

GCE

Edexcel GCE

Core Mathematics C1 (6663)

January 2005

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Mark Scheme

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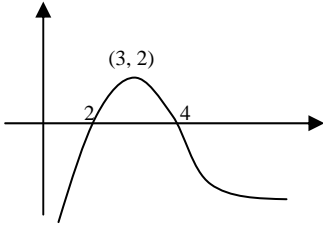
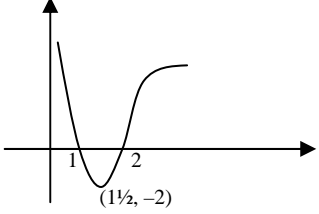
Question number	Scheme	Marks
1.	<p>(a) 4 (or ± 4)</p> <p>(b) $16^{-\frac{3}{2}} = \frac{1}{16^{\frac{3}{2}}}$ and any attempt to find $16^{\frac{3}{2}}$</p> <p>$\frac{1}{64}$ (or exact equivalent, e.g. 0.015625) (or $\pm \frac{1}{64}$)</p>	<p>B1</p> <p>M1</p> <p>A1 (3)</p> <p>3</p>

Question number	Scheme	Marks
2.	(i) (a) $15x^2 + 7$ (i) (b) $30x$ (ii) $x + 2x^{\frac{3}{2}} + x^{-1} + C$	M1 A1 A1 (3) B1ft (1) A1: $x + C$, A1: $+2x^{\frac{3}{2}}$, A1: $+x^{-1}$ M1 A1 A1 A1(4) 8

Question number	Scheme	Marks
3.	<p>Attempt to use discriminant $b^2 - 4ac$ Should have no x's (Need not be equated to zero) (Could be within the quadratic formula)</p> <p>$144 - 4 \times k \times k = 0$ or $\sqrt{144 - 4 \times k \times k} = 0$</p> <p>Attempt to solve for k (Could be an inequality)</p> <p>$k = 6$</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1 (4)</p> <p>4</p>

Question number	Scheme	Marks
4.	$x^2 + 2(2 - x) = 12$ or $(2 - y)^2 + 2y = 12$ (Eqn. in x or y only) $x^2 - 2x - 8 = 0$ or $y^2 - 2y - 8 = 0$ (Correct 3 term version) (Allow, e.g. $x^2 - 2x = 8$) $(x - 4)(x + 2) = 0$ $x = \dots$ or $(y - 4)(y + 2) = 0$ $y = \dots$ $x = 4, \quad x = -2$ or $y = 4, \quad y = -2$ $y = -2, \quad y = 4$ or $x = -2, \quad x = 4$ (M: attempt one, A: both)	M1 A1 M1 A1 M1 A1ft (6) 6

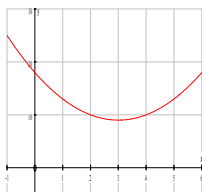
Question number	Scheme	Marks
5.	<p>(a) $-3, -1, 1$ B1: One correct</p> <p>(b) 2 (ft only if terms in (a) are in arithmetic progression)</p> <p>(c) $\text{Sum} = \frac{1}{2}n\{2(-3) + (n-1)(2)\}$ or $\frac{1}{2}n\{(-3) + (2n-5)\}$</p> <p>$= \frac{1}{2}n\{2n-8\} = n(n-4)$ (<u>Not</u> just $n^2 - 4n$) (*)</p>	<p>B1 B1 (2)</p> <p>B1ft (1)</p> <p>M1 A1ft</p> <p>A1 (3)</p> <p>6</p>

Question number	Scheme		Marks
6.	<p>(a)</p>  <p>(b)</p> 	<p>Reflection in x-axis, cutting x-axis twice. 2 and 4 labelled (or (2, 0) and (4, 0) seen) Image of P (3, 2)</p> <p>Stretch parallel to x-axis 1 and 2 labelled (or (1, 0) and (2, 0) seen) Image of P ($1\frac{1}{2}$, -2)</p>	<p>B1 B1 B1 (3)</p> <p>M1 A1 A1 (3) 6</p>

