Core Mathematics C2 For Edexcel Advanced Subsidiary

Paper I

Time: 1 hour 30 minutes

Instructions and Information

Candidates may use any calculator EXCEPT those with the facility for symbolic algebra, differentiation and/or integration.

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

You must show sufficient working to make your methods clear to an examiner.
Answers without working may gain no credit.

Published by Elmwood Press
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1. $$f(x) = 4x^3 + 3x^2 - 4x + k.$$

(*a*) When $f(x)$ is divided by $(x + 1)$ the remainder is 4. Find the value of the constant k.

(2)

(*b*) Find the remainder when $f(x)$ is divided by $(2x - 1)$

(3)

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2. Find the coefficient of x^2 in the expansion of

$$(1 + 2x)(1 + x)^5$$

(4)

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3. Given that $s = \log_t 2$, express in terms of s,

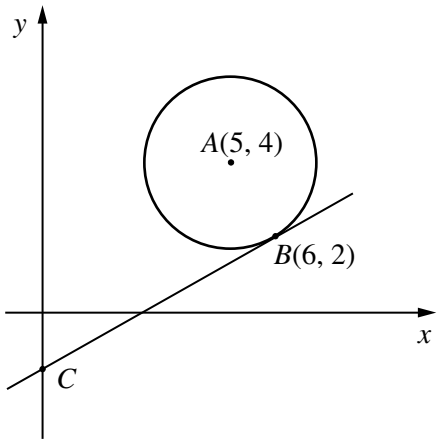
(*a*) $\log_t 8$

(2)

(*b*) $\log_t (4t)$.

(4)

4.



The diagram shows a circle with centre $A(5, 4)$. A tangent touches the circle at $B(6, 2)$ and crosses the y-axis at C.

(*a*) Find the equation of the tangent BC

(3)

(*b*) Find the area of triangle ABC.

(4)

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5. The sequence $u_1, u_2, u_3, \cdots, u_n$ is defined by the recurrence relation

$$u_{n+1} = ku_n + 3, \quad \text{where } k \text{ is a constant.}$$

(a) Given that $u_1 = 4$, write down an expression for u_2 in terms of k.

(1)

(b) Given that $u_3 = 4$, find the two possible values of k.

(4)

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6. $$f(x) = 3\sin 2x, \qquad 0 \leq x \leq 180°$$

(a) Sketch the graph of $y = f(x)$, indicating the value of x at each point where the graph crosses the x-axis.

(3)

(b) Write down the coordinates of the maximum point of $f(x)$.

(3)

(c) Calculate the values of x for which $f(x) = \dfrac{3^{\frac{3}{2}}}{2}$.

(4)

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7. The second and third terms of a geometric series are 3.2 and 2.56 respectively.

Find

(a) the common ratio of the series,

(2)

(b) the first term of the series,

(2)

(c) the sum to infinity of the series.

(2)

(d) Calculate the sum of the first 10 terms of the series, giving your answer correct to 4 significant figures.

(2)

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8. A curve has equation

$$y = 5 - 2x + 4x^{\frac{1}{2}}, \quad x > 0.$$

(a) Find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$.

(3)

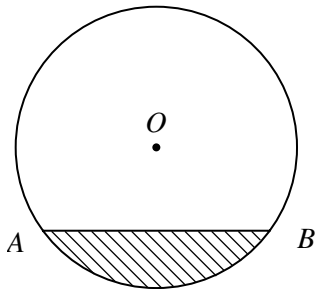
(b) Find the coordinates of the turning point of curve.

(4)

(c) Determine whether the turning point is a maximum or minimum point.

(2)

9.



The diagram shows a circle of radius 10 cm. The chord AB subtends an angle of 1.8 radians at the centre of the circle. Find the following, giving your answers to one decimal place,

(a) the length of the chord AB,

(2)

(b) the perimeter of the shaded region,

(4)

(c) the area of the shaded region.

(5)

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10. (a) Given that

$$(1 + x)^5 + (1 - x)^5 = a + bx^2 + cx^4,$$

find the values of the constants a, b, and c.

(6)

(b) Use your answers to part (a) and by letting $y = x^2$, solve

$$(1 + x)^5 + (1 - x)^5 = 152$$

(5)

END **TOTAL 75 MARKS**