

# Core Mathematics C1 Advanced Subsidiary

# For Edexcel

## Paper C

**Time: 1 hour 30 minutes**

### *Instructions and Information*

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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*

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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) Find, in the form  $y = mx + c$ , the equation of the line joining the points (5, 6) and (2, -3). (3)

(b) Find the coordinates of the points where this line cuts the coordinate axes. (3)

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2. (a) Factorise the expression  $9x^2 + 12x$  and hence solve the equation  $9x^2 + 12x = 0$ . (3)

(b) The function  $f$  is defined by  $f(x) = 9x^2 + 12x + c$ , where  $c$  is a constant.

Given that  $f(x) = 0$  has equal roots, find the value of  $c$  and hence solve  $f(x) = 0$ . (4)

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

(a) Fully factorise  $x^3 - x^2 - 6x$ . (3)

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

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4. The point  $P$  with coordinates (3,  $m$ ) lies on the curve  $y = x^2 + kx$ . At  $P$  the gradient of the curve is 8.

Find the values of the constants  $k$  and  $m$ . (6)

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5. (a) Solve the inequality

$$2(x - 1) > 5 - x. \quad (2)$$

(b) Solve the inequality

$$x^2 + 2x - 15 < 0. \quad (3)$$


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6.

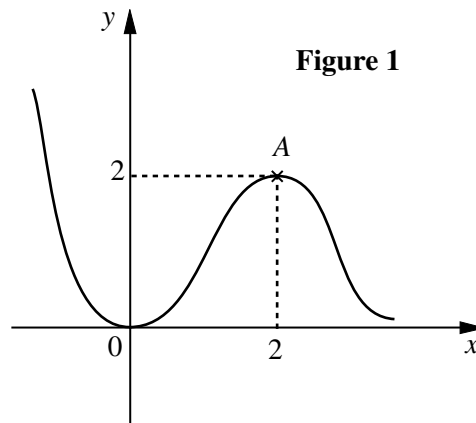


Figure 1

Figure 1 shows the graph of  $y = f(x)$ .

(a) Write down the number of solutions that exist for the equation

(i)  $f(x) = 1.7$

(ii)  $f(x) = 3$

(2)

(b) Sketch on separate diagrams the graphs below, showing the coordinates of point A in each case.

(i)  $y = f(x + 2)$ ,

(ii)  $y = f(2x)$ .

(6)

7. The first three terms of an arithmetic series are  $x$ ,  $4x - 9$  and  $5x$  respectively.

(a) Show that  $x = 9$ .

(2)

(b) Find the value of the 51st term of this series.

(3)

(c) Show that the sum of the first  $n$  terms of the series is  $9n^2$ .

(4)

8.

Figure 2

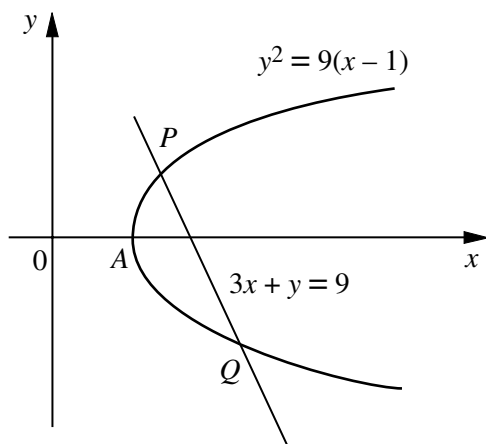


Figure 2 shows the curve with equation  $y^2 = 9(x - 1)$  and the line with equation  $3x + y = 9$

The curve crosses the  $x$ -axis at the point  $A$ , and the line intersects the curve at the points  $P$  and  $Q$ .

(a) Write down the coordinates of  $A$ . (1)

(b) Find, using algebra, the coordinates of  $P$  and  $Q$ . (6)

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9. Given that  $(1 + \sqrt{5})(3 - \sqrt{5}) = a + b\sqrt{5}$ , where  $a$  and  $b$  are integers,

(a) find the value of  $a$  and the value of  $b$ . (2)

Given that  $\frac{5 + \sqrt{2}}{3 + \sqrt{2}} = c + d\sqrt{2}$ , where  $c$  and  $d$  are rational numbers,

(b) find the value of  $c$  and the value of  $d$ . (3)

(c) Solve the equation

$$x\sqrt{8} - 6 = \frac{2x}{\sqrt{2}}$$

giving your answer in the form  $k\sqrt{2}$ , where  $k$  is an integer. (5)

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10. Given that

$$x^2 + 8x + 17 \equiv (x + a)^2 + b,$$

where  $a$  and  $b$  are constants,

(a) find the value of  $a$  and the value of  $b$ . (3)

(b) Hence show that the equation  $x^2 + 8x + 17 = 0$  has no real roots. (2)

The equation  $x^2 + 8x + k = 0$  has equal roots.

(c) Find the value of  $k$ . (2)

(d) For this value of  $k$ , sketch the graph of  $y = x^2 + 8x + k$ , showing the coordinates of any points at which the graph meets the coordinate axes. (4)

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**END**

**TOTAL 75 MARKS**