IYGB GCE

Core Mathematics C1

Advanced Subsidiary

Practice Paper H

Difficulty Rating: 3.4333/1.5584

Time: 1 hour 30 minutes

Calculators may NOT be used in this examination.

Information for Candidates

This practice paper follows the Edexcel Syllabus.
The standard booklet "Mathematical Formulae and Statistical Tables" may be used.
Full marks may be obtained for answers to ALL questions.
The marks for the parts of questions are shown in round brackets, e.g. **(2)**.
There are 11 questions in this question paper.
The total mark for this paper is 75.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled.
You must show sufficient working to make your methods clear to the Examiner.
Answers without working may not gain full credit.
The examiner may refuse to mark any parts of questions if deemed not to be legible.

Question 1

$$f(x) = x^2 - 6x + 7,\ x \in \mathbb{R}.$$

a) Express $f(x)$ in the form $(x+a)^2 + b$, where a and b are integers. **(2)**

b) Hence find the exact coordinates of the points where the graph of $f(x)$ meets the x axis. **(3)**

Question 2

It is given that that for some constants a, b and c

$$\frac{2\sqrt{2}}{\sqrt{3}-1} - \frac{2\sqrt{3}}{\sqrt{2}+1} \equiv a\sqrt{2} + b\sqrt{3} + c\sqrt{6}.$$

Find the value of a, the value of b and the value of c. **(5)**

Question 3

Use an algebraic method to show that the graphs

$$y = 1 - x \text{ and } y = x^2 - 6x + 10,$$

do **not** intersect. **(4)**

Question 4

The curve C has equation

$$y = x^3 - 9x .$$

a) Sketch the graph of C. **(4)**

b) Hence sketch on a separate diagram the graph of

$$y = (x+2)^3 - 9(x+2). \quad \textbf{(2)}$$

Each of the two sketches must include the coordinates of all the points where the curve meets the coordinate axes.

Question 5

Determine the range of values of x that satisfy **both** the inequalities given below.

$$6 - 2(7 - 3x) \geq 8 - (3x + 7)$$

$$(2x - 3)(x + 4) < x(x + 6). \quad \textbf{(8)}$$

Question 6

A sequence $x_1,\ x_2,\ x_3,\ x_4, \ldots$ is given by

$$x_{n+1} = \frac{a + 2x_n}{x_n}, \quad x_1 = 2,$$

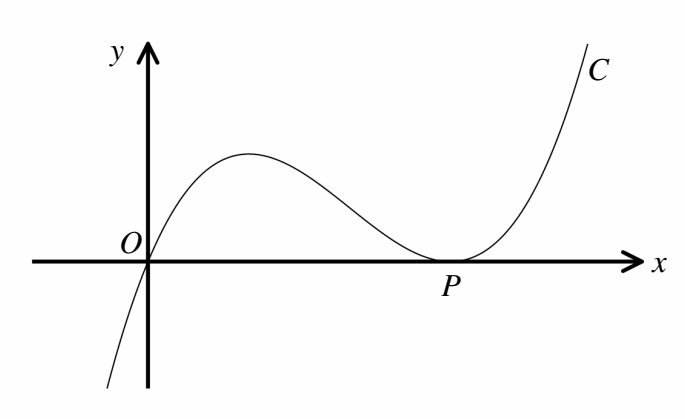
where a is a non zero constant.

a) Find a simplified expression for x_3 in terms of a. **(4)**

It is given that $x_3 = 12$.

b) Determine the value of a. **(2)**

Question 7



The figure above shows the cubic curve C which meets the coordinates axes at the origin O and at the point P.

The gradient function of C is given by

$$f'(x) = 3x^2 - 8x + 4 .$$

a) Find an equation for C. **(6)**

b) Determine the coordinates of P. **(2)**

Question 8

The curve C has equation

$$y = ax^2 - 4\sqrt{x} + \frac{8}{x} \ , \ x > 0 ,$$

where a is a non zero constant.

Given that $\frac{dy}{dx} = 0$ at the point on C where $x = 4$, find the value of a. **(6)**

Question 9

A length of rope is wrapped neatly around a circular pulley.

The length of the rope in the first coil (the nearest to the pulley) is 60 cm, and each successive coil of rope (outwards) is 3.5 cm longer than the previous one.

The outer coil has a length of 144 cm.

Show that total length of the rope is 25.5 metres. **(7)**

Question 10

The curve C and the straight line L have equations

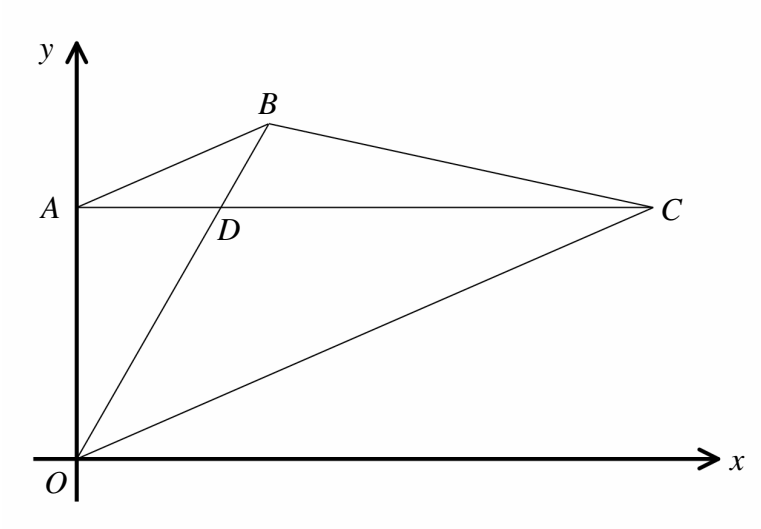
$$C:\ y = x^2 - 10x + 23 \quad \text{and} \quad L:\ y = \frac{1}{2}x - 3.$$

a) Find an equation of the tangent to C at the point P where $x = 4$. **(5)**

b) Determine the coordinates of the points of intersection between L and C. **(5)**

c) Show that L is a normal to C. **(2)**

Question 11



The figure above shows a trapezium $OABC$, where O is the origin, whose side AB is parallel to the side OC.

The diagonal AC is horizontal and the points A and B have coordinates $(0,6)$ and $(8,8)$, respectively.

The diagonals of the trapezium meet at the point D.

Show by direct area calculations that the area of the triangle BCD is equal to the area of the triangle OAD.

(8)