IYGB GCE

Core Mathematics C1

Advanced Subsidiary

Practice Paper V

Difficulty Rating: 3.8000/1.8182

Time: 2 hours

Calculators may NOT be used in this examination.

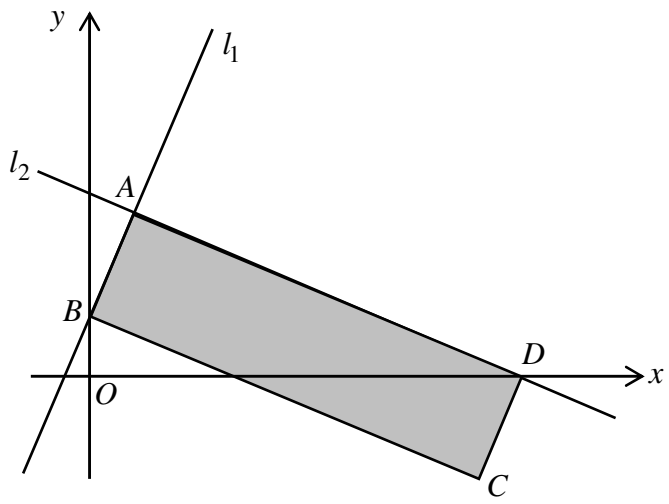
Information for Candidates

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 9 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



The straight line l_1 has equation

$$3x-2y+6=0,$$

and crosses the y axis at the point B.

a) Find the gradient of l_1. **(2)**

The straight line l_2 intersects l_1 at the point $A(2,6)$ and crosses the x axis at the point D.

b) Given that $\angle BAD = 90°$, find an equation of l_2. **(3)**

The point C is such so that $ABCD$ is a rectangle, as shown in the figure above.

c) Calculate the area of the rectangle $ABCD$. **(5)**

Question 2

The gradient function at every point on a curve C is given by

$$\frac{dy}{dx} = (kx - 3)\sqrt{x},$$

where k is a non zero constant.

The point $P(4, 40)$ lies on C and the gradient at P is 34.

Determine an equation of C. **(8)**

Question 3

a) Simplify fully each of the following expressions, writing the final answer as a single simplified surd.

i. $\left(2 + \sqrt{3}\right)\left(2\sqrt{3} - 3\right)$. **(2)**

ii. $\dfrac{\sqrt{6} + 3\sqrt{2}}{\sqrt{6} + \sqrt{2}}$. **(3)**

b) Solve the equation

$$8w^{\frac{1}{2}} - w^{-1} = 0, \quad w \neq 0. \qquad \textbf{(4)}$$

Question 4

$$f(x) \equiv 5x^2 - 30x + 50,\ x \in \mathbb{R}.$$

a) Express $f(x)$ in the form $a(x+b)^2 + c$, where a, b and c are constants. **(3)**

b) Hence write down the minimum value of $f(x)$. **(1)**

The point A has coordinates $(5,6)$.

The variable point B has coordinates $(x, 2x+1)$.

c) Show clearly that

$$|AB|^2 = 5x^2 - 30x + 50.$$ **(3)**

d) Use part (b) to determine the shortest distance between A and B. **(1)**

e) Hence write down the coordinates of B when the distance between A and B is shortest. **(2)**

Question 5

A sequence $y_1, y_2, y_3, y_4, y_5, y_6 \ldots$ is given by

$$y_{n+2} = y_{n+1} + 2y_n, \quad y_1 = 1, \quad y_2 = 5.$$

a) Find the value of y_3, y_4, y_5 and y_6. **(3)**

b) Find a simplified expression for the n^{th} term of the sequence, by considering the first few powers of 2. **(2)**

Question 6

$$f(x) \equiv \sqrt{8x^3 - 15}\,,\ x \geq \frac{\sqrt[3]{15}}{8}.$$

a) Describe the geometric transformation which maps the graph of $f(x)$ onto the graph of $\sqrt{x^3 - 15}$. **(3)**

The graph of $g(x)$ is a translation of $f(x)$ by the vector $\begin{bmatrix} 1 \\ 15 \end{bmatrix}$.

b) Evaluate $g(3)$. **(3)**

Question 7

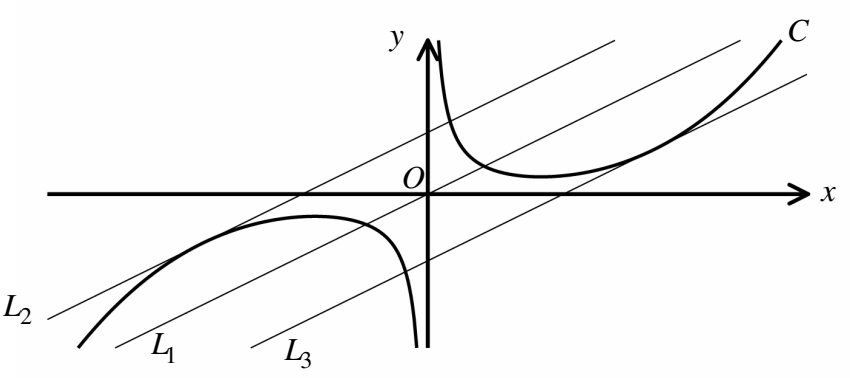
$$x^2 - 4ax + 2b + 1 = 0.$$

The above quadratic equation, where a and b are constants, has no real solutions.

Show clearly that

$$b > \frac{1}{2}(2a+1)(2a-1). \quad \textbf{(4)}$$

Question 8



The figure above shows the curve C with equation

$$y = \frac{2x^4 - x + 6}{6x}, \ x \neq 0 .$$

The straight line L_1 has equation $4y = 15x$.

The straight lines L_2 and L_3 are tangents to C.

Given that L_1, L_2 and L_3 are parallel to one another, determine an equation of L_2 and an equation of L_3. **(12)**

Question 9

The first four terms of an arithmetic series are

$$2, \ (2b + 3c), \ (b - 3c + 1) \text{ and } (4b + 5c),$$

respectively, where b and c are a constants.

Show that the sum of the first thirty terms of the series is 1365. **(11)**
