Paper Reference (complete below)	Centre No.					Surname	Initial(s)
6 6 6 3 / 0 1	Candidate No.					**Signature**	

Paper Reference(s)

6663

Edexcel GCE

Core Mathematics C1

Advanced Subsidiary

Set A: Practice Paper 2

Time: 1 hour 30 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
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 eight 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

1. A sequence is defined by the recurrence relation

$$u_{n+1} = \sqrt{\left(\frac{u_n}{2} + \frac{a}{u_n}\right)}, \quad n = 1, 2, 3, ...,$$

where a is a constant.

(a) Given that $a = 20$ and $u_1 = 3$, find the values of u_2, u_3 and u_4, giving your answers to 2 decimal places.

(3)

(b) Given instead that $u_1 = u_2 = 3$,

(i) calculate the value of a,

(3)

(ii) write down the value of u_5.

(1)

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2. The equation $x^2 + 5kx + 2k = 0$, where k is a constant, has real roots.

(a) Prove that $k(25k - 8) \geq 0$.

(2)

(b) Hence find the set of possible values of k.

(4)

(c) Write down the values of k for which the equation $x^2 + 5kx + 2k = 0$ has equal roots.

(1)

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3. (a) Given that $3^x = 9^{y-1}$, show that $x = 2y - 2$.

(2)

(b) Solve the simultaneous equations

$$x = 2y - 2,$$

$$x^2 = y^2 + 7.$$

(6)

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4. The curve C with equation $y = \mathrm{f}(x)$ is such that

$$\frac{\mathrm{d}y}{\mathrm{d}x} = 3\sqrt{x} + \frac{12}{\sqrt{x}}, \quad x > 0.$$

(a) Show that, when $x = 8$, the exact value of $\frac{\mathrm{d}y}{\mathrm{d}x}$ is $9\sqrt{2}$.

(3)

The curve C passes through the point (4, 30).

(b) Using integration, find $\mathrm{f}(x)$.

(6)

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5. The points A and B have coordinates (4, 6) and (12, 2) respectively.

The straight line l_1 passes through A and B.

(a) Find an equation for l_1 in the form $ax + by = c$, where a, b and c are integers.

(4)

The straight line l_2 passes through the origin and has gradient –4.

(b) Write down an equation for l_2.

(1)

The lines l_1 and l_2 intercept at the point C.

(c) Find the exact coordinates of the mid-point of AC.

(5)

6.
$$\mathrm{f}(x) = 9 - (x - 2)^2$$

(a) Write down the maximum value of $\mathrm{f}(x)$.

(1)

(b) Sketch the graph of $y = \mathrm{f}(x)$, showing the coordinates of the points at which the graph meets the coordinate axes.

(5)

The points A and B on the graph of $y = \mathrm{f}(x)$ have coordinates (–2, –7) and (3, 8) respectively.

(c) Find, in the form $y = mx + c$, an equation of the straight line through A and B.

(4)

(d) Find the coordinates of the point at which the line AB crosses the x-axis.

(2)

The mid-point of AB lies on the line with equation $y = kx$, where k is a constant.

(e) Find the value of k.

(2)

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7. For the curve C with equation $y = x^4 - 8x^2 + 3$,

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

(2)

The point A, on the curve C, has x-coordinate 1.

(*b*) Find an equation for the normal to C at A, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(5)

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8. $$f(x) = \frac{(x^2 - 3)^2}{x^3}, \; x \neq 0.$$

(*a*) Show that $f(x) \equiv x - 6x^{-1} + 9x^{-3}$.

(2)

(*b*) Hence, or otherwise, differentiate $f(x)$ with respect to x.

(3)

END