

Core Mathematics C2 Advanced Subsidiary

For Edexcel

Paper C

Time: 1 hour 30 minutes

Instructions and Information

Candidates may use any calculator EXCEPT those with the facility for symbolic algebra, differentiation and/or integration.

Full marks may be obtained for answers to ALL questions.

The booklet ‘Mathematical Formulae and Statistical Tables’, available from Edexcel, may be used.

Advice to Candidates

You must show sufficient working to make your methods clear to an examiner.
Answers without working may gain no credit.

Published by Elmwood Press
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1. Write down the binomial expansion of $(1 - 2x)^6$ in ascending powers of x up to and including the term in x^3 . (4)
-

2.
$$f(x) = x^3 - 5x^2 + 3x + 7$$
 Find the set of values of x for which $f(x)$ is decreasing. (5)
-

3. The first two terms of a geometric sequence are 10935, 3645.
- (a) Find the exact value of the 11th term. (2)
- (b) Find the sum of the first nine terms, giving your answer to 2 decimal places. (2)
- (c) Find the sum to infinity of the sequence. (1)
-

4. (a) Express $\frac{x^{\frac{5}{2}} + 1}{x^2}$ in the form $x^a + x^b$, where a and b are constants. (2)

(b) Hence show that
$$\int_1^4 \left(\frac{x^{\frac{5}{2}} + 1}{x^2} \right) dx = \frac{65}{12}$$
 (5)

5. (a) Express each of the following in terms of $\log_3 a$,
- (i) $\log_3(a^4)$ (1)
- (ii) $\log_3(9a^2)$ (3)
- (b) Given that $b^2 = 8$, find the value of $\log_2 b$. (3)
-

6.

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

(a) Sketch the curve $y = f(x)$, giving the coordinates of the points where the curve meets the x -axis. (4)

(b) Solve the equation $\sin 2x = \frac{1}{2}$, giving your answers in terms of π . (4)

7.

$$f(x) = x^3 - x^2 + ax + b, \text{ where } a \text{ and } b \text{ are constants.}$$

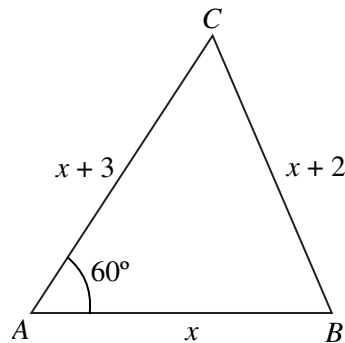
When $f(x)$ is divided by $(x - 1)$, the remainder is 12.

When $f(x)$ is divided by $(x + 3)$, the remainder is -32 .

(a) Find the value of a and the value of b . (5)

(b) Solve the equation $f'(x) = 3$. (3)

8.



The diagram shows triangle ABC in which $AB = x$, $AC = x + 3$, $BC = x + 2$ and $\angle BAC = 60^\circ$.

(a) Use the cosine rule to find the value of x . (4)

(b) Hence find the area of triangle ABC , giving your answer in the form $k\sqrt{3}$. (4)

9. A circle C has equation

$$x^2 + y^2 - 20x = 0$$

(a) By completing the square, express this equation in the form

$$(x - a)^2 + y^2 = r^2 \tag{3}$$

(b) Write down the radius and the coordinates of the centre of the circle C . (2)

(c) The point P , which has coordinates $(4, 8)$, lies on the circle C .

(i) Show that the line which passes through P and the centre of C has gradient $-\frac{4}{3}$. (2)

(ii) Find the equation of the tangent to the circle C at the point P . (4)

10.

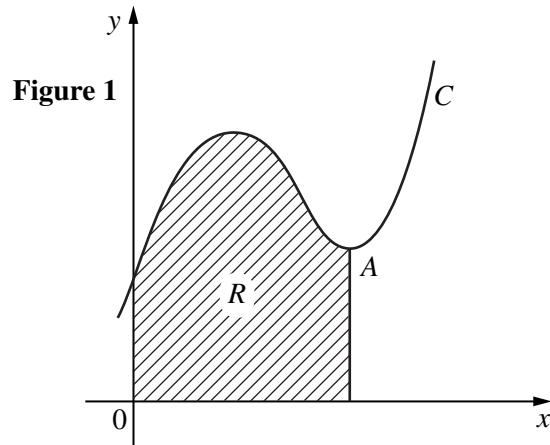


Figure 1 shows a sketch of part of the curve C with equation

$$y = x^3 - 5x^2 + 3x + 17.$$

The point A is the minimum turning point of C .

(a) Find $\frac{dy}{dx}$. (2)

(b) Find the coordinates of A . (4)

(c) Calculate the area, shown shaded in Fig. 1, bounded by C , the positive x - and y -axes and the ordinate through point A . (6)

END

TOTAL 75 MARKS