IYGB GCE

Core Mathematics C2

Advanced Subsidiary

Practice Paper M

Difficulty Rating: 3.5533/1.6349

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 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.
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 the value of each of the constants a, b and c so that

$$6x^3 - 7x^2 - x + 2 \equiv (x-1)\left(ax^2 + bx + c\right). \quad \textbf{(3)}$$

b) Hence solve the equation

$$6x^3 - 7x^2 - x + 2 = 0. \quad \textbf{(3)}$$

Question 2

A circle has equation

$$x^2 + y^2 - 8x + 6y = 0$$

a) Find the coordinates of the centre of the circle. **(2)**

b) Determine the radius of the circle. **(2)**

The points A, B and C lie on the circle so that $|AB| = 10$ and $|BC| = 5$.

c) Find the distance of AC, giving the answer in the form $k\sqrt{3}$, where k is a positive integer. **(2)**

Question 3

Solve the following trigonometric equation in the range given.

$$\frac{\sin x - \cos x}{\cos x} = 2, \quad 0° \le x < 360°. \quad \textbf{(5)}$$

Question 4

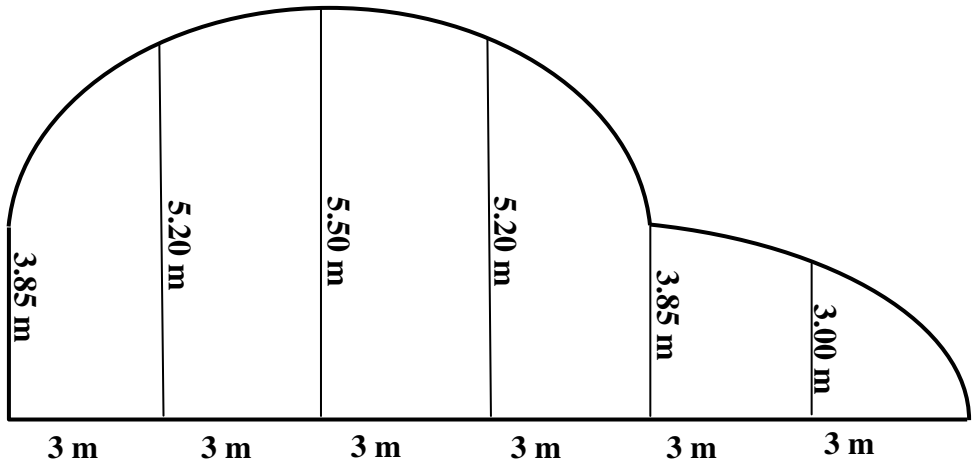
The curve C has equation

$$y = x^3 - 6x^2 + 12x - 5 .$$

Find the coordinates of the stationary point of C and use a clear method to determine its nature.

(8)

Question 5



The figure above shows the cross section of a tunnel.

The height of the tunnel, in metres, from one end directly across to the other end, is recorded at 3 metre intervals.

Use the trapezium rule to estimate the cross sectional area of the tunnel. **(4)**

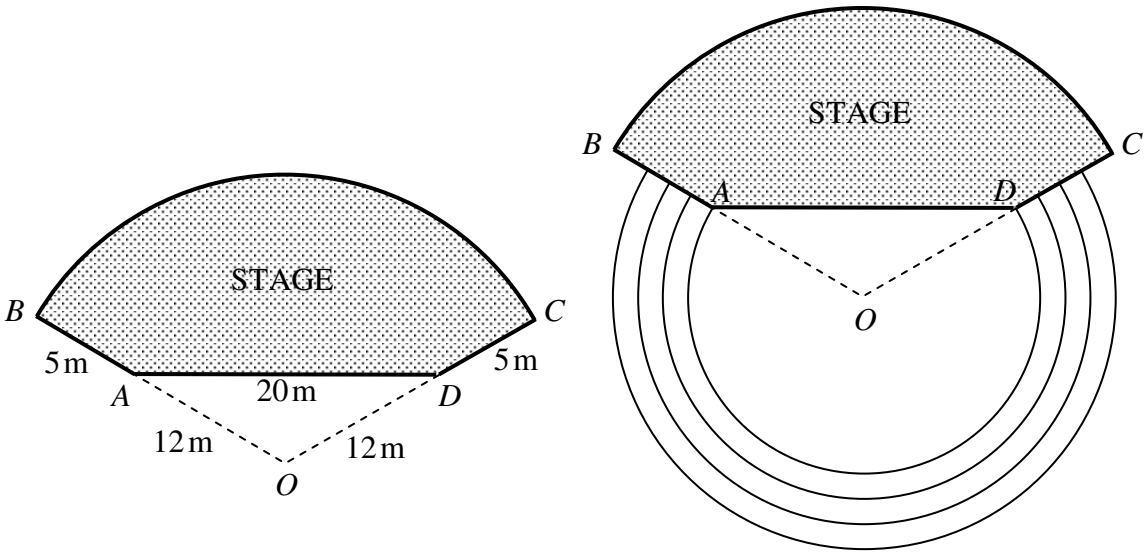
Question 6

Solve each of the following exponential equations, giving the final answers correct to 3 significant figures.

