

GCE Examinations
Advanced / Advanced Subsidiary

Core Mathematics C2

Paper C

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. Giving your answers in terms of π , solve the equation

$$3 \tan^2 \theta - 1 = 0,$$

for θ in the interval $-\pi \leq \theta \leq \pi$. [5]

2. Given that $p = \log_2 3$ and $q = \log_2 5$, find expressions in terms of p and q for

(i) $\log_2 45$, [3]

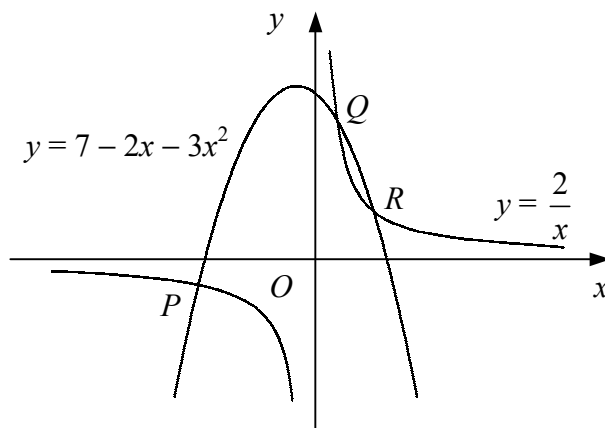
(ii) $\log_2 0.3$ [3]

3. For the binomial expansion in ascending powers of x of $(1 + \frac{1}{4}x)^n$, where n is an integer and $n \geq 2$,

(i) find and simplify the first three terms, [3]

(ii) find the value of n for which the coefficient of x is equal to the coefficient of x^2 . [3]

- 4.



The diagram shows the curves with equations $y = 7 - 2x - 3x^2$ and $y = \frac{2}{x}$.

The two curves intersect at the points P , Q and R .

- (i) Show that the x -coordinates of P , Q and R satisfy the equation

$$3x^3 + 2x^2 - 7x + 2 = 0. [2]$$

Given that P has coordinates $(-2, -1)$,

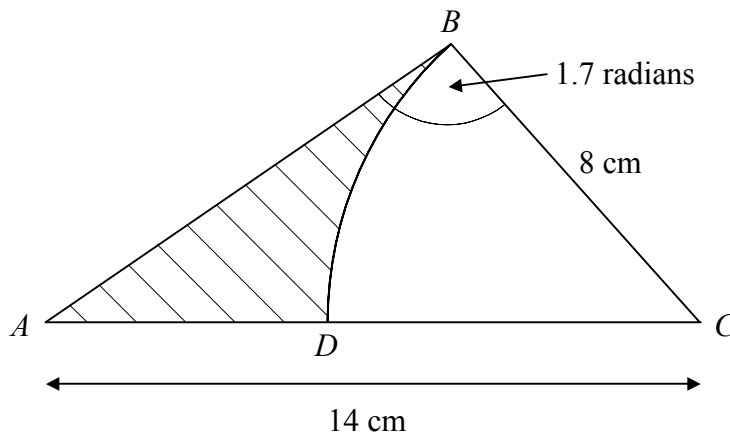
- (ii) find the coordinates of Q and R . [6]

5. The curve $y = f(x)$ passes through the point $P(-1, 3)$ and is such that

$$\frac{dy}{dx} = -\frac{4}{x^3}, \quad x \neq 0.$$

- (i) Find $f(x)$. [4]
- (ii) Show that the area of the finite region bounded by the curve $y = f(x)$, the x -axis and the lines $x = 1$ and $x = 4$ is $4\frac{1}{2}$. [4]

6.



The diagram shows triangle ABC in which $AC = 14$ cm, $BC = 8$ cm and $\angle ABC = 1.7$ radians.

- (i) Find the size of $\angle ACB$ in radians. [4]

The point D lies on AC such that BD is an arc of a circle, centre C .

- (ii) Find the perimeter of the shaded region bounded by the arc BD and the straight lines AB and AD . [4]

7. (a) Given that $y = 3^x$, find expressions in terms of y for

(i) 3^{x+1} , [2]

(ii) 3^{2x-1} . [2]

- (b) Hence, or otherwise, solve the equation

$$3^{x+1} - 3^{2x-1} = 6. \quad [5]$$

Turn over

8. (i) Given that

$$\int_1^3 (x^2 - 2x + k) \, dx = 8\frac{2}{3},$$

find the value of the constant k . [6]

(ii) Evaluate

$$\int_2^{\infty} \frac{6}{x^{\frac{5}{2}}} \, dx,$$

giving your answer in its simplest form. [5]

9. The second and fifth terms of a geometric series are -48 and 6 respectively.

(i) Find the first term and the common ratio of the series. [4]

(ii) Find the sum to infinity of the series. [2]

(iii) Show that the difference between the sum of the first n terms of the series and its sum to infinity is given by 2^{6-n} . [5]