

# Core Mathematics C1 Advanced Subsidiary

# For Edexcel

## Paper A

**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.

Published by Elmwood Press  
80 Attimore Road  
Welwyn Garden City  
Herts. AL8 6LP  
Tel. 01707 333232

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1. (a) Express  $\frac{30}{\sqrt{5}}$  in the form  $k\sqrt{5}$ . (2)

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(b) Express  $8^{-\frac{2}{3}}$  as an exact fraction in its simplest form. (2)

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2. (a) Make  $x$  the subject of the equation  $a(x - b) = x + c$ . (3)

(b) Solve the equation  $2x^2 + 7x = 4$ . (3)

(c) Differentiate  $2x^5 + x^{\frac{1}{2}}$  with respect to  $x$ . (3)

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3. (a) Express  $x^2 - 6x + 10$  in the form  $(x + a)^2 + b$ . (3)

(b) Hence write down the coordinates of the minimum point on the graph of  $y = x^2 - 6x + 10$ . (2)

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4. The straight line  $l$  has the equation  $3x - 2y = 9$ .  
The straight line  $m$  is perpendicular to  $l$  and passes through the point  $(3, -2)$ .  
Find an equation for  $m$  in the form  $ax + by + c = 0$ . (5)

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5. The equation  $x^2 + 6x + m = 0$  has no real roots for  $x$ .  
Find the set of values that  $m$  can take. (5)

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6. (a) An arithmetic series has first term  $a$  and common difference  $d$ . Prove that the sum of the first  $n$  terms of the series is

$$\frac{1}{2}n[2a + (n - 1)d]. \quad (4)$$

- (b) The tenth term of an arithmetic series is 67 and the sum of the first twenty terms is 1280.

Find the first term  $a$  and the common difference  $d$ . (6)

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7. (a) Solve the simultaneous equations

$$y = x^2 - x + 5, \quad y = 3x + 1. \quad (5)$$

- (b) What can you deduce from the solution to part (a) about the graphs of  $y = x^2 - x + 5$  and  $y = 3x + 1$ ? (2)

- (c) Hence, or otherwise, find the equation of the normal to the curve  $y = x^2 - x + 5$  at the point  $(2, 7)$ , giving your answer in the form  $ax + by + c = 0$  where  $a, b$  and  $c$  are integers. (4)
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8. Given that  $f(x) = 2x^2 - 5x - 3$ ,

- (a) find the coordinates of all the points at which the graph of  $y = f(x)$  crosses the coordinate axes. (3)

- (b) Sketch the graph of  $y = f(x)$ . (2)

- (c) The graph of  $y = f(x)$  is obtained from the graph of  $y = 2x^2 - 5x$  by a single transformation. Describe the transformation fully. (3)
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9.

Figure 1

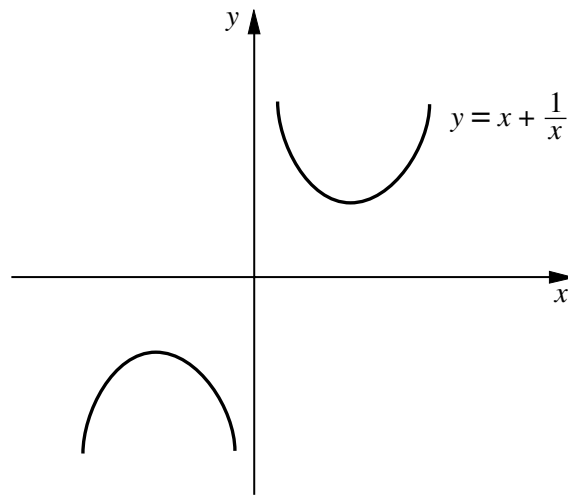


Figure 1 shows a sketch of the curve with equation  $y = x + \frac{1}{x}$ .

Find the coordinates of the two points on the curve where the gradient is zero.

(5)

10.  $PQRS$  is a rectangle, where  $P$ ,  $Q$  and  $R$  are the points  $(4, 9)$ ,  $(2, k)$  and  $(8, 1)$  respectively.

(a) Find the coordinates of the mid-point of  $PR$ .

(2)

(b) Find the gradient of the line  $PQ$ , giving your answer in terms of  $k$ .

(2)

(c) Determine the two possible values of  $k$ .

(4)

(d) Find the area of the rectangle  $PQRS$  for the case in which  $PQRS$  is a square.

(5)

END

TOTAL 75 MARKS