IYGB GCE

Core Mathematics C2

Advanced Subsidiary

Practice Paper E

Difficulty Rating: 3.2067/1.4320

Time: 1 hour 30 minutes

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

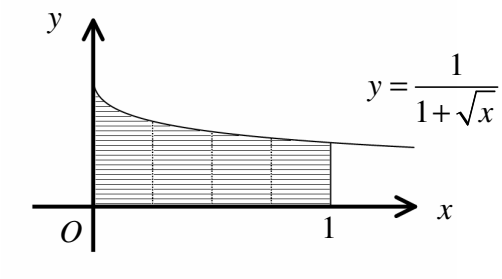
Information for Candidates

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 9 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



The figure above shows part of the curve C with equation

$$y = \frac{1}{1+\sqrt{x}}, \ x \geq 0 .$$

It is required to estimate the area of the shaded region which is bounded by C, the coordinate axes and the straight line with equation $x = 1$.

Use the trapezium rule with 4 equally spaced strips to estimate the area of this region, giving the answer correct to 3 decimal places. **(5)**

Question 2

The maximum speed, in mph, that can be achieved in each of the five gears of a sports car form a geometric progression.

The maximum speed obtained in first gear is 32 mph while the car can achieve a maximum speed of 162 mph in fifth gear.

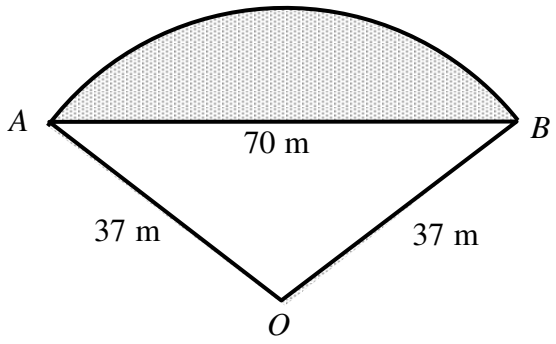
Find the maximum speed that can be achieved in third gear. **(4)**

Question 3

$$y = x^3 - 6x^2 + 12, \ x \in \mathbb{R} .$$

Find the range of values of x for which y is decreasing. **(5)**

Question 4



The figure above shows a circular sector OAB, subtending an angle of θ radians at its centre O.

The radius of the sector is 37 m and the length of the **chord** AB is 70 m.

a) Show that θ is approximately 2.481 radians. **(3)**

b) Calculate …

i. … the length of the **arc** AB. **(2)**

ii. … the shortest distance from O to the **chord** AB. **(2)**

iii. … the area of the circular segment, shown shaded in the figure. **(4)**

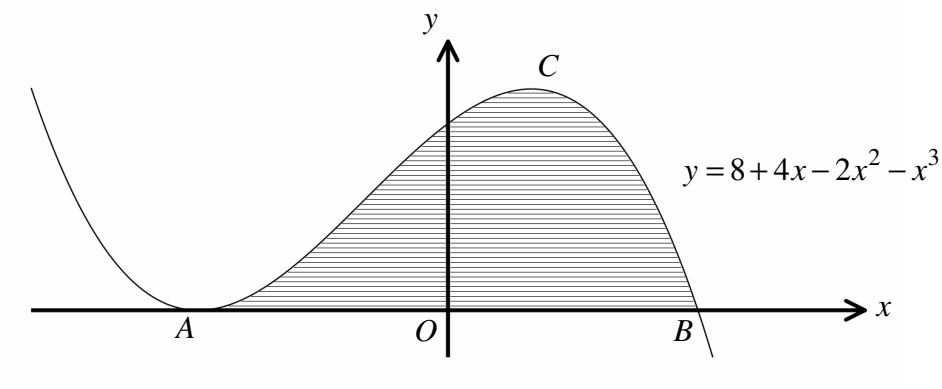
Question 5

It is given that if k is a non zero constant, then

$$(2+kx)^6 \equiv a+bx+bx^2+cx^3+...$$

Determine the value of each of the constants a, b and c. **(7)**

Question 6



The figure above shows part of the curve with equation

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

The curve meets the x axis at A and B.

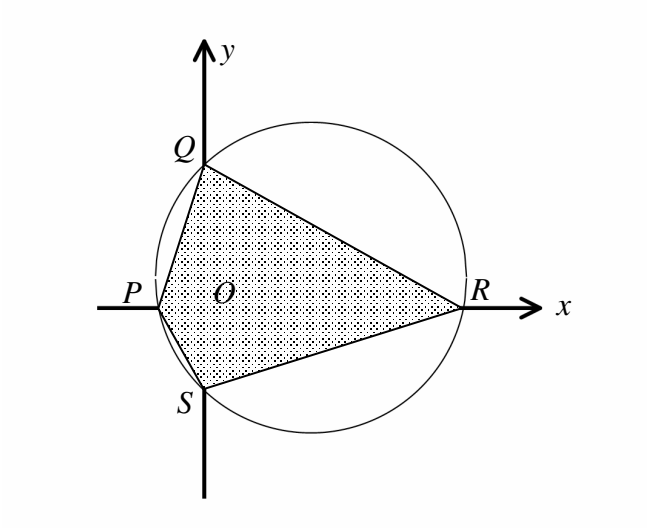
a) Verify that the coordinates of A are $(-2,0)$ and hence use algebra to show that the coordinates of B are $(2,0)$. **(5)**

The point C is a stationary point of the curve.

b) Use calculus to determine the exact coordinates of C. **(5)**

c) Find the exact area of the finite region bounded by the curve and the x axis. **(5)**

Question 7



The figure above shows a circle with centre at $C(7,2)$.

The circle meets the x axis at the points P and R, and the y axis at the points Q and S.

a) Given that $R(17,0)$, find an equation of the circle. **(4)**

b) Show that

$$|QS| = 2\sqrt{55}\,.$$ **(4)**

c) Determine the area of the quadrilateral $PQRS$. **(5)**

Question 8

Solve the following logarithmic equation

$$\log_3 8 - 3\log_3 t = 3\,.$$ **(5)**

Question 9

$$f(x) = x^3 - 4x^2 - \frac{1}{2}x + 2\,,\ x \in \mathbb{R}\,.$$

a) Show that $(x-4)$ is a factor of $f(x)$. **(2)**

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

c) Hence solve the trigonometric equation

$$\cos^3\theta - 4\cos^2\theta - \frac{1}{2}\cos\theta + 2 = 0\,,$$

for $0° \le \theta < 360°$. **(6)**