IYGB GCE

Core Mathematics C2

Advanced Subsidiary

Practice Paper C

Difficulty Rating: 2.8400/1.2658

Time: 1 hour 30 minutes

Candidates may use any calculator allowed by the Regulations of the Joint Council for Qualifications.

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 10 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.
Non exact answers should be given to an appropriate degree of accuracy.
The examiner may refuse to mark any parts of questions if deemed not to be legible.

Question 1

a) Find, in ascending powers of x, the first four terms in the binomial expansion of $(2+x)^9$. **(5)**

b) Hence find the coefficient of x^3 in the expansion of

$$\left(1-\frac{1}{8}x\right)^2(2+x)^9 \ . \qquad \textbf{(3)}$$

Question 2

The values of y, for a curve with equation $y=f(x)$, have been tabulated below.

x	1	2.25	3.5	4.75	6
y	9	17	25	21	13

Use the trapezium rule with all the values from the above table to find an estimate for the integral

$$\int_1^6 f(x)\ dx \, . \qquad \textbf{(4)}$$

Question 3

$$f(x) \equiv 3x^3 - 2x^2 - 12x + 8 \, .$$

a) Find the remainder when $f(x)$ is divided by $(x-4)$. **(2)**

b) Given that $(x-2)$ is a factor of $f(x)$ solve the equation $f(x)=0$. **(5)**

Question 4

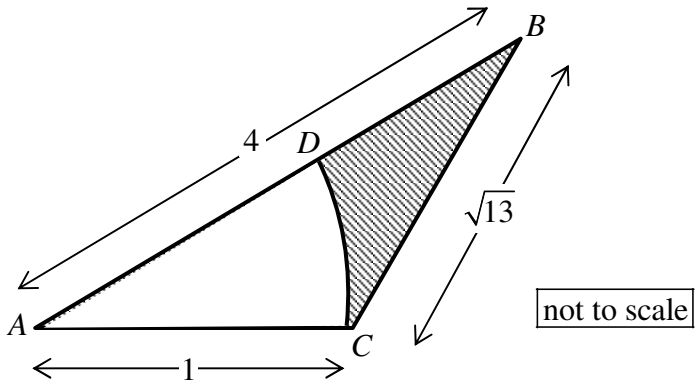
A circle has its centre at $C(-1,2)$.

The points $A(-4,3)$ and $B(0,5)$ lie on this circle **(4)**

a) Find an equation for the circle.

b) Determine an equation of the straight line which passes through C and bisects the chord AB. **(4)**

Question 5



The figure above shows the triangle ABC, where $|AB| = 4$, $|AC| = 1$ and $|BC| = \sqrt{13}$.

a) Show that $\angle BAC = \frac{\pi}{3}$. **(3)**

A circular sector ACD, where D lies on AB, is drawn inside the triangle ABC.

The centre of the sector is at A and its radius is 1.

b) Determine the area of the shaded region BCD. **(5)**

Question 6

Solve the following logarithmic equation for x.

$$2\log_a x = \log_a 18 + \log_a (x-4)\,. \qquad (5)$$

Question 7

$$f(x) = -x^3 + 9x^2 - 15x - 13\,,\ x \in \mathbb{R}\,.$$

a) Find the coordinates of the stationary points of $f(x)$. (5)

b) Determine the nature of each of the two stationary points found in part (a). (3)

c) Hence find the range of values of x for which $f(x)$ is decreasing. (2)

Question 8

Solve, in **degrees**, the following trigonometric equation

$$\sin 3x = \sin 48°\,,\quad 0 \le x < 180\,. \qquad (5)$$

Question 9

A steamboat uses 5 tonnes of coal to cover a standard journey designed for tourists.

Due to the engines becoming less efficient, the steamboat requires in each journey 2% more coal than the previous journey.

a) Calculate, in tonnes correct to three decimal places, …

i. … the amount of coal the steamboat will use on the tenth journey. **(3)**

ii. … the total amount of coal the steamboat will use in the first ten journeys. **(2)**

The company that owns the steamboat has stocked up with 360 tonnes of coal and plans to use all the coal during a single tourist season.

b) Assuming that in the first journey the steamboat used 5 tonnes of coal, and the consumption of coal increased by 2% in each subsequent journey, show clearly that

$$1.02^n \leq 2.44,$$

where n is the total number of journeys during a single tourist season. **(3)**

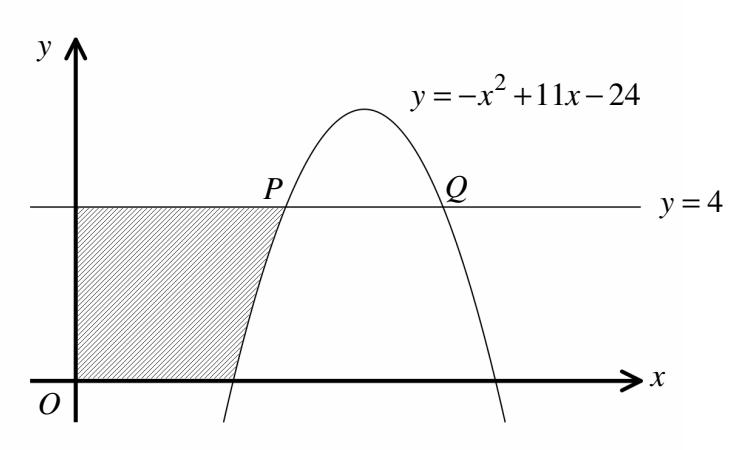
c) Hence, or otherwise, determine the maximum number of journeys that the steamboat can make a single tourist season. **(3)**

Question 10

The diagram below shows a parabola and a straight line with respective equations

$$y = -x^2 + 11x - 24 \quad \text{and} \quad y = 4 .$$

The points P and Q are the intersections between the parabola and the straight line.



Find the exact area of the shaded region, bounded by the curve, the coordinate axes and the straight line with equation $y = 4$. **(9)**