at an average speed of x km h^{-1}
He ran the last 13 km at an average speed of $(x - 2)$ km h^{-1}
The total time taken to complete the race was 4 hours.

(i) Show that $2x^2 - 19x + 17 = 0$ [7]

(ii) Hence find his average speed for the first 17 km. [3]

7 **(a)** A curve has equation

$$y = x^4 + 32x$$

(i) Find $\frac{dy}{dx}$ [2]

(ii) Hence find the x coordinate of the turning point on the curve and determine its nature. [4]

(b) The cost £C and the time t minutes of manufacture of an electrical component are connected by the formula

$$C = \frac{12}{t} + \frac{3t^2}{4} \qquad t > 0$$

Find the time during which the cost is increasing. [5]

8 A curve has equation

$$y = x^2 - 4x + 6$$

A second curve has equation

$$y = 5 + mx - x^2$$

The curves do not meet.

Find the range of possible values of m. [8]

THIS IS THE END OF THE QUESTION PAPER