

Quadratic Expressions and Equations

1)

1	(i) $a = -12, b = -4$	B1, B1 [2]	B1 for each
	(ii) -4	√B1 [1]	Follow through on their y value

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2)

5	Eliminate y $x^2 + (8 - m)x + 9 = 0$	M1 A1
	Use $b^2 * 4ac$ Reach $(8 - m) * \pm 6$ or solves $m^2 - 16m + 28 * 0$ (* is either $>$ or $=$)	DM1 DDM1
	$m = 2$ and 14 $m < 2, m > 14$	A1 A1 [6]

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3)

3	$4(2k+1)^2 = 4(k+2)$ $4k^2 + 3k - 1 = 0$	M1 A1	M1 for use of ' $b^2 - 4ac$ ' Correct quadratic equation
	leading to $k = \frac{1}{4}, -1$	M1 A1 [4]	M1 for correct attempt at solution A1 for both k values

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4)

7	(i) $y = 4x^2 - 12x + 3$ $y = (2x - 3)^2 - 6$	B1 B1 B1 [3]	B1 for 2 (part of linear factor) B1 for -3 (part of linear factor) B1 for -6
	(ii) $\left(\frac{3}{2}, -6\right)$	√B1, √B1 [2]	Follow through on their a, b and c Allow calculus method.
	(iii) $f \geq -6$	√B1 [1]	Follow through on their c

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5)

1	$x^2 + (2k+10)x + (k^2 + 5) = 0$	M1	M1 for equating to zero and use of $b^2 = 4ac$ M1 for solution
	$(2k+10)^2 = 4(k^2 + 5)$	M1	
	$k = -2$	A1	
		[3]	
	(or $\frac{dy}{dx} = 2x + (2k+10), x = -(k+5)$)	M1	M1 for differentiation and attempt to equate to zero.
	$0 = (k+5)^2 - (2k+10)(k+5) + k^2 + 5$	M1	M1 for attempt to substitute in for x in terms of k, for y = 0 and for attempt at solution.
	leading to $k = -2$)	A1	
	(or $(x+A)^2 = x^2 + (2k+10)x + k^2 + 5$)	M1	M1 for approach
	$A = (k+5), A^2 = k^2 + 5$	M1	M1 for equating and attempt at solution
	$(k+5)^2 = k^2 + 5, \text{ leading to } k = -2$)	A1	
(or by completing the square			
$y = (x + (k+5))^2 - (k+5)^2 + (k^2 + 5)$	M1	M1 for approach	
$(k+5)^2 = k^2 + 5$	M1	M1 for equating last 2 terms to zero and attempt to solve	
leading to $k = -2$)	A1		

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6)

4	Eliminates y	M1	[6]
	$x^2 + kx - 2x + 16 (= 0)$	A1	
	Uses $b^2 - 4ac$	M1	
	$k^2 - 4k - 60 = 0$ or $(k-2) \pm 8$	A1	
	$k = -6$ or 10	A1	
	$k < -6$ or $k > 10$	A1	

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7)

1	$24x^2 - 6x = 0$	M1	M1 for attempt to get an equation in one variable.
	(or $y^2 + 3y + 2 = 0$)	M1	M1 for attempt to get 2 or 3 term quadratic = 0
	leading to $(0, 1)$ and $(\frac{1}{4}, -2)$	DM1 A1, A1	DM1 for attempt to solve A1 for each pair of values
		[5]	

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8)

<p>4 (i) $5x - 3 = kx^2 - 3x + 5$ $kx^2 - 8x + 8 = 0$ using $b^2 - 4ac = 0, k = 2$ (Alt scheme: $5 = 2kx - 3, x = \frac{4}{k}$ $\frac{20}{k} - 3 = \frac{16}{k} - \frac{12}{k} + 5$ leading to $k = 2$)</p> <p>(ii) leading to $x = 2, y = 7$</p>	<p>M1 DM1, A1 [3]</p> <p>M1, A1 [2]</p>	<p>M1 for equating line and curve equations DM1 for use of $b^2 - 4ac$ on resulting quadratic (Alt scheme: M1 for attempt to differentiate quadratic and equate to 5 DM1 for simplification and solution using resulting quadratic)</p> <p>M1 for obtaining x and y coords</p>
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9)

<p>3 Eliminates x or y $7x^2 - 14x - 21 = 0$ or $7y^2 + 14y - 105 = 0$ oe Solve 3 term quadratic $(x+1)(x-3)$ $(3,3)$ and $(-1,-5)$</p>	<p>M1 A1 M1 A1 A1</p>
<p>[or $x = \frac{2 \pm \sqrt{16}}{2}$ -1 and 3 $(3,3)$ and $(-1,-5)$</p>	<p>M1 A1 A1] [5]</p>

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