Question number	Scheme	Marks
7.	<p>(a) $\frac{5-x}{x} = \frac{5}{x} - \frac{x}{x} \left(= \frac{5}{x} - 1 \right) \quad (= 5x^{-1} - 1)$</p> <p>$\frac{dy}{dx} = 8x, -5x^{-2}$</p> <p>When $x = 1$, $\frac{dy}{dx} = 3$ (*)</p> <p>(b) At P, $y = 8$</p> <p>Equation of tangent: $y - 8 = 3(x - 1) \quad (y = 3x + 5) \quad (\text{or equiv.})$</p> <p>(c) Where $y = 0$, $x = -\frac{5}{3} \quad (= k) \quad (\text{or exact equiv.})$</p>	<p>M1</p> <p>M1 A1, A1</p> <p>A1 cso (5)</p> <p>B1</p> <p>M1 A1ft (3)</p> <p>M1 A1 (2)</p> <p>10</p>

Question number	Scheme	Marks
8.	<p>(a) $p = 15, q = -3$</p> <p>(b) Grad. of line ADC: $m = -\frac{5}{7}$, Grad. of perp. line $= -\frac{1}{m} \left(= \frac{7}{5} \right)$</p> <p>Equation of l: $y - 2 = \frac{7}{5}(x - 8)$</p> <p>$7x - 5y - 46 = 0$ (Allow rearrangements, e.g. $5y = 7x - 46$)</p> <p>(c) Substitute $y = 7$ into equation of l and find $x = \dots$</p> <p>$\frac{81}{7}$ or $11\frac{4}{7}$ (or exact equiv.)</p>	<p>B1 B1 (2)</p> <p>B1, M1</p> <p>M1 A1ft</p> <p>A1 (5)</p> <p>M1</p> <p>A1 (2)</p> <p>9</p>

Question number	Scheme	Marks
9.	<p>(a) Evaluate gradient at $x = 1$ to get 4, Grad. of normal $= -\frac{1}{m} \left(= -\frac{1}{4} \right)$</p> <p>Equation of normal: $y - 4 = -\frac{1}{4}(x - 1)$ ($4y = -x + 17$)</p> <p>(b) $(3x - 1)^2 = 9x^2 - 6x + 1$ (May be seen elsewhere)</p> <p>Integrate: $\frac{9x^3}{3} - \frac{6x^2}{2} + x (+C)$</p> <p>Substitute (1, 4) to find $c = \dots$, $c = 3$ ($y = 3x^3 - 3x^2 + x + 3$)</p> <p>(c) Gradient of given line is -2</p> <p>Gradient of (tangent to) C is ≥ 0 (allow >0), so can never equal -2.</p>	<p>B1, M1</p> <p>M1 A1 (4)</p> <p>B1</p> <p>M1 A1ft</p> <p>M1, A1cso (5)</p> <p>B1</p> <p>B1 (2)</p> <p>11</p>

Question number	Scheme	Marks
10.	<p>(a) $x^2 - 6x + 18 = (x - 3)^2 + 9$</p> <p>(b)  “U”-shaped parabola Vertex in correct quadrant P: (0, 18) (or 18 on y-axis) Q: (3, 9)</p> <p>(c) $x^2 - 6x + 18 = 41$ or $(x - 3)^2 + 9 = 41$ Attempt to solve 3 term quadratic $x = \dots$ $x = \frac{6 \pm \sqrt{36 - (4 \times -23)}}{2} \quad (\text{or equiv.})$ $\sqrt{128} = \sqrt{64 \times 2} \quad (\text{or surd manipulation } \sqrt{2a} = \sqrt{2}\sqrt{a})$ $3 + 4\sqrt{2}$</p>	<p>B1, M1 A1 (3)</p> <p>M1</p> <p>A1ft</p> <p>B1</p> <p>B1ft (4)</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1 (5)</p> <p>12</p>