

GCE Examinations
Advanced / Advanced Subsidiary

Core Mathematics C2

Paper A

Time: 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Answer **all** the questions.
- Give non-exact numerical answers correct to 3 significant figures, unless a different degree of accuracy is specified in the question or is clearly appropriate.
- You are permitted to use a graphic calculator in this paper.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is 72.
- **You are reminded of the need for clear presentation in your answers.**

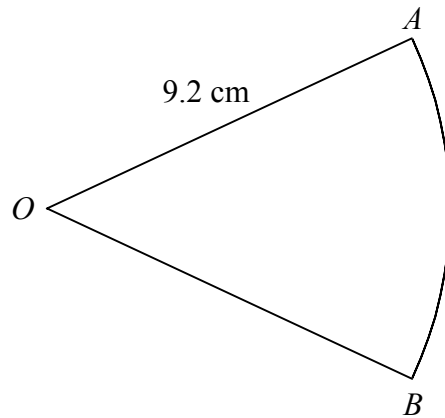


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1.



The diagram shows the sector OAB of a circle of radius 9.2 cm and centre O .

Given that the area of the sector is 37.4 cm^2 , find to 3 significant figures

- (i) the size of $\angle AOB$ in radians, [2]
(ii) the perimeter of the sector. [2]

2.

$$f(x) = x^3 + kx - 20.$$

Given that $f(x)$ is exactly divisible by $(x + 1)$,

- (i) find the value of the constant k , [2]
(ii) solve the equation $f(x) = 0$. [4]

3. Given that

$$\frac{dy}{dx} = 3\sqrt{x} - x^2,$$

and that $y = \frac{2}{3}$ when $x = 1$, find the value of y when $x = 4$. [7]

4. A geometric progression has third term 36 and fourth term 27.

Find

- (i) the common ratio, [2]
(ii) the fifth term, [2]
(iii) the sum to infinity. [4]

5. (i) Solve the equation

$$\log_2 (6 - x) = 3 - \log_2 x. \quad [4]$$

- (ii) Find the smallest integer n such that

$$3^{n-2} > 8^{250}. \quad [4]$$

6. $f(x) = \cos 2x, \quad 0 \leq x \leq \pi.$

- (i) Sketch the curve $y = f(x)$. [2]

- (ii) Write down the coordinates of any points where the curve $y = f(x)$ meets the coordinate axes. [3]

- (iii) Solve the equation $f(x) = 0.5$, giving your answers in terms of π . [3]

7. (i) Find

$$\int \left(x + 5 + \frac{3}{\sqrt{x}} \right) dx. \quad [4]$$

- (ii) Evaluate

$$\int_{-2}^0 (3x - 1)^2 dx. \quad [5]$$

Turn over

8. (a) An arithmetic series has a common difference of 7.

Given that the sum of the first 20 terms of the series is 530, find

(i) the first term of the series, [3]

(ii) the smallest positive term of the series. [2]

- (b) The terms of a sequence are given by

$$u_n = (n + k)^2, \quad n \geq 1,$$

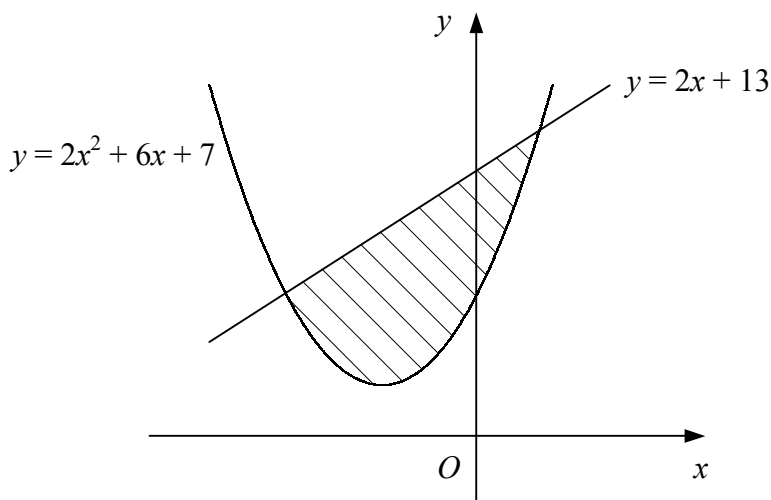
where k is a positive constant.

Given that $u_2 = 2u_1$,

(i) find the value of k , [4]

(ii) show that $u_3 = 11 + 6\sqrt{2}$. [2]

9.



The diagram shows the curve $y = 2x^2 + 6x + 7$ and the straight line $y = 2x + 13$.

(i) Find the coordinates of the points where the curve and line intersect. [4]

(ii) Show that the area of the shaded region bounded by the curve and line is given by

$$\int_{-3}^1 (6 - 4x - 2x^2) \, dx. \quad [2]$$

(iii) Hence find the area of the shaded region. [5]