

Core Mathematics C2 Advanced Subsidiary

For Edexcel

Paper F

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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1. (a) Write down the first four terms of the binomial expansion, in ascending powers of x , of $(1 + 2x)^n$, where $n > 2$. (2)

Given that the coefficient of x^2 in this expansion is five times the coefficient of x ,

- (b) find the value of n , (2)
 (c) find the coefficient of x^3 in the expansion. (2)
-

2.
$$f(x) = x^3 - 2x^2 - 5x + 6$$

- (a) Show that $(x - 1)$ is a factor of $f(x)$. (1)
 (b) Factorise $f(x)$ completely and hence sketch the graph of $y = f(x)$. (7)
 (c) On the same axes sketch and label the graph of $y = -x^3 + 2x^2 + 5x - 6$. (2)
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3. (a) Using the substitution $u = 2^x$, show that the equation $4^x - 3(2^x) - 10 = 0$ can be written in the form $u^2 - 3u - 10 = 0$ (2)
 (b) Hence solve the equation $4^x - 3(2^x) - 10 = 0$, giving your answer to 2 decimal places. (4)
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4. (i) Differentiate with respect to x

$$5x^4 + \frac{x^2 + 3}{x} + 2\sqrt{x}. \quad (5)$$

- (ii) Evaluate

$$\int_1^4 \left(\sqrt{x} + \frac{x}{2} \right) dx. \quad (5)$$

5. A geometric series has first term a and positive common ratio r .
 The sum of the first two terms is 75 and the sum to infinity of the series is 80.
 Form two simultaneous equations involving a and r and hence find the value of a and the value of r . (6)
-

6. Given that $f(x) = x \left(x^{\frac{1}{2}} - 2x^{-\frac{1}{2}} \right)^2$, $x > 0$,
- (a) find the value of x for which $f(x) = 0$. (2)
- (b) Show that $f(x)$ may be written in the form $ax^2 + bx + c$, where a , b and c are constants to be found. (3)
- (c) Show that $\int_{\frac{1}{2}}^1 f(x) dx = \frac{19}{24}$. (4)
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7. (a) Find the coordinates of the stationary point of the curve with equation
- $$y = \frac{2}{3}x + \frac{9}{x^2}. \quad (6)$$
- (b) Determine whether the stationary point in part (a) is a maximum or a minimum point. (3)
-

8.

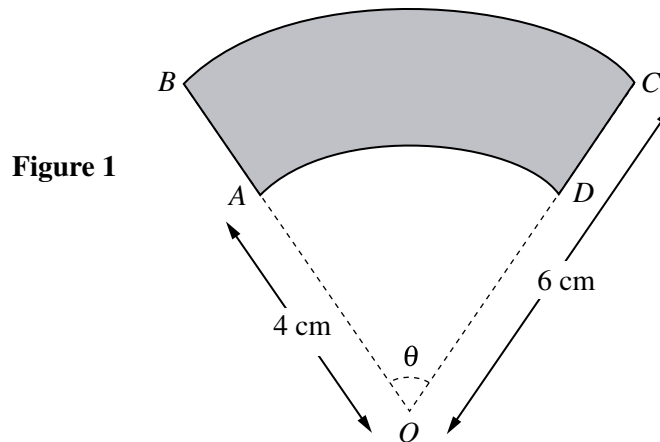


Figure 1 shows a shape $ABCD$. AD and BC are arcs of a circle with centre O with radii shown.

OAB and ODC are straight lines and $\angle BOC$ is θ radians.

- (a) Find, in terms of θ , an expression for the area of shape $ABCD$. (3)
- Given that the area of shape $ABCD = 8 \text{ cm}^2$,
- (b) show that $\theta = 0.8$ (2)
- (c) calculate the perimeter of shape $ABCD$. (3)
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9. (a) Solve for $-180^\circ < x < 180^\circ$, the equation

$$\tan(x + 20^\circ) = 2$$

giving your answers to 1 decimal place.

(7)

(b) In the triangle ABC , $AB = 12$ cm, $\angle ABC = 30^\circ$ and $\angle BAC = 105^\circ$.
Use the sine rule to show that $AC = 6\sqrt{2}$ cm.

(4)

END

TOTAL 75 MARKS