Core Mathematics C1 For Edexcel Advanced Subsidiary

Paper H

Time: 1 hour 30 minutes

Instructions and Information

Candidates may NOT use a calculator in this paper.

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.

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1. (*a*) Write down the value of $27^{\frac{1}{3}}$

(1)

(*b*) Find the value of $16^{-\frac{1}{2}}$

(2)

(*c*) Given that $64 = 4^x$, write down the value of x.

(1)

(*d*) Given that $64^{(1-y)} = 4^y$, find the value of y.

(3)

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2. (*a*) Given that $y = 3x^3 + 8x - 7$, find

(i) $\dfrac{\mathrm{d}y}{\mathrm{d}x}$,

(3)

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

(1)

(*b*) Find $\displaystyle\int \left(5 + 6\sqrt{x} + \frac{2}{x^2}\right) dx$

(4)

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3. Given that the equation $kx^2 + 12x + 9 = 0$, where k is a positive constant, has equal roots, find the value of k.

(4)

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4. Solve the simultaneous equations

$$x - 2y = 7$$

$$x^2 + 4y^2 = 37$$

(6)

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5. The sequence $u_1, u_2, u_3, \ldots$ is defined by

$$u_n = 2^n - \frac{n}{k}$$

where k is a constant.

Given that $u_1 = u_2$

(*a*) find the value of k,

(3)

(*b*) find the value of u_4

(2)

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6. The curve with equation $y = f(x)$ passes through the point $(4, -1)$.

Given that

$$f'(x) = 3x^{\frac{1}{2}} + 5$$

find $f(x)$.

(6)

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7. **Figure 1**

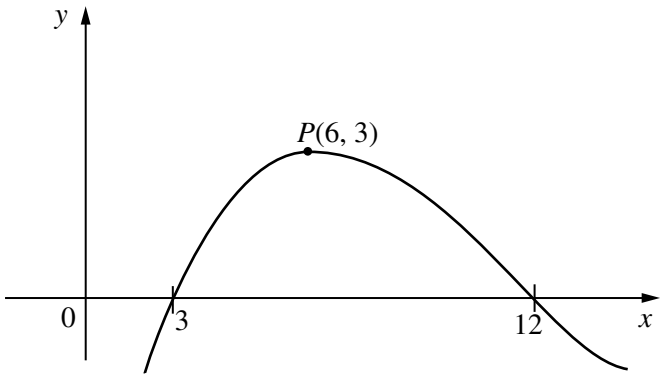

Figure 1 shows a sketch of the curve with equation $y = f(x)$. The curve crosses the x-axis at the points $(3, 0)$ and $(12, 0)$. The maximum point on the curve is $P(6, 3)$.

In separate diagrams sketch the curve with equation

(*a*) $y = f(x + 2)$

(3)

(*b*) $y = f(3x)$

(3)

On each diagram, give the coordinates of the points at which the curve crosses the x-axis, and the coordinates of the image of P under the given transformation.

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8. (*a*) Given that $y = x^3 - 4x^2 + 5x - 2$, find $\frac{dy}{dx}$.

(2)

P is the point on the curve where $x = 3$.

(*b*) Calculate the y-coordinate of P.

(1)

(*c*) Calculate the gradient at P.

(2)

(*d*) Find the equation of the tangent at P.

(2)

(*e*) Find the equation of the normal at P.

(2)

(*f*) Find the values of x for which the curve has a gradient of 5.

(3)

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9. The curve C has equation $y = x^2 - 3$ and the straight line l has equation $y = 3 - x$.

(*a*) Sketch C and l on the same axes.

(3)

(*b*) Write down the coordinates of the points at which C meets the coordinate axes.

(2)

(*c*) Using algebra, find the coordinates of the points at which l intersects C.

(4)

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10. The points $A(1, 2)$, $B(3, -2)$ and $C(k, 0)$, where k is a constant, are the vertices of ΔABC. Angle ABC is a right angle.

(*a*) Find the gradient of AB.

(2)

(*b*) Calculate the value of k.

(3)

(*c*) Show that the length of AB may be written in the form $p\sqrt{5}$, where p is an integer to be found.

(3)

(*d*) Find the exact value of the area of ΔABC.

(4)

END **TOTAL 75 MARKS**