Rewarding Learning

Centre Number

Candidate Number

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2018

Mathematics

Assessment Unit C1

assessing

Module C1:
AS Core Mathematics 1

[AMC11]

AMC11

MONDAY 14 MAY, MORNING

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer **all eight** questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen**.
Questions which require drawing or sketching should be completed using an H.B. pencil.
All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions. **Answers without working may not gain full credit**.
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.
Throughout the paper the logarithmic notation used is $\ln z$ where it is noted that $\ln z \equiv \log_e z$

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

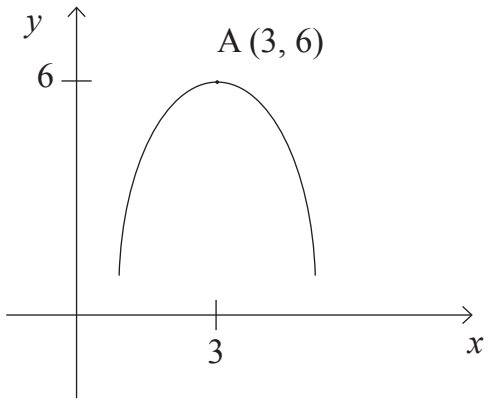


Fig. 1

Point A has coordinates (3, 6).

Sketch, on the axes opposite, the graphs of:

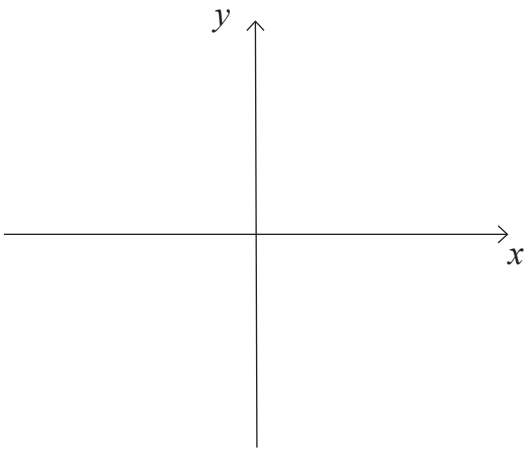
(i) $y = f(x) + 1$ [2]

(ii) $y = \frac{1}{3}f(x)$ [2]

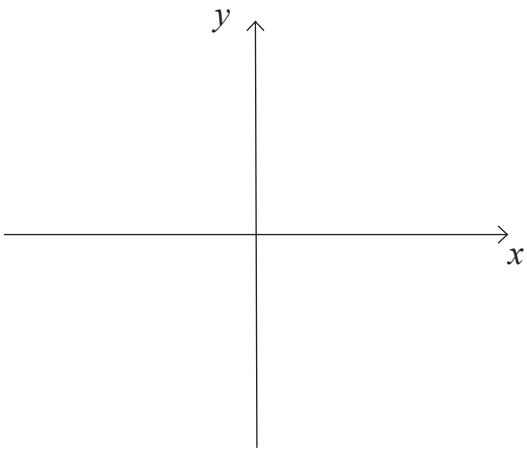
(iii) $y = f(-x)$ [2]

clearly labelling the image of the point A.

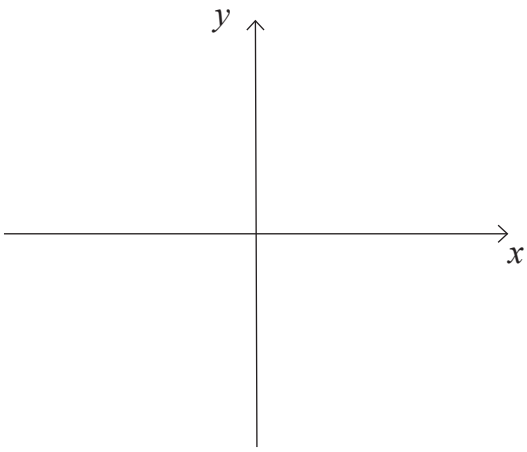
(i)



(ii)



(iii)



[Turn over

2 Point A has coordinates (7, −2)
Point B has coordinates (1, 10)

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

(ii) Hence find the equation of the line AB. [2]

The line AB cuts the x-axis at the point P.

(iii) Find the exact distance BP. [3]

3 **(a)** Solve the simultaneous equations

$$y - 2x = 5$$

$$x^2 + 4y = 5$$ [6]

(b) Solve

$$8^x \times \left(\frac{1}{32}\right)^{1-x} = 1$$

[6]

4 f(x) is the expression $x^3 + x^2 + px + q$
f(x) has a factor $(x - 3)$
When f(x) is divided by $(x + 1)$ the remainder is -32

(i) Find the values of p and q. [6]

(ii) Hence solve the equation $f(x) = 0$ [3]

[Turn over

5 **(a)** Differentiate

$$7 + 6\sqrt{x} - \frac{2}{5x^2}$$ [3]

(b) Find the equation of the normal to the curve

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

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

[Turn over

6 An indoor sports centre has two artificial pitches modelled as the two adjacent rectangles shown in **Fig. 2** below.

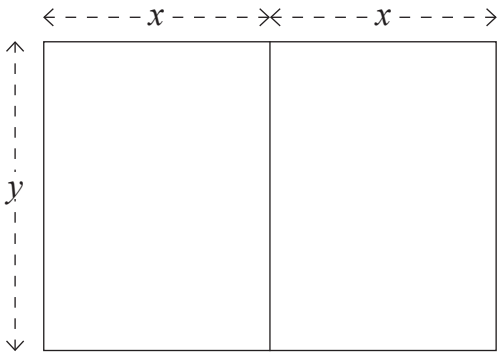


Fig. 2

Each pitch is x metres wide and y metres long.
Fencing surrounds each pitch with one fence shared.
The length of fencing used is 240 m.

(i) Express y in terms of x. [2]

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(ii) Show that the total area of the pitches can be expressed as

$$A = 160x - \frac{8x^2}{3} \qquad [3]$$

(iii) Hence find the values of x and y for which the total area of the pitches

$$A = 160x - \frac{8x^2}{3}$$

is a maximum. [6]

7 The plan for the landscaping of a rectangular plot of land is shown in **Fig. 3** below.

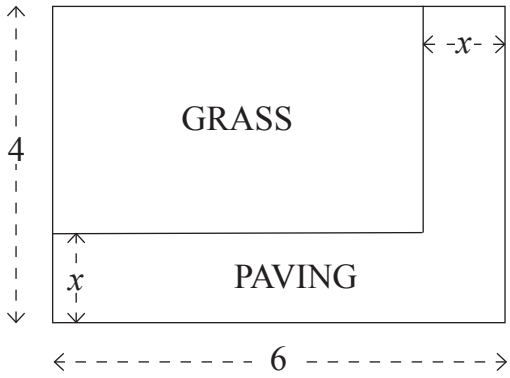

Fig. 3

The plot of land is 6 metres long and 4 metres wide.
Paving, x metres wide, runs along two of the sides.
The area of grass must be greater than the area of paving.

(i) Show that $x^2 - 10x + 12 > 0$ [4]

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(ii) Hence find the range of values within which the width of the paving must lie. [5]

8 **(a)** A quadratic equation is of the form

$$(x - p)(x - q) = m^2$$

where p, q and m are non-zero constants.

Show that the equation will always have real roots. [6]

[Turn over

(b) Show that

$$\frac{a-1}{a+\sqrt{a}} \qquad [a > 0]$$

can be written in the form $1 - a^y$, stating the value of y. [5]

THIS IS THE END OF THE QUESTION PAPER

DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

Examiner Number