

GCE Examinations  
Advanced Subsidiary

# Core Mathematics C1

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.

Mathematical formulae and statistical tables are available.

This paper has ten questions.

## *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. Solve the equation

$$x^2 - 4x - 8 = 0,$$

giving your answers in the form  $a + b\sqrt{3}$  where  $a$  and  $b$  are integers. (3)

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2. Find the set of values of  $x$  for which

$$(x - 1)(x - 2) < 20. \quad (4)$$


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3. The curve with equation  $y = f(x)$  passes through the point (8, 7).

Given that

$$f'(x) = 4x^{\frac{1}{3}} - 5,$$

find  $f(x)$ . (6)

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4. (a) Evaluate  $(5\frac{4}{9})^{-\frac{1}{2}}$ . (2)

(b) Find the value of  $x$  such that

$$\frac{1+x}{x} = \sqrt{3},$$

giving your answer in the form  $a + b\sqrt{3}$  where  $a$  and  $b$  are rational. (4)

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5. Given that

$$y = x + 5 + \frac{3}{\sqrt{x}},$$

(a) find  $\frac{dy}{dx}$ , (3)

(b) find  $\int y \, dx$ . (4)

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6.  $f(x) = x^{\frac{3}{2}} - 8x^{-\frac{1}{2}}$ .

(a) Evaluate  $f(3)$ , giving your answer in its simplest form with a rational denominator. (3)

(b) Solve the equation  $f(x) = 0$ , giving your answers in the form  $k\sqrt{2}$ . (4)

7. The straight line  $l_1$  has gradient 2 and passes through the point with coordinates  $(4, -5)$ .

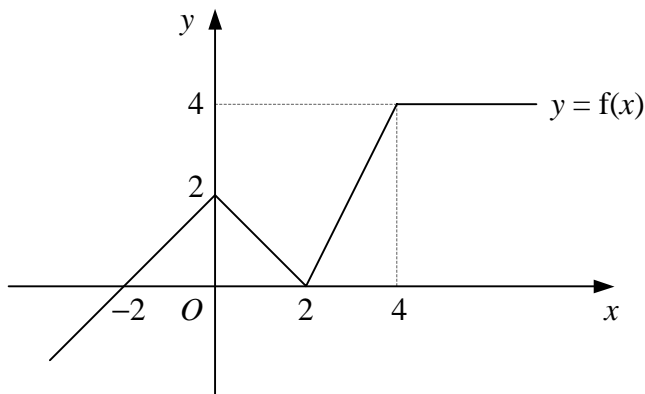
(a) Find an equation for  $l_1$  in the form  $y = mx + c$ . (2)

The straight line  $l_2$  is perpendicular to the line with equation  $3x - y = 4$  and passes through the point with coordinates  $(3, 0)$ .

(b) Find an equation for  $l_2$ . (3)

(c) Find the coordinates of the point where  $l_1$  and  $l_2$  intersect. (3)

8.



**Figure 1**

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

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

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

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

(b) Labelling the axes in a similar way, sketch on separate diagrams the graphs of

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

(ii)  $y = f(2x)$ . (6)

**Turn over**

9. (a) Prove that the sum of the first  $n$  terms of an arithmetic series with first term  $a$  and common difference  $d$  is given by

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

A novelist begins writing a new book. She plans to write 16 pages during the first week, 18 during the second and so on, with the number of pages increasing by 2 each week.

Find, according to her plan,

- (b) how many pages she will write in the fifth week, (2)
- (c) the total number of pages she will write in the first five weeks. (2)
- (d) Using algebra, find how long it will take her to write the book if it has 250 pages. (4)

10. The curve  $C$  has the equation  $y = f(x)$  where

$$f(x) = (x + 2)^3.$$

- (a) Sketch the curve  $C$ , showing the coordinates of any points of intersection with the coordinate axes. (3)
- (b) Find  $f'(x)$ . (4)

The straight line  $l$  is the tangent to  $C$  at the point  $P(-1, 1)$ .

- (c) Find an equation for  $l$ . (3)

The straight line  $m$  is parallel to  $l$  and is also a tangent to  $C$ .

- (d) Show that  $m$  has the equation  $y = 3x + 8$ . (4)

END