IYGB GCE

Core Mathematics C2

Advanced Subsidiary

Practice Paper I

Difficulty Rating: 3.3000/1.4815

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

By showing clear workings, find the value of

$$\int_1^9 6\sqrt{x} - \frac{6}{\sqrt{x}}\, dx\,. \qquad (\mathbf{4})$$

Question 2

$$f(x) \equiv 2x^3 - 7x^2 - 5x + 4$$

a) Find the remainder when $f(x)$ is divided by $(x+2)$. $(\mathbf{2})$

b) Use the factor theorem to show that $(x-4)$ is a factor of $f(x)$. $(\mathbf{2})$

c) Factorize $f(x)$ completely. $(\mathbf{3})$

Question 3

The first and second term of a geometric series is 90 and 15, respectively.

a) State the common ratio of the series. $(\mathbf{1})$

b) Calculate the sum to infinity of the series. $(\mathbf{2})$

Question 4

$$f(x) \equiv x^3 - 5x^2 + 3x + 1,\ x \in \mathbb{R}\,.$$

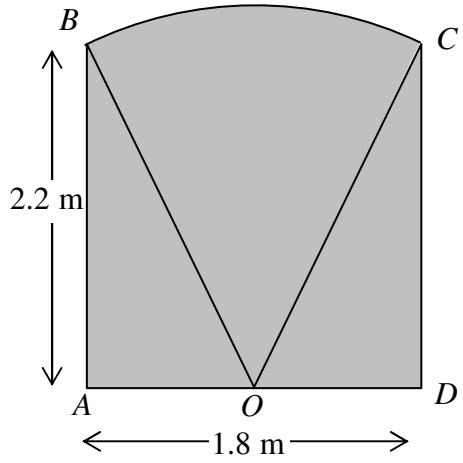
Find the range of values of x, for which $f(x)$ is decreasing. $(\mathbf{6})$

Question 5

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

$$3\sin^2 3x - 7\cos 3x = 5, \quad 0° \le x < 180°. \qquad (\mathbf{8})$$

Question 6



The figure above shows a design of a door.

The door design consists of two congruent right angled triangles ABO and DCO where $\measuredangle BAO = \measuredangle CDO = 90°$, and a circular sector BOC centred at O, where O is the midpoint of AD.

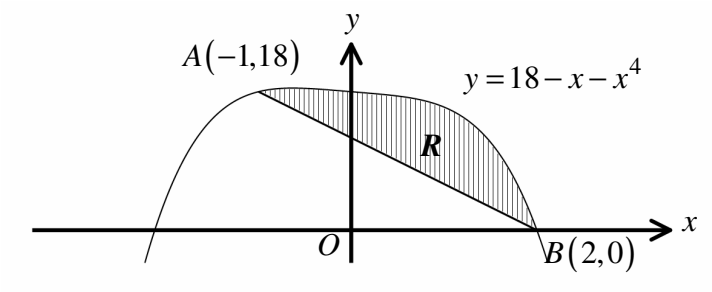
a) Show that the angle BOC is approximately 0.7766 radians. $(\mathbf{4})$

b) Hence determine …

i. … the perimeter of the door design. $(\mathbf{4})$

ii. … the area of the door design. $(\mathbf{3})$

Question 7



The figure above shows the curve C with equation

$$y = 18 - x - x^4.$$

The curve crosses the x axis at $B(2,0)$ and the point $A(-1,18)$ lies on C.

The shaded region R is bounded by the curve and the straight line segment AB.

Find the area of the shaded region. **(6)**

Question 8

Given that k is a non zero constant and n is a positive integer, then

$$(1+kx)^n \equiv 1 + 40x + 120k^2x^2 + \ldots$$

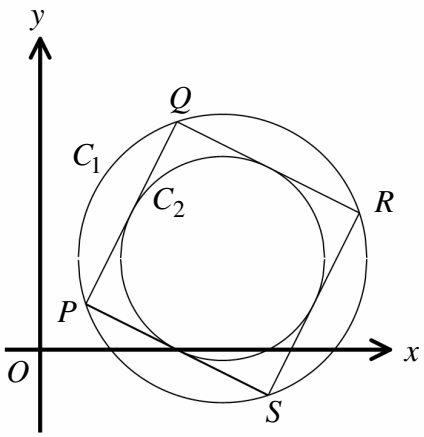
Find the value of k and the value of n. **(6)**

Question 9

Solve the following logarithmic equation

$$\log_4 x - \log_{16}(x-4) = 1.$$ **(8)**

Question 10



The figure above shows a square $PQRS$ with vertices at the points $P(1,1)$, $Q(3,5)$, $R(7,3)$ and $S(5,-1)$.

The square is circumscribed by the circle C_1.

a) Determine the coordinates of the centre of C_1 and the size of its radius. **(3)**

A circle C_2 is inscribed in the square $PQRS$.

b) Find an equation of the circle C_2. **(4)**

Question 11

The curve C has equation

$$y = x^3 + ax^2 + bx - 10,$$

where a and b are constants.

The curve has two stationary points P and Q.

Given the coordinates of P are $(-1,-5)$, find the coordinates of Q and use $\frac{d^2y}{dx^2}$ to determine its nature. **(9)**
