Paper Reference (complete below)	Centre No.						Surname	Initial(s)
6664 / 01	Candidate No.						Signature	

Paper Reference(s)

6664

Edexcel GCE

Core Mathematics C2

Advanced Subsidiary

Mock Paper

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total	

Time: 1 hour 30 minutes

Materials required for examination	**Items included with question papers**
Mathematical Formulae	Nil

Candidates may use any calculator EXCEPT those with the facility for symbolic algebra, differentiation and/or integration. Thus candidates may NOT use calculators such as the Texas Instruments TI 89, TI 92, Casio CFX 9970G, Hewlett Packard HP 48G.

Instructions to Candidates

In the boxes above, write your cente 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.
When a calculator is used, the answer should be given to an appropriate degree of accuracy.

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
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1. $$f(x) = 2x^3 - x^2 + px + 6,$$

where p is a constant.

Given that $(x - 1)$ is a factor of $f(x)$, find

(a) the value of p,

(2)

(b) the remainder when $f(x)$ is divided by $(2x + 1)$.

(2)

Leave blank

2. (a) Find $\displaystyle\int \left(3+4x^3-\frac{2}{x^2}\right)\mathrm{d}x$.

(3)

(b) Hence evaluate $\displaystyle\int_1^2 \left(3+4x^3-\frac{2}{x^2}\right)\mathrm{d}x$.

(2)

Turn over

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3. **Figure 1**

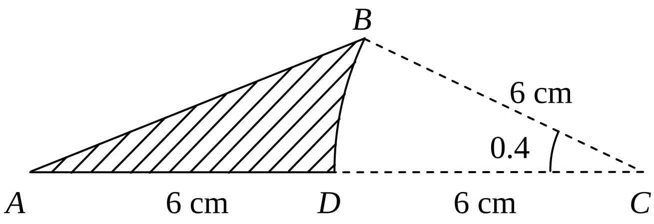

Figure 1 shows a logo ABD.

The logo is formed from triangle ABC. The mid-point of AC is D and $BC = AD = DC = 6$ cm. $\angle BCA = 0.4$ radians. The curve BD is an arc of a circle with centre C and radius 6 cm.

(a) Write down the length of the arc BD.

(1)

(b) Find the length of AB.

(3)

(c) Write down the perimeter of the logo ABD, giving your answer to 3 significant figures.

(1)

Leave blank

4. Solve

$$2\log_3 x - \log_3(x-2) = 2, \qquad x > 2.$$

(6)

Leave blank

5. The second and fifth terms of a geometric series are 9 and 1.125 respectively.

For this series find

(a) the value of the common ratio,

(3)

(b) the first term,

(2)

(c) the sum to infinity.

(2)

Leave blank

5. continued

Leave blank

6. The circle C, with centre A, has equation

$$x^2 + y^2 - 6x + 4y - 12 = 0.$$

(a) Find the coordinates of A.

(2)

(b) Show that the radius of C is 5.

(2)

The points P, Q and R lie on C. The length of PQ is 10 and the length of PR is 3.

(c) Find the length of QR, giving your answer to 1 decimal place.

(3)

Leave blank

6. continued

Leave blank

7. The first four terms, in ascending powers of x, of the binomial expansion of $(1 + kx)^n$ are

$$1 + Ax + Bx^2 + Bx^3 + \ldots,$$

where k is a positive constant and A, B and n are positive integers.

(a) By considering the coefficients of x^2 and x^3, show that $3 = (n - 2)\,k$.

(4)

Given that $A = 4$,

(b) find the value of n and the value of k.

(4)

Leave blank

7. continued

Leave blank

8. (a) Solve, for $0 \leq x < 360°$, the equation $\cos(x - 20°) = -0.437$, giving your answers to the nearest degree.

(4)

(b) Find the exact values of θ in the interval $0 \leq \theta < 360°$ for which

$$3 \tan \theta = 2 \cos \theta.$$

(6)

Leave blank

8. continued

Leave blank

9. A pencil holder is in the shape of an open circular cylinder of radius r cm and height h cm. The surface area of the cylinder (including the base) is 250 cm^2.

(a) Show that the volume, $V\,cm^3$, of the cylinder is given by $V = 125r - \dfrac{\pi r^3}{2}$.

(4)

(b) Use calculus to find the value of r for which V has a stationary value.

(3)

(c) Prove that the value of r you found in part (b) gives a maximum value for V.

(2)

(d) Calculate, to the nearest cm^3, the maximum volume of the pencil holder.

(2)

Leave blank

9. continued

Leave blank

10. **Figure 2**

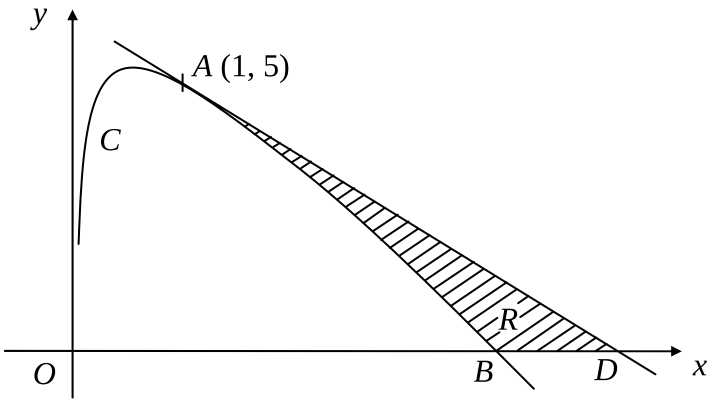

Figure 2 shows part of the curve C with equation

$$y = 9 - 2x - \frac{2}{\sqrt{x}}, \qquad x > 0.$$

The point $A(1, 5)$ lies on C and the curve crosses the x-axis at $B(b, 0)$, where b is a constant and $b > 0$.

(a) Verify that $b = 4$.

(1)

The tangent to C at the point A cuts the x-axis at the point D, as shown in Fig. 2.

(b) Show that an equation of the tangent to C at A is $y + x = 6$.

(4)

(c) Find the coordinates of the point D.

(1)

The shaded region R, shown in Fig. 2, is bounded by C, the line AD and the x-axis.

(d) Use integration to find the area of R.

(6)

Leave blank

10. continued

Leave blank

10. continued

END