IYGB GCE

Core Mathematics C1

Advanced Subsidiary

Practice Paper K

Difficulty Rating: 2.9800/1.3245

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

Find the coordinates of any points of intersection between the graphs of

$$y = x^2 - 4x + 2 \quad \text{and} \quad y = -x^2 - 8x\,. \qquad (4)$$

Question 2

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

$$u_{n+1} = (3 - u_n)^2, \quad u_1 = 4\,.$$

a) Find the value of $u_2,\ u_3$ and u_4. (3)

b) State the value of u_{10}. (1)

Question 3

$$\frac{2+y}{y} = \sqrt{2}\,.$$

Solve the above equation giving the answer in the form $a + b\sqrt{2}$, where a and b are integers. (5)

Question 4

$$f(x) = x^2 + 4x + 12,\ x \in \mathbb{R}\,.$$

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

b) Determine the greatest value of $\dfrac{1}{f(x)}$. (1)

Question 5

Solve each of the following inequalities.

a) $4(4-2x)<30$. **(3)**

b) $x+3\left(x^2-4x+2\right)>0$. **(5)**

Question 6

Evaluate the following expression, showing clearly all the steps in the calculation.

$$\sum_{r=1}^{20}(3r+10). \quad \textbf{(4)}$$

Question 7

The straight line l_1 passes through the points $A(1,2)$ and $B(7,-2)$.

a) Determine an equation for l_1, giving the answer in the form $ax+by=c$, where a, b and c are integers. **(4)**

The straight line l_2 passes through B and is perpendicular to l_1.

b) Find. in simplified form, an equation for l_2. **(3)**

l_2 meets the straight line with equation $x=1$ at the point C.

c) Calculate the area of the triangle ABC. **(4)**

Question 8

Sketch on separate diagrams the curve with equation …

a) … $y = x^2(x+3)$. **(3)**

b) … $y = (x-k)^2(x-k+3)$, where k is a constant such that $k > 3$. **(3)**

Both sketches must include the coordinates, in terms of k where appropriate, of any points where each of the curves meets the coordinate axes.

Question 9

Consider the arithmetic series below

$$77 + 80 + 83 + ... + 500.$$

a) Find the sum of the arithmetic series. **(5)**

b) Calculate the sum of the even terms of the series. **(2)**

Question 10

$$y = \left(\frac{2x+1}{3x^2}\right)^2, \ x > 0.$$

a) Express y in the form $Ax^{-2} + Bx^{-3} + Cx^{-4}$, where A, B and C are fractions to be found. **(4)**

b) Hence determine simplified expressions for …

i. … $\frac{dy}{dx}$. **(2)**

ii. … $\int y \, dx$ **(3)**

Question 11

The quadratic equation

$$x^2 + 2mx + 3x + m^2 = 0, \text{ where } m \text{ is a constant,}$$

has equal roots.

Find the value of m. **(5)**

Question 12

The curve C has equation

$$y = 4x^3 - 7x - 1, \ x \in \mathbb{R}.$$

The point A lies on C where $x = 1$.

a) Find an equation of the tangent to C at A. **(4)**

The tangent to C at A meets C again at the point B.

b) Find the coordinates of B. **(5)**