

Paper Reference(s)

6663/01

Beal Edexcel GCE

Core Mathematics C1 & C2

Differentiation Assessment

Advanced Subsidiary

January 2016

Time: 1 hour

Materials required for examination

Mathematical Formulae (Pink)

Items included with question papers

Nil

Calculators may NOT be used in questions 1, 2, 3 & 4.

Calculators may be used in questions 5, 6, 7 & 8.

Instructions to Candidates

Write the name of the examining body (Edexcel), your centre number, candidate number, the unit title (Core Mathematics C1&2), the paper reference (6663), your surname, initials and signature.

Information for Candidates

A booklet 'Mathematical Formulae and Statistical Tables' is provided.

Full marks may be obtained for answers to ALL questions.

The marks for the parts of questions are shown in round brackets, e.g. (2).

There are 8 questions in this question paper. The total mark for this paper is 53.

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 not gain full credit.

Caution: Calculators must not be used in questions 1, 2, 3, & 4

1. Given that $y = 4x^3 - \frac{5}{x^2}$, $x \neq 0$, find $\frac{dy}{dx}$ in their simplest form (3)
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2. $f(x) = \frac{8}{x^2} - 4\sqrt{x} + 3x - 1$, $x > 0$
- Giving your answer in their simplest form, find $f'(x)$ (3)
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3. Given that
- $$y = \frac{x^4 - 3}{2x^2}$$
- (a) find $\frac{dy}{dx}$, (4)

- (b) show that $\frac{d^2y}{dx^2} = \frac{x^2 - 9}{x^4}$. (2)
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4. The curve C has equation
- $$y = \frac{(x^2 + 4)(x - 3)}{2x}, \quad x \neq 0.$$
- (a) Find $\frac{dy}{dx}$ in its simplest form. (5)

- (b) Find an equation of the tangent to C at the point where $x = -1$.
- Give your answer in the form $ax + by + c = 0$, where a , b and c are integers. (5)
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Calculators may be used in questions 5, 6, 7 & 8.

5. $f(x) = \frac{5}{3}x^3 + 7x^2 - 3x + 11$

Find the set of values of x for which $f(x)$ is increasing. **(5)**

6. A curve has the equation

$$y = x^3 + ax^2 + 45x + b$$

where a and b are constants.

Given that the curve has a stationary point at $(3, 14)$,

(a) find the values of a and b , **(6)**

(b) find the coordinates of the other stationary point of the curve. **(3)**

7. The curve $y = \frac{10}{3}x^3 - \frac{7}{2}x^2 + x + \frac{23}{24}$ has turning points

at $\left(\frac{1}{2}, 1\right)$ and $\left(\frac{1}{5}, \frac{143}{150}\right)$.

Use calculus to determine the nature of each turning point.

(5)

TURN OVER

8. A container made from thin metal is in the shape of a right circular cylinder with height h cm and base radius r cm. **The container has no lid.** When full of water, the container holds 500 cm^3 of water.

(a) Show that the exterior surface area, $A \text{ cm}^2$, of the container is given by

$$A = \pi r^2 + \frac{1000}{r}. \quad (4)$$

(b) Find the value of r for which A is a minimum. (4)

(c) Prove that this value of r gives a minimum value of A . (2)

(d) Calculate the minimum value of A , giving your answer to the nearest integer. (2)

TOTAL FOR PAPER: 53 MARKS

END