FOR OCR

GCE Examinations

Advanced / Advanced Subsidiary

Core Mathematics C1

Sample Paper from Solomon Press

MARKING GUIDE

This guide is intended to be as helpful as possible to teachers by providing concise solutions and indicating how marks could be awarded. There are obviously alternative methods that would also gain full marks.

Method marks (M) are awarded for using a valid method.

Accuracy marks (A) can only be awarded when a correct method has been used.

(B) marks are independent of method marks.

Written by Shaun Armstrong

C1 Sample Paper – Marking Guide

1. *(i)* $= 3^2 - [4 \times 2 \times (-1)] = 9 + 8 = 17$ M1 A1

(ii) discriminant > 0 $\therefore$ 2 real roots B2 **(4)**

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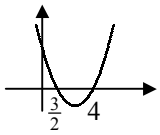
2. $(2x - 3)(x - 4) < 0$ M1 A1



M1

$\frac{3}{2} < x < 4$ A1 **(4)**

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3. *(i)* $= (\frac{25}{4})^{-\frac{1}{2}} = \sqrt{\frac{4}{25}} = \frac{2}{5}$ M1 A1

(ii) $2^{x+1} = 2^2 \times 2^{\frac{1}{2}} = 2^{\frac{5}{2}}$ B1

$x + 1 = \frac{5}{2}$ M1

$x = \frac{3}{2}$ A1 **(5)**

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4. $2x - y + 9 = 0 \Rightarrow \quad y = 2x + 9$ M1

sub. into $x^2 + 2xy + y^2 = 9$

$x^2 + 2x(2x + 9) + (2x + 9)^2 = 9$ M1

$x^2 + 6x + 8 = 0$ A1

$(x + 2)(x + 4) = 0$ M1

$x = -2, -4$ A1

$\therefore \ x = -2, \ y = 5$ or $x = -4, \ y = 1$ M1 A1 **(7)**

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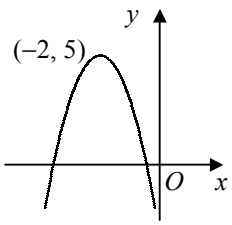
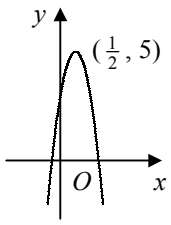
5. *(a)* *(i)*



(ii)



B2

B2

(b) quadratic, turning point (1, 5)

$\therefore \ f(x) = k(x - 1)^2 + 5 = kx^2 - 2kx + k + 5$ M1 A1

$\therefore \ k + 5 = 3, \ k = -2$ M1

$\therefore \ a = -2, \ b = 4$ A1 **(8)**

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6. *(i)* $\frac{dy}{dx} = 1 - 8x^{-2}$ M1 A1

at A, $1 - 8x^{-2} = 0$ M1

$x^2 = 8$ A1

$x > 0 \ \therefore x = \sqrt{8} = \sqrt{4 \times 2} = 2\sqrt{2}$ A1

(ii) $y = 2\sqrt{2} + \frac{8}{2\sqrt{2}} + 3$ M1

$= 2\sqrt{2} + 2\sqrt{2} + 3 = 4\sqrt{2} + 3$ A1

(iii) $\frac{d^2y}{dx^2} = 16x^{-3}$ M1

at A, $\frac{d^2y}{dx^2} = \frac{16}{(2\sqrt{2})^3}$ M1

$\frac{d^2y}{dx^2} > 0 \ \therefore$ minimum point A1 **(10)**

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7. *(i)* grad $= \frac{3-2}{1-(-2)} = \frac{1}{3}$ M1 A1

$\therefore\ y - 2 = \frac{1}{3}(x + 2)$ M1

$3y - 6 = x + 2$

$x - 3y + 8 = 0$ A1

(ii) grad $l_2 = \frac{-1}{\frac{1}{3}} = -3$ M1

$\therefore\ y + 1 = -3(x - 9)$ $\quad [\ y = 26 - 3x\ ]$ A1

(iii) at D, $x - 3(26 - 3x) + 8 = 0$ M1

$x = 7\ \ \therefore D\ (7, 5)$ A1

$AB = \sqrt{(1+2)^2 + (3-2)^2} = \sqrt{9+1} = \sqrt{10}$ M1

$AD = \sqrt{(7+2)^2 + (5-2)^2} = \sqrt{81+9} = \sqrt{90} = 3\sqrt{10}$ A1

$\therefore\ AB : AD = \sqrt{10} : 3\sqrt{10} = 1 : 3$ A1 **(11)**

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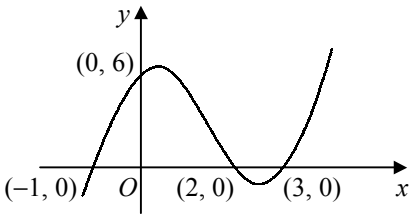
8. *(i)* LHS $= (x + 1)(x^2 - 5x + 6) = x(x^2 - 5x + 6) + (x^2 - 5x + 6)$ M1

$= x^3 - 5x^2 + 6x + x^2 - 5x + 6 = x^3 - 4x^2 + x + 6 =$ RHS A1

(ii)



B3

(iii) when $x = 1$, $y = 1 - 4 + 1 + 6 = 4$ B1

$\frac{dy}{dx} = 3x^2 - 8x + 1$ M1 A1

when $x = 1$, grad $= 3 - 8 + 1 = -4$ A1

$\therefore\ y - 4 = -4(x - 1)$ $\quad [\ y = 8 - 4x\ ]$ M1 A1 **(11)**

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9. *(i)* grad $PQ = \frac{7-3}{4-(-8)} = \frac{1}{3}$, grad $QR = \frac{1-7}{6-4} = -3$ M1

grad $PQ \times$ grad $QR = \frac{1}{3} \times (-3) = -1$ M1

$\therefore\ PQ$ perp. to QR, $\therefore\ \angle PQR = 90°$ A1

(ii) $\angle PQR = 90°\ \ \therefore\ PR$ is a diameter

$\therefore$ centre = mid-point of $PR = (\frac{-8+6}{2}, \frac{3+1}{2}) = (-1, 2)$ M1 A1

(iii) radius = dist. $(-8, 3)$ to $(-1, 2) = \sqrt{49+1} = \sqrt{50}$ B1

$(x + 1)^2 + (y - 2)^2 = (\sqrt{50})^2$ M1

$x^2 + 2x + 1 + y^2 - 4y + 4 = 50$

$x^2 + y^2 + 2x - 4y - 45 = 0$ A1

(iv) grad of radius $= \frac{7-2}{4-(-1)} = 1$ M1

$\therefore$ grad of tangent $= \frac{-1}{1} = -1$ A1

$\therefore\ y - 7 = -1(x - 4)$ M1

$y = 11 - x$ A1 **(12)**

Total **(72)**

Performance Record – C1 Sample Paper

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	discrim.	inequal.	indices	simul. eqn	transform., quad.	SP	straight lines	curve sketch, diff.	circle	
Marks	4	4	5	7	8	10	11	11	12	72
Student										