IYGB GCE

Core Mathematics C1

Advanced Subsidiary

Practice Paper D

Difficulty Rating: 3.2867/1.4742

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

Simplify fully

$$\left(\sqrt{8}+\sqrt{50}\right)\left(\sqrt{24}+\sqrt{54}\right). \qquad (3)$$

Question 2

Evaluate the following indicial expression, giving the final answers as an exact simplified fraction.

$$\left(36^{\frac{1}{2}}+16^{\frac{1}{4}}\right)^{-\frac{2}{3}}. \qquad (3)$$

Question 3

$$f(x)=3x^2+12x+8,\ x\in\mathbb{R}.$$

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

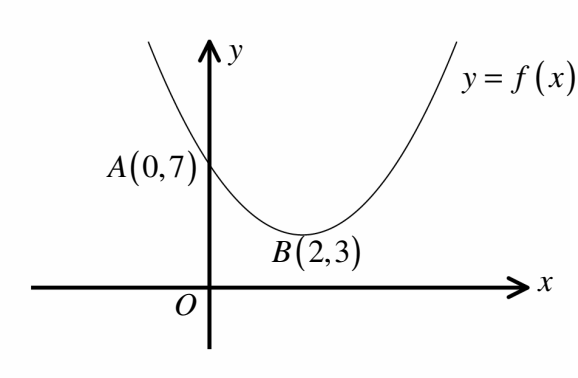
b) State the minimum value of $f(x)$. **(1)**

c) Solve the equation $f(x)=0$, giving the answers as exact simplified surds. **(3)**

Question 4

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

The curve meets the y axis at $A(0,7)$ and has a minimum point at $B(2,3)$.



Sketch on separate diagrams the graph of …

a) … $y = f(x+2)$. **(2)**

b) … $y = f(x)-3$. **(2)**

c) … $y = f(2x)$. **(2)**

Each sketch must include the coordinates of any points where the graph meets the coordinate axes and the new coordinates of the point B.

Question 5

The curve C has equation

$$y = -x^2(x+1),\ x \in \mathbb{R}.$$

The curve meets the coordinate axes at the origin O and at the point A.

a) Sketch the graph of C, indicating clearly the coordinates of A. **(3)**

b) Show that the straight line with equation

$$x + y + 1 = 0,$$

is a tangent to C at A. **(4)**

Question 6

A recurrence relation is defined for $n \geq 1$ by

$$u_{n+1} = a + \frac{1}{2}u_n,\quad u_1 = 520,$$

where a is a non zero constant. **(5)**

a) Given that $u_4 = 72$, find the value of a.

b) Given further that $u_{10} = 9$, find the value of u_9. **(2)**

Question 7

The roof of a museum has a sloping shape with the roof tiles arranged neatly in horizontal rows. There are 28 roof tiles in the top row and each row below the top row has an extra 4 tiles than the row above it.

The bottom row has 96 tiles.

Show that there are 1116 tiles on the roof of the museum. **(7)**

Question 8

The curve C with equation $y = f(x)$ satisfies

$$f'(x) = -\frac{4}{x^2},\ x \neq 0.$$

a) Given that $f(1) = 2$, find an expression for $f(x)$. **(5)**

b) Sketch the graph of $f(x)$, indicating clearly the asymptotes of the curve and the coordinates of any points where the curve crosses the coordinate axes. **(3)**

Question 9

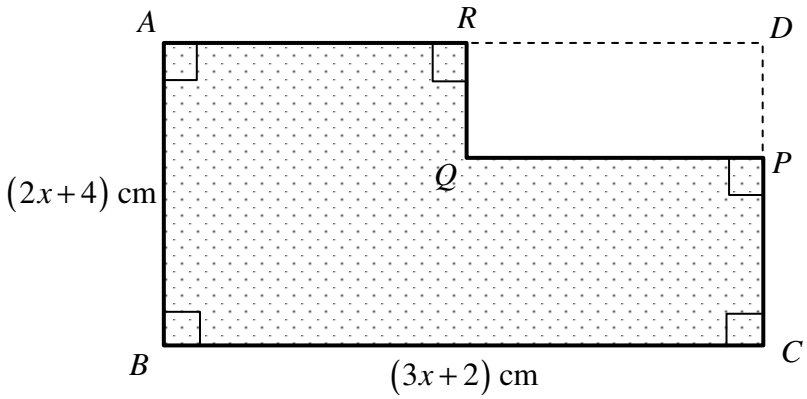
The quadratic curves with equations

$$y = k\left(2x^2 + 1\right) \quad \text{and} \quad y = x^2 - 2x,$$

where k is a constant, **touch** each other.

Determine the possible values of k. **(7)**

Question 10



A rectangle $ABCD$ measures $(3x+2)$ cm by $(2x+4)$ cm.

A second rectangle $PQRD$ is removed from the rectangle $ABCD$, as shown in the figure above. The perimeter of the composite shape $ABCPRQ$ is greater than 27 cm but less than 52 cm.

a) Find the range of the possible values of x. **(4)**

The area of the rectangle $PQRD$ is $4x$ cm^2.

b) Given further that the area of the composite shape $ABCPRQ$ is less than 98 cm^2, determine an amended range of the possible values of x. **(6)**

Question 11

The straight line l passes through the point $A(3,4)$ and has gradient $\frac{1}{2}$.

a) Find an equation of l, giving the answer in the form $y = mx + c$, where m and c are constants. **(2)**

b) Show that $B(-3,1)$ also lies on l. **(1)**

c) Calculate, in exact surd form, the distance of AB. **(2)**

The point P lies on l and has x coordinate p, where p is a constant.

d) Given that the distance AP is $\sqrt{125}$, determine the possible values of p. **(5)**