

GCE Examinations
Advanced / Advanced Subsidiary

Core Mathematics C2

Paper F

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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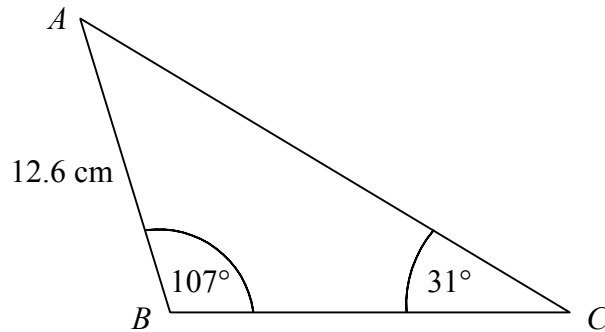
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1. Evaluate

$$\sum_{r=1}^{12} (5 \times 2^r).$$

[4]

2.



The diagram shows triangle ABC in which $AB = 12.6$ cm, $\angle ABC = 107^\circ$ and $\angle ACB = 31^\circ$.

Find

(i) the length BC ,

[3]

(ii) the area of triangle ABC .

[2]

3. The curve with equation $y = f(x)$ passes through the point $(8, 7)$.

Given that

$$f'(x) = 4x^{\frac{1}{3}} - 5,$$

find $f(x)$.

[6]

4. Solve the equation

$$\sin^2 \theta = 4 \cos \theta,$$

for values of θ in the interval $0 \leq \theta \leq 360^\circ$. Give your answers to 1 decimal place.

[7]

5. (i) Evaluate

$$\log_3 27 - \log_8 4. \quad [4]$$

- (ii) Solve the equation

$$4^x - 3(2^{x+1}) = 0. \quad [5]$$

6. (a) Expand $(1 + x)^4$ in ascending powers of x . [2]

- (b) Using your expansion, express each of the following in the form $a + b\sqrt{2}$, where a and b are integers.

(i) $(1 + \sqrt{2})^4$ [3]

(ii) $(1 - \sqrt{2})^8$ [4]

7. The second and fifth terms of an arithmetic sequence are 26 and 41 respectively.

- (i) Show that the common difference is 5. [3]

- (ii) Find the 12th term. [3]

Another arithmetic sequence has first term -12 and common difference 7.

Given that the sums of the first n terms of these two sequences are equal,

- (iii) find the value of n . [4]

Turn over

8. The polynomial $p(x)$ is defined by

$$p(x) = 2x^3 + x^2 + ax + b,$$

where a and b are constants.

Given that when $p(x)$ is divided by $(x + 2)$ there is a remainder of 20,

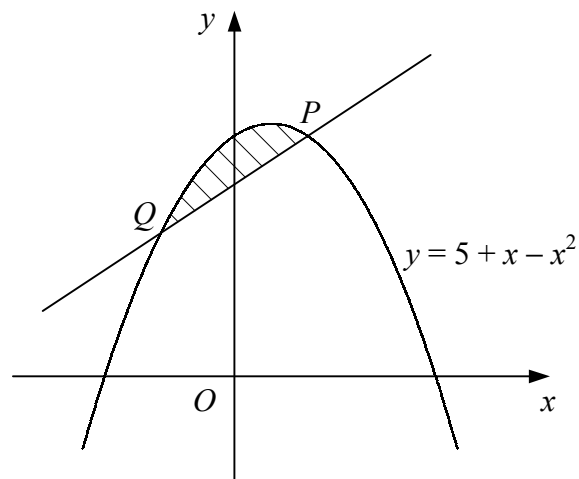
(i) find an expression for b in terms of a . [2]

Given also that $(2x - 1)$ is a factor of $p(x)$,

(ii) find the values of a and b , [4]

(iii) fully factorise $p(x)$. [4]

9.



The diagram shows the curve with equation $y = 5 + x - x^2$ and the normal to the curve at the point $P(1, 5)$.

(i) Find an equation for the normal to the curve at P in the form $y = mx + c$. [5]

(ii) Find the coordinates of the point Q , where the normal to the curve at P intersects the curve again. [2]

(iii) Show that the area of the shaded region bounded by the curve and the straight line PQ is $\frac{4}{3}$. [5]