IYGB GCE

Core Mathematics C1

Advanced Subsidiary

Practice Paper I

Difficulty Rating: 3.2133/1.4354

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 12 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 curve C has equation

$$y = -x^2 + 8x - 7 .$$

a) Express $x^2 - 8x + 7$ in the form $(x+a)^2 + b$, where a and b are constants. **(2)**

b) Hence write down the coordinates of the **maximum** point of C. **(2)**

c) Sketch the graph of C, indicating clearly all the points where C meets the coordinate axes. **(3)**

Question 2

Solve the simultaneous equations

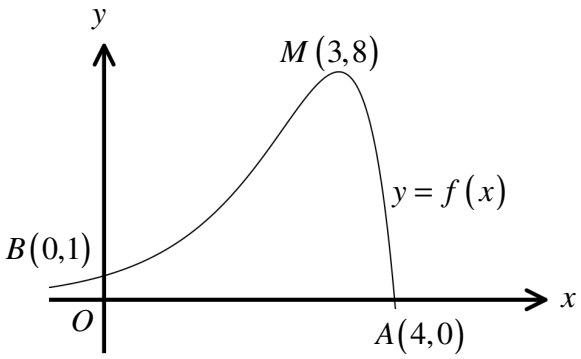
$$x^2 - 3xy + y^2 = 11$$
$$3y - x = 1 \qquad \textbf{(6)}$$

Question 3

The figure below shows the graph of the curve with equation $y = f(x)$.

The curve crosses the x axis at $A(4,0)$, the y axis at $B(0,1)$.

The curve has a maximum at $M(3,8)$.



Sketch on separate diagrams the graph of …

a) … $y = f(3x)$. **(2)**

b) … $y = f(x+3)$. **(2)**

Each sketch must include the coordinates of any points where the graph crosses the coordinate axes and the new coordinates of the maximum point of the curve.

Question 4

$$z\sqrt{8} - 6 = \frac{2z}{\sqrt{2}}.$$

Solve the above equation giving your answer in the form $k\sqrt{2}$, where k is an integer.

(3)

Question 5

The straight line L passes through the points $A(-1,-14)$ and $B(3,-2)$.

a) Find an equation for L, giving the answer in the form $y = mx + c$. **(3)**

The point C has coordinates $(-100,-312)$.

b) Determine, by calculation, whether C lies above L or below L. **(2)**

Question 6

A curve has the following equation.

$$f(x) = 4x\sqrt{x} - \frac{25x^2}{16},\ x \geq 0.$$

a) Find a simplified expression for $f'(x)$. **(3)**

b) Determine an equation of the tangent to the curve at the point where $x = 4$, giving the answer in the form $ax + by = c$, where a, b and c are integers. **(6)**

Question 7

The sum of the first n terms of the sequence 50, 53, 56, 59, ... is denoted by S_n.

The sum of the first n terms of the sequence 200, 198, 196, 194, ... is denoted by T_n.

Find the smallest value of n so that $S_n > T_n$. **(6)**

Question 8

$$f(x) = x^2 - 2mx - 5 \text{, where } m \text{ is a constant.}$$

a) **Without** attempting a solution, show that the equation $f(x) = 0$ has two distinct real roots for all possible values of the constant m. **(3)**

b) Find, in terms of m and in fully simplified form, the roots of the equation

$$f(x) = 0. \quad \textbf{(3)}$$

Question 9

A sequence $u_1, u_2, u_3, u_4, u_5, \ldots$ is given by

$$u_{n+2} = u_{n+1} + 6u_n, \quad u_1 = 1, \quad u_2 = 13.$$

a) Find the value of u_3, the value of u_4 and the value of u_5. **(3)**

b) Find a simplified expression for the n^{th} term of the above sequence by considering the first few terms of the sequence shown below

$$3-2,\ 9+4,\ 27-8,\ 81+16,\ 243-32, \ldots \quad \textbf{(3)}$$

Question 10

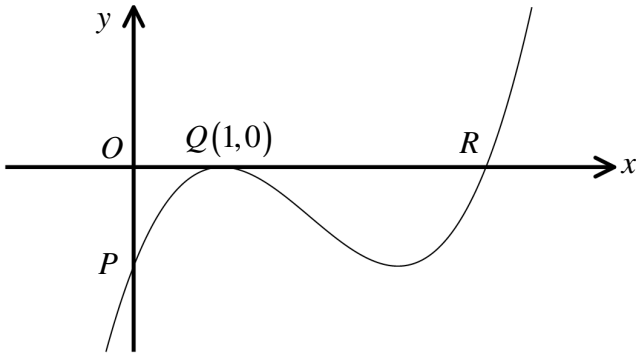
The cost for framing a picture is

- 2 pence per cm^2 of glass.
- 5 pence per cm of wooden frame.

A rectangular picture is such so that its length is 4 cm greater than its width, x cm.

If a **maximum** of £10 is available for framing, determine the range of the possible values of x. **(8)**

Question 11



The figure above shows the graph of a cubic curve, which touches the x axis at the point $Q(1,0)$.

a) Determine an equation for the cubic curve , given its gradient function is

$$\frac{dy}{dx} = 3x^2 - 12x + 9 . \qquad \textbf{(6)}$$

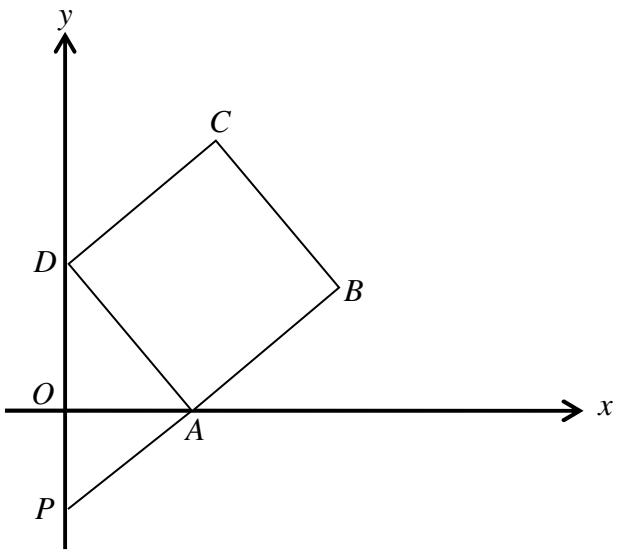
The cubic curve crosses the x axis and the y axis at the points R and P, respectively.

b) Determine the coordinates …

i. … of the point P. **(1)**

ii. … of the point R. **(1)**

Question 12



The figure above shows the square $ABCD$, where the vertices of A and D lie on the x axis and the y axis, respectively.

The point P lies on the y axis so that PAB is a straight line.

Given that the equation of the straight line through A and D is $y+2x=6$, show clearly that the distance PD is 7.5 units. **(7)**