Paper Reference (complete below)	Centre No.						Surname	Initial(s)
6663 / 01	Candidate No.						**Signature**	

Paper Reference(s)

6663

Edexcel GCE

Core Mathematics C1
Advanced Subsidiary
Mock Paper

Time: 1 hour 30 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
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6	
7	
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9	
10	
Total	

Materials required for examination
Mathematical Formulae

Items included with question papers
Nil

Calculators may NOT be used in this examination.

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. You must write your answer for each question in the space following the question. If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

A booklet 'Mathematical Formulae and Statistical Tables' is provided.
Full marks may be obtained for answers to ALL questions.
This paper has ten questions.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled.
You must show sufficient working to make your methods clear to the examiner.
Answers without working may gain no credit.

Turn over

Edexcel
Success through qualifications

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1. Solve the inequality

$$10 + x^2 > x(x - 2).$$

(3)

Leave blank

2. Find $\int \left(x^2 - \frac{1}{x^2} + \sqrt[3]{x} \right) \mathrm{d}x$.

(4)

Leave blank

3. Find the value of

(a) $81^{\frac{1}{2}}$,

(1)

(b) $81^{\frac{3}{4}}$,

(2)

(c) $81^{-\frac{3}{4}}$.

(1)

Leave blank

4. A sequence $a_1, a_2, a_3, \ldots$ is defined by

$$a_1 = k, \quad a_{n+1} = 4a_n - 7,$$

where k is a constant.

(a) Write down an expression for a_2 in terms of k.

(1)

(b) Find a_3 in terms of k, simplifying your answer.

(2)

Given that $a_3 = 13$,

(c) find the value of k.

(2)

Turn over

Leave blank

5. (a) Show that eliminating y from the equations

$$2x + y = 8,$$

$$3x^2 + xy = 1$$

produces the equation

$$x^2 + 8x - 1 = 0.$$

(2)

(b) Hence solve the simultaneous equations

$$2x + y = 8,$$

$$3x^2 + xy = 1$$

giving your answers in the form $a + b\sqrt{17}$, where a and b are integers.

(5)

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5. continued

Turn over

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6.

$$f(x) = \frac{(2x+1)(x+4)}{\sqrt{x}}, \quad x > 0.$$

(a) Show that f(x) can be written in the form $Px^{\frac{3}{2}} + Qx^{\frac{1}{2}} + Rx^{-\frac{1}{2}}$, stating the values of the constants P, Q and R.

(3)

(b) Find f $'(x)$.

(3)

(c) Show that the tangent to the curve with equation y = f(x) at the point where x = 1 is parallel to the line with equation $2y = 11x + 3$.

(3)

Leave blank

6. continued

Leave blank

7. (a) Factorise completely $x^3 - 4x$.

(3)

(b) Sketch the curve with equation $y = x^3 - 4x$, showing the coordinates of the points where the curve crosses the x-axis.

(3)

(c) On a separate diagram, sketch the curve with equation

$$y = (x - 1)^3 - 4(x - 1),$$

showing the coordinates of the points where the curve crosses the x-axis.

(3)

Leave blank

7. continued

Turn over

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8. The straight line l_1 has equation $y = 3x - 6$.

The straight line l_2 is perpendicular to l_1 and passes through the point (6, 2).

(a) Find an equation for l_2 in the form $y = mx + c$, where m and c are constants.

(3)

The lines l_1 and l_2 intersect at the point C.

(b) Use algebra to find the coordinates of C.

(3)

The lines l_1 and l_2 cross the x-axis at the points A and B respectively.

(c) Calculate the exact area of triangle ABC.

(4)

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8. continued

Leave blank

9. An arithmetic series has first term a and common difference d.

(a) Prove that the sum of the first n terms of the series is

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

(4)

A polygon has 16 sides. The lengths of the sides of the polygon, starting with the shortest side, form an arithmetic sequence with common difference d cm.

The longest side of the polygon has length 6 cm and the perimeter of the polygon is 72 cm.

Find

(b) the length of the shortest side of the polygon,

(5)

(c) the value of d.

(2)

Leave blank

9. continued

Leave blank

10. For the curve C with equation $y = \mathrm{f}(x)$,

$$\frac{\mathrm{d}y}{\mathrm{d}x} = x^3 + 2x - 7.$$

(a) Find $\dfrac{\mathrm{d}^2 y}{\mathrm{d}x^2}$.

(2)

(b) Show that $\dfrac{\mathrm{d}^2 y}{\mathrm{d}x^2} \geq 2$ for all values of x.

(1)

Given that the point $P(2, 4)$ lies on C,

(c) find y in terms of x,

(5)

(d) find an equation for the normal to C at P in the form $ax + by + c = 0$, where a, b and c are integers.

(5)

Leave blank

10. continued

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