IYGB GCE

Core Mathematics C2

Advanced Subsidiary

Practice Paper W

Difficulty Rating: 3.8467/1.8576

Time: 2 hours

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

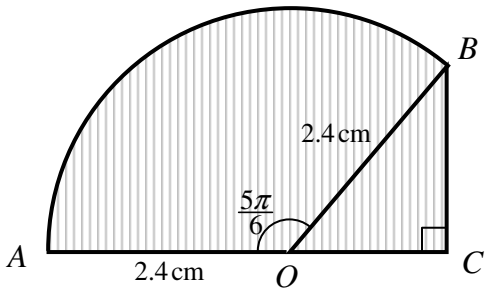
Information for Candidates

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



not drawn accurately

The figure above shows a composite shape.

The composite shape consists of a circular sector AOB centred at O, where it subtends an angle of $\frac{5\pi}{6}$ radians.

The straight sides of the sector have length of 2.4 cm. The triangle OBC is right angled at C and is attached to the sector so that AOC is a straight line.

Find, to two decimal places, the area of the composite shape. **(7)**

Question 2

$$y = \frac{x^2 + 4}{4x},\ x \neq 0.$$

Find the range of values of x for which y is increasing. **(7)**

Question 3

The first and the second term of a geometric series add up to 240.

The first and the third term of the same geometric series add up to 200.

Determine the two possible values of the sum to infinity of the series. **(9)**

Question 4

Solve the following trigonometric equation in the range given.

$$8\tan^2 x \sin x = \cos x, \quad 0 \le x < 2\pi .$$

Give the answers in radians correct to two decimal places. **(6)**

Question 5

$$f(x) \equiv x^3 - 2x^2 - x - 6, \ x \in \mathbb{R}.$$

a) Use the factor theorem to show that $(x-3)$ is a factor of $f(x)$. **(2)**

b) Hence express $f(x)$ as the product of a linear and a quadratic factor. **(2)**

The curve C has equation

$$y = 3x^4 - 8x^3 - 6x^2 - 72x + 240.$$

c) Show that C has a single stationary point, and determine its coordinates and its nature. **(8)**

Question 6

Find the coefficient of x^{11} in the binomial expansion of

$$\left(\frac{9}{2x} - \frac{2x^2}{3}\right)^{13}.$$ **(3)**

Question 7

The population P of a certain town in time t years is modelled by the equation

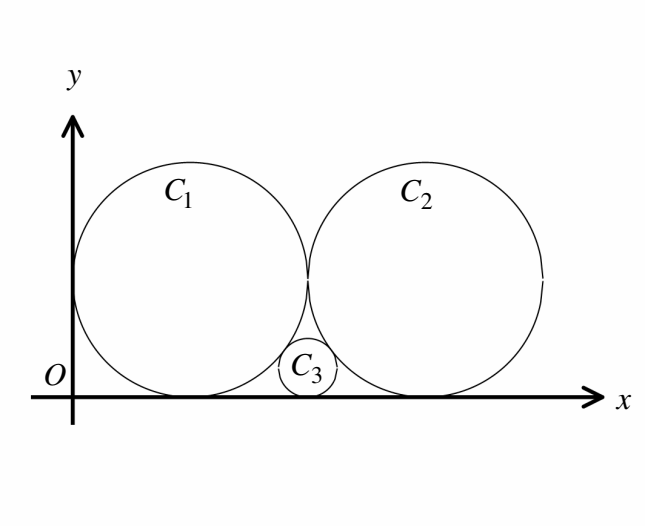
$$P = A \times 10^{kt},\ t \geq 0,$$

where A and k are non zero constants.

When $t = 3$, $P = 19000$ and when $t = 6$, $P = 38000$.

Find the value of A and the value of k, correct to 2 significant figures. **(6)**

Question 8



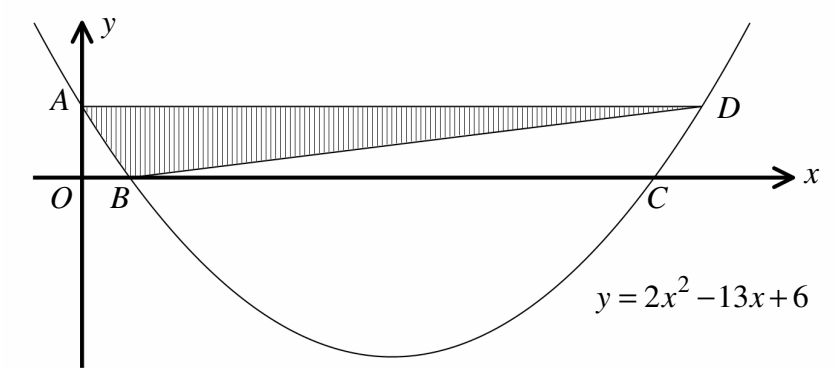
The figure above shows three circles C_1, C_2 and C_3.

The coordinates of the centres of all three circles are positive.

- The circle C_1 has centre at $(6,6)$ and **touches** both the x axis and the y axis.
- The circle C_2 has the same size radius as C_1 and **touches** the x axis.
- The circle C_3 **touches** the x axis and **both** C_1 and C_2.

Determine an equation of C_3. **(7)**

Question 9



The figure above shows the curve with equation

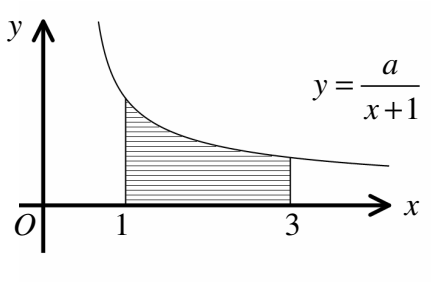
$$y = 2x^2 - 13x + 6 .$$

The points A, B and C are the points where the curve meets the coordinate axes.

The point D is such so that the straight line segment AD is parallel to the x axis.

Find the exact area of the shaded region, bounded by the curve and the straight line segments BD and AD. **(10)**

Question 10



The figure above shows part of the curve C with equation

$$y = \frac{a}{x+1},$$

where a is a positive integer.

When the trapezium rule with 5 equally spaced strips is used, the area bounded by C, the x axis and the vertical straight lines with equations $x = 1$ and $x = 3$, is approximated to 701.2 square units.

a) Determine the value of a. **(5)**

b) By considering suitable graph transformation, find an approximate value of

$$\int_{0.5}^{1.5} \frac{5a}{2x+1}\, dx. \quad \textbf{(3)}$$