

Core Mathematics C1 Advanced Subsidiary

For Edexcel

Paper G

Time: 1 hour 30 minutes

Instructions and Information

Candidates may NOT use a calculator in this paper.

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) Given that $27 = 3^m$, write down the value of m . (1)
- (b) Given that $9^x = 27^{1-x}$, find the value of x . (3)
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2. The sum of an arithmetic series is

$$\sum_{r=1}^n (27 + 3r)$$

- (a) Write down the first two terms of the series. (2)
- (b) Find the common difference of the series. (1)

Given that $n = 20$,

- (c) find the sum of the series. (3)
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3. Find the set of values for x for which

- (a) $4x + 8 > 3 - x$ (1)
- (b) $2x^2 + 5x - 3 < 0$ (4)
- (c) both $4x + 8 > 3 - x$ and $2x^2 + 5x - 3 < 0$. (2)
-

4. (a) By completing the square, find the exact roots of the equation

$$x^2 + 4x + 1 = 0. \quad (3)$$

- (b) By completing the square, find in terms of the constant k , the roots of the equation

$$x^2 + 2kx + 5 = 0 \quad (4)$$

5. The gradient of a curve is given by

$$\frac{dy}{dx} = 6x^2 - 3x$$

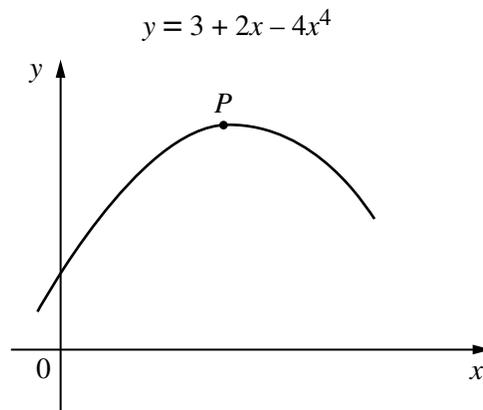
- The curve passes through the point $(-1, 2)$. Find the equation of the curve. (6)
-

6. The function f is defined for all real values of x by

$$f(x) = (1 + x)(1 - 2x)$$

- (a) (i) Find the coordinates of the points where the graph of $y = f(x)$ cuts the coordinate axes. (3)
- (ii) Sketch the graph of $y = f(x)$. (2)
- (b) The graph of $y = f(x)$ is translated by 3 units in the positive y -direction to give the graph of $y = g(x)$. Find an expression for $g(x)$ in the form $ax^2 + bx + c$, where a , b and c are integers. (2)
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7. The diagram shows a part of the graph of



- (a) (i) Find $\frac{dy}{dx}$. (2)
- (ii) Show that the x -coordinate of the stationary point P is $\frac{1}{2}$. (3)
- (iii) Find the y -coordinate of P . (2)
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8. For the curve C with equation $y = x^3 - 3x^2 + 2x$
- (a) find $\frac{dy}{dx}$, (2)

The point A , on the curve C , has x -coordinate 2.

- (b) Find an equation for the normal to C at A , giving your answer in the form $ax + by + c = 0$, where a, b and c are integers. (5)
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9. The points A, B and C have coordinates $(2, 8), (6, 6)$ and $(8, 10)$ respectively.
- (a) Show that AB and BC are perpendicular. (2)
- (b) Find an equation of the line BC . (3)
- (c) The equation of the line AC is $3y = x + 22$ and M is the mid-point of AB . (3)
- (i) Find an equation of the line through M parallel to AC . (3)
- (ii) This line intersects BC at the point T . Find the coordinates of T . (2)
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10. The function f is defined for all real values of x by
- $$f(x) = (x^2 + 3)(x - 2).$$
- (a) Find $f(-3)$ and $f(3)$. (2)
- (b) Show that the curve with equation $y = f(x)$ crosses the x -axis at only one point and state the x -coordinate of this point. (3)
- (c) Write down the y -coordinate of the point where the curve $y = f(x)$ crosses the y -axis. (1)
- (d) Differentiate $f(x)$ with respect to x to obtain $f'(x)$. (3)
- (e) Show that the equation $f'(x) = 0$ has no real roots. (3)
- (f) Sketch the curve $y = f(x)$. (2)
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END

TOTAL 75 MARKS