

Question number	Scheme	Marks
<b>1.</b>		
(a)	$3x - x > 13 + 8$ $x > \frac{21}{2}$	M1, A1 (2)
(b)	$x^2 - 5x - 14 > 0$ $x < -2$ or $x > 7$ $(x - 7)(x + 2) > 0$ $x = 7, -2$	B1 M1, A1 ft (3)
		<b>(5 marks)</b>
<b>2.</b>		
(a)	$x = -\frac{1}{2}$ $4 = 2^2$ and $\sqrt{2} = 2^{\frac{1}{2}}$ , $y = 2\frac{1}{2}$	B1 M1, A1 (3)
(b)	$y - x = 3$ $2^3 = 8$ (or: $4\sqrt{2} \div \frac{1}{\sqrt{2}} = 8$ )	M1 A1 (2)
		<b>(5 marks)</b>
<b>3.</b>		
(a)	$(x + k)^2, -k^2 + c (= 0)$ $(x + k)^2 = k^2 - c$ $x = -k \pm \sqrt{(k^2 - c)}$ *	M1, A1 M1 A1 c.s.o (4)
(b)	(Discriminant = 0, $k^2 = 81$ $k = 9$ , or $-9$ )	B1, B1 (2)
		<b>(6 marks)</b>
<b>4.</b>		
(a)(i)	$a + (n - 1)d = 280 + (35 \times 5) = 455$	M1 A1
(ii)	$\frac{1}{2}n [2a + (n - 1)d] = 18 [560 + (35 \times 5)] = 13\,230$	M1 A1 ft (4)
(b)	$18 [560 + (35 \times d)] = 17\,000$ $d = 10.98\dots$ $x = 11$ (allow 11.0 or 10.98 or 10.99 or $10\frac{62}{63}$ )	M1 A1 M1 A1 (4)
		<b>(8 marks)</b>

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5.	(a) (2, 0) (or $x = 2, y = 0$ )	B1 (1)
	(b) $y^2 = 4\left(\frac{3y+12}{2} - 2\right)$ or $\left(\frac{2x-12}{3}\right)^2 = 4(x-2)$	M1
	$y^2 - 6y - 16 = 0$ or $x^2 - 21x + 54 = 0$ (or equiv. 3 terms)	A1
	$(y+2)(y-8) = 0, y = \dots$ or $(x-3)(x-18) = 0, x = \dots$ (3 term quad.)	M1
	$y = -2, y = 8$ or $x = 3, x = 18$	A1
	$x = 3, x = 18$ or $y = -2, y = 8$ (attempt <u>one</u> for M mark)	M1 A1ft (6)
	(A1ft requires both values)	
	(c) Grad. of $AQ = \frac{8-0}{18-2}$ , Grad. of $AP = \frac{0-(-2)}{2-3}$ (attempt <u>one</u> for M mark)	M1 A1ft
	$m_1 \times m_2 = \frac{1}{2} \times -2 = -1$ , so $\angle PAQ$ is a right angle (A1 is c.s.o.)	M1 A1 (4)
	Alternative: Pythagoras: Find 2 lengths [M1] $AQ = \sqrt{320}, AP = \sqrt{5}, PQ = \sqrt{325}$ (O.K. unsimplified) [A1ft] (if decimal values only are given, with no working shown, require at least 1 d.p. accuracy for M1(implied) A1) $AQ^2 + AP^2 = PQ^2$ , so $\angle PAQ$ is a right angle [M1, A1] M1 requires attempt to use Pythag. for right angle at A, and A1 requires correct <u>exact</u> working + conclusion.	(11 marks)
6.	(a) $AB: m = -\frac{4}{3}, BC: m = \frac{3}{4}$ (s.c. $AB: \frac{4}{3}, BC: \frac{3}{4}$ B1)	B1, M1 A1 ft (3)
	(b) $BC = \sqrt{(8^2 + (k-4)^2)}$ ( $= \sqrt{(k^2 - 8k + 80)}$ )	M1 A1 (2)
	(c) $(k^2 - 8k + 80) = 100$ (Their $BC^2 = 100$ )	M1
	$k^2 - 8k - 20 = 0$ ( $(k-10)(k+2) = 0$ )	M1 A1
	$k = 10, k = -2$ (rejected)	A1 (4)
(d) (11, 6)	B1 B1 (2)	
	(11 marks)	

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7.	<p>(a) Integrate: <math>y = x^3 - 10x^2 + 29x (+C)</math>  <math>6 = 8 - 40 + 58 + C \Rightarrow C = -20</math> (<math>y = x^3 - 10x^2 + 29x - 20</math>)</p> <p>(b) Substitute <math>x = 4</math>: <math>64 - 160 + 116 - 20 = 0</math></p> <p>(c) At <math>x = 2</math>, <math>\frac{dy}{dx} = 12 - 40 + 29 = 1</math>  Tangent: <math>y - 6 = x - 2</math> (<math>y = x + 4</math>)</p> <p>(d) <math>\frac{dy}{dx} = 1</math>  <math>3x^2 - 20x + 28 = 0</math>  <math>(3x - 14)(x - 2) = 0</math>  <math>x = \frac{14}{3}</math></p>	<p>M1 A1</p> <p>M1 A1 (4)</p> <p>M1 A1 (2)</p> <p>B1</p> <p>M1 A1 (3)</p> <p>M1</p> <p>M1</p> <p>M1 A1</p> <p>A1 (5)</p> <p><b>(14 marks)</b></p>