

# Core Mathematics C1 Advanced Subsidiary

# For Edexcel

## Paper B

**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. Write down the exact values of

(a)  $3^{-2}$ , (1)

(b)  $(5\sqrt{3})^2$ , (1)

(c)  $(1^3 + 2^3 + 3^3)^{\frac{1}{2}}$ . (2)

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2. Giving your answers in the form  $a + b\sqrt{5}$ , where  $a$  and  $b$  are rational numbers, find

(a)  $(4 - \sqrt{5})^2$ , (3)

(b)  $\frac{1}{(4 - \sqrt{5})}$ . (3)

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3. (a) Calculate  $\frac{dy}{dx}$  when  $y = x^2 - x + 1$ . (2)

(b) Find the coordinates of the point on the curve where the gradient is equal to 9. (3)

(c) Find the equation of the tangent at this point in the form  $y = mx + c$ . (3)

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4. The  $r$ th term of a sequence is defined by

$$u_r = 3 + 4r, \quad r \geq 1.$$

(a) Find the first three terms of the sequence. (3)

(b) Calculate  $\sum_{r=1}^{200} (3 + 4r)$ . (4)

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5. 
$$\frac{dy}{dx} = 8 + \frac{1}{x^2}.$$

(a) Use integration to find  $y$  in terms of  $x$ . (3)

(b) Given that  $y = 12$  when  $x = 1$ , find the value of  $y$  at  $x = \frac{1}{2}$ . (3)

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6.

Figure 1

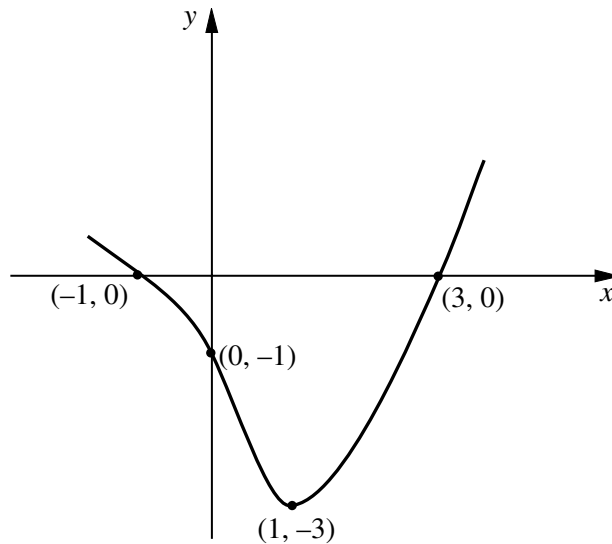


Figure 1 shows a sketch of the curve with equation  $y = f(x)$ .

The curve crosses the coordinate axes at the points  $(-1, 0)$ ,  $(0, -1)$  and  $(3, 0)$ .  
The minimum point on the curve is  $(1, -3)$ .

On separate diagrams sketch the curve with equation

(a)  $y = f(x + 1)$ , (3)

(b)  $y = f\left(\frac{1}{2}x\right)$ . (3)

On each diagram, show clearly the coordinates of the minimum point, and of each point at which the curve crosses the coordinate axes.

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7. The quadratic equation  $x^2 + kx + 1 = 0$  has no real roots for  $x$ .

(a) Write down the discriminant of  $x^2 + kx + 1$  in terms of  $k$ . (2)

(b) Hence find the set of values that  $k$  can take. (4)

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8. (a) Solve the simultaneous equations

$$x + y = 8$$

$$2x^2 + 13 = 12x + y.$$

(6)

- (b) Hence, or otherwise, find the set of values of  $x$  for which

$$2x^2 - 12x + 13 < 8 - x.$$

(3)

9. (a)  $f(x) = x^2 + 4x + 1$

By completing the square, write  $f(x)$  in the form  $(x + a)^2 + b$  where  $a$  and  $b$  are constants to be determined.

(3)

- (b) Hence solve the equation

$$x^2 + 4x + 1 = 2,$$

(4)

writing your solutions in the form  $c \pm \sqrt{d}$ .

- (c) Write down the coordinates of the minimum point on the graph of  $y = f(x)$ .

(2)

- (d) Sketch the graph of  $y = f(x)$ .

(3)

- (e) Sketch the graph of  $y = -f(x)$ .

(2)

10. The points  $A$  and  $B$  have coordinates  $(-1, 4)$  and  $(3, -2)$  respectively. The straight line  $l$  passes through  $B$  and is perpendicular to  $AB$ .

- (a) Find an equation for  $l$ , giving your answer in the form  $ax + by + c = 0$ , where  $a$ ,  $b$  and  $c$  are integers.

(6)

The line  $AB$  crosses the  $x$  and  $y$  axes at the points  $C$  and  $D$  respectively.

- (b) Calculate the area of triangle  $OCD$ , where  $O$  is the origin.

(6)

END

TOTAL 75 MARKS