a) $5^{2x-1} = 4^{300}$. **(3)**

b) $2^{y+1} = \dfrac{10}{2^y}$. **(5)**

Question 7



The two diagrams above show an orchestral stage $ABCD$ which is part of a circular sector OBC, centred at O and of radius 17 m. The points A and D lie on OB and OC respectively so that $|OA| = |OD| = 12$ m and $|AD| = 20$ m.

a) Show that $\measuredangle BOC = 1.97$, correct to three significant figures. **(3)**

b) Calculate the area of the stage. **(4)**

There are 4 rows of seats with their backs arranged in concentric circles, centred at O. The radii of these circles are 12 m, 13.1 m, 14.2 m and 15.3 m.

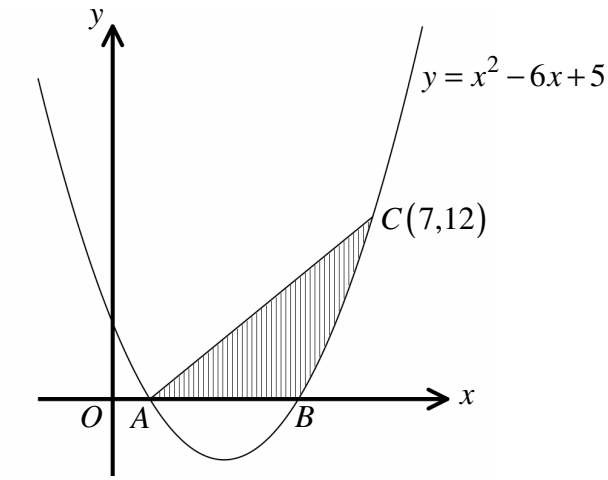
c) Given further that each seat requires a length of 82 cm along the arc, find approximately how many more seats are in the back row than in the front row. **(5)**

Question 8

The sum of £33500 is to be divided into three shares, so that the three shares form the terms of a geometric progression.

Given that the value of the smallest share is £2000, calculate the largest of the three shares. **(6)**

Question 9



The diagram above shows the curve with equation

$$y = x^2 - 6x + 5.$$

The point $C(7,12)$ lies on the curve while A and B are the points of intersection of the curve and the x axis.

Find the exact area of the shaded region, bounded by the curve, the straight line segment AC and the x axis. **(8)**

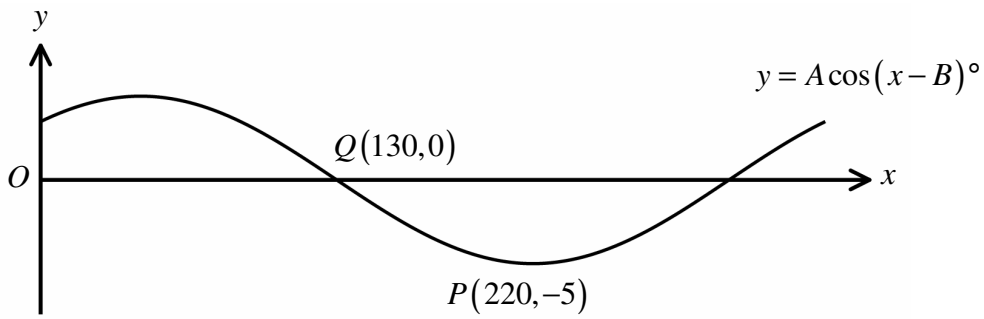
Question 10

$$(1+ax)^n = 1-30x+405x^2+bx^3+\ldots,$$

where a and b are constants, and n is a positive integer.

Determine the value of n, a and b. **(8)**

Question 11



The figure above shows the graph of the curve with equation

$$y = A\cos(x-B)^\circ,\ 0 \le x \le 360,$$

where A and B are positive constants with $0 < B < 90$.

The graph meets the x axis at point $Q(130,0)$ and the point $P(220,-5)$ is the minimum point of the curve.

a) State the value of A and the value of B. **(2)**

The graph of $y = A\cos(x-B)^\circ$ can also be expressed in the form $y = C\sin(x+D)^\circ$, where C and D are positive constants with $0 < D < 90^\circ$.

b) State the value of C and the value of D. **(2)**
