

Core Mathematics C1 Advanced Subsidiary

For Edexcel

Paper L

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. The points P , Q and R have coordinates $(2, 1)$, $(6, 2)$ and $(-1, 5)$ respectively.
Find an equation for the straight line which passes through R and is parallel to PQ .
Give your answer in the form $ax + by = c$, where a , b and c are integers. (4)
-

2. (a) Solve the inequality
- $$3x - 8 > x + 13. \quad (2)$$

- (b) Solve the inequality
- $$(x - 6)(x + 1) < 8 \quad (4)$$
-

3. (a) Express $2x^2 + 12x + 13$ in the form $a(x + b)^2 + c$. (4)

- (b) Find the equation of the line of symmetry of the curve
- $$y = 2x^2 + 12x + 13. \quad (3)$$
-

4. The equation $x^2 + 3kx + k = 0$, where k is a constant, has real roots.
(a) Prove that $k(9k - 4) \geq 0$. (2)

- (b) Hence find the set of possible values of k . (4)

- (c) Write down the values of k for which the equation $x^2 + 3kx + k = 0$ has equal roots. (1)
-

5. (a) Given that $16 = 2^m$, write down the value of m . (1)

- (b) Given that $4^n = 8^{3-n}$, find the value of n . (4)

- (c) (i) Given that $u^{\frac{1}{4}} = y$, show that the equation

$$u^{\frac{1}{4}} = 2 + 3u^{-\frac{1}{4}}$$

may be written as

$$y^2 - 2y - 3 = 0. \quad (3)$$

- (ii) Hence solve the equation $u^{\frac{1}{4}} = 2 + 3u^{-\frac{1}{4}}$. (2)
-

6. (a) Evaluate

$$\sum_{r=1}^{20} (5t + 1) \quad (3)$$

(b) A firm sold 20000 phones in the year 2005. A model for the future assumes that sales will increase in an arithmetic sequence with common difference x . This model predicts that total sales for the 10 years from 2005 to 2014 inclusive will be 312 500 phones.

(i) Find the value of x . (4)

Using your value of x ,

(ii) find the predicted sales for the year 2012. (2)

7. Given that

$$\frac{dy}{dx} = \frac{8x^3 + 1}{x^2}, \quad x \neq 0,$$

(a) find the value of x for which $\frac{dy}{dx} = 0$, (2)

(b) find $\frac{d^2y}{dx^2}$. (3)

Given also that $y = 2$ when $x = \frac{1}{2}$,

(c) find the value of y when $x = 1$. (6)

8.

$$f(x) = x^3 - 2x^2 - 13x - 10.$$

(a) Show that

$$(x + 2)(x + 1)(x - 5) \equiv x^3 - 2x^2 - 13x - 10. \quad (3)$$

(b) Sketch the curve $y = f(x)$, showing the coordinates of any points of intersection with the coordinate axes. (3)

(c) Sketch on separate diagrams the curves

(i) $y = f(x + 1),$

(ii) $y = f(-x).$ (4)

9. A curve has the equation $y = \frac{4}{x^2} + x^2$.

The point P on the curve has coordinates $(-2, 5)$

(a) Show that the gradient of the curve at P is -3 . (3)

(b) Find an equation for the tangent to the curve at P , giving your answer in the form $ax + by + c = 0$. (4)

This tangent intersects the coordinate axes at the points A and B .

(c) Show that the length of AB is $\frac{1}{3}\sqrt{10}$. (4)

END

TOTAL 75 MARKS