

Core Mathematics C2 Advanced Subsidiary

For Edexcel

Paper E

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.

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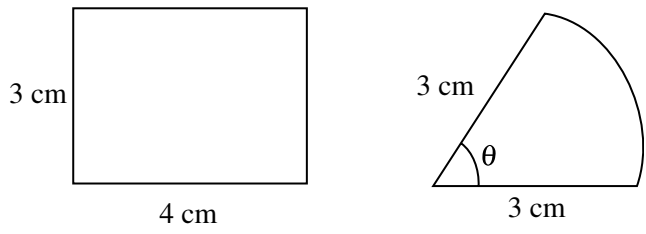
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1. A geometric series has common ratio $\frac{1}{2}$ and the sum of the first three terms is 147.
- (a) Find the first term of the series. (3)
- (b) Find the sum to infinity of the series. (2)
-

2. Given that $c = \log_3 4$ and $d = \log_3 5$, find expressions in terms of c and d for
- (a) $\log_3 20$ (1)
- (b) $\log_3 100$ (2)
- (c) $\log_3 0.4$ (3)
-

3.
$$f(x) = x^3 + ax^2 + x - 10$$
- When $f(x)$ is divided by $(x - 1)$ there is a remainder of -6 .
- (a) Find the value of the constant a . (3)
- (b) Find the remainder when $f(x)$ is divided by $(x + 2)$ (2)
-

4.



The diagrams show a rectangle, measuring 3 cm by 4 cm, and a sector of a circle of radius 3 cm and angle θ radians.

The perimeter of the rectangle is twice the perimeter of the sector.

- (a) Show that $\theta = \frac{1}{3}$. (3)
- (b) Show that the area of the rectangle is 8 times the area of the sector. (3)
-

5. Given that $2 \sin 2\theta = 3 \cos 2\theta$
- (a) show that $\tan 2\theta = 1.5$ (1)
- (b) Hence find the values of θ , to one decimal place, in the interval $0 \leq \theta < 360$ for which $2 \sin 2\theta^\circ = 3 \cos 2\theta^\circ$. (5)
-

6. Given that $f(x) = 5 + 9x - 2x^2$,
- (a) find the coordinates of all points at which the graph of $y = f(x)$ crosses the coordinate axes. (3)
- (b) Sketch the graph of $y = f(x)$. (2)
- (c) Calculate the coordinates of the stationary point of $f(x)$. (3)
-

7. For the binomial expansion in ascending powers of x of $(1 + kx)^5$,
- (a) find and simplify the first three terms, (3)
- (b) find the value of k for which the coefficient of x is equal to the coefficient of x^2 . (3)
-

8. Some values of the function $f(x) = \frac{1}{1 + 2x}$ are given in the table below.
The figures are rounded to 4 decimal places.

x	0.0	0.2	0.4	0.6	0.8	1.0
$f(x)$		0.7143		0.4545	0.3846	

- (a) Find the values of $f(x)$ missing from the table. (2)
- (b) Use the trapezium rule with 5 strips to estimate the value of:

$$\int_0^1 \frac{1}{1 + 2x} dx. \quad (6)$$

9. The circle C has equation

$$x^2 + y^2 - 12x - 8y + 39 = 0.$$

(a) Find the radius of C . (3)

The line $x + y = 9$ intersects C at the points L and M .

(b) Find the coordinates of L and M . (5)

(c) Show that $LM = 5\sqrt{2}$. (3)

10. (a) Find the coordinates of the stationary points on the curve

$$y = x^3 + 3x^2 - 4$$
 (6)

(b) Determine whether each stationary point is a maximum point or a minimum point. (3)

(c) By expanding the right-hand side, show that

$$x^3 + 3x^2 - 4 = (x - 1)(x + 2)^2.$$
 (2)

(d) Sketch the curve $y = x^3 + 3x^2 - 4$, marking the coordinates of the stationary points and the points where the curve meets the axes. (3)

END

TOTAL 75 MARKS