

Higher Grade Unit Tests

Marking Scheme - UNIT 2

	Give 1 mark for each •	Illustration for awarding each mark
1	A	Award 2 marks for each correct answer 10 marks
2	C	
3	B	
4	B	
5	A	
6(a)	ans: $(x - 5)^2 + (y + 1)^2 = 34$ (3 marks) —¹ knows to find centre —² finds radius —³ states equation of circle	—¹ midpoint AB = (5, -1) —² $r^2 = (8 - 5)^2 + (4 - (-1))^2 = 34$ —³ $(x - 5)^2 + (y + 1)^2 = 34$
(b)	ans: $3y - 5x + 62 = 0$ (3 marks) —¹ finds gradient from the centre —² finds gradient of tangent —³ subs into straight line equation	—¹ $m = \frac{-1 + 4}{5 - 10} = -\frac{3}{5}$ —² $m_{\tan} = \frac{5}{3}$ —³ $y + 4 = \frac{5}{3}(x - 10)$
7	ans: $0^\circ, 109.5^\circ, 180^\circ, 250.5^\circ$ (5 marks) —¹ replaces $\sin 2x^\circ$ —² multiplies out and equates to 0 —³ factorises by taking common factor —⁴ solves for first factor —⁵ solves for second factor	—¹ $3(2 \sin x^\circ \cos x^\circ) \dots$ —² $6 \sin x^\circ \cos x^\circ + 2 \sin x^\circ = 0$ —³ $2 \sin x^\circ (3 \cos x^\circ + 1) = 0$ —⁴ $x = 0^\circ, 180^\circ$ —⁵ $x = 109.5^\circ, 250.5^\circ$

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8(a)	ans: $k = 1$ (3 marks)	
	$\frac{1}{-}$ knows to use synthetic division $\frac{2}{-}$ completes synthetic division $\frac{3}{-}$ equates remainder to 0 and solves for k	$\frac{1}{-} \quad -3 \left \begin{array}{rrrr} 3 & -k & -38 & -24 \end{array} \right.$ $\frac{2}{-} \quad -3 \left \begin{array}{rrrr} 3 & -k & -38 & -24 \\ & -9 & 3k+27 & 33-9k \end{array} \right.$ $\frac{3}{-} \quad 3 \quad -k-9 \quad 3k-11 \quad 9-9k$ $\frac{3}{-} \quad 9-9k = 0; k = 1$
(b)	ans: $(x+3)(3x+2)(x-4)$ (2 marks)	
	$\frac{1}{-}$ starts to factorise $\frac{2}{-}$ completes factorising	$\frac{1}{-} \quad (x+3)(3x^2-10x-8)$ $\frac{2}{-} \quad (x+3)(3x+2)(x-4)$
9	ans: $-3x^{-\frac{1}{3}} - \frac{1}{2}x^2 + C$ (5 marks)	
	$\frac{1}{-}$ brings power up and deals with surd $\frac{2}{-}$ prepares to integrate $\frac{3}{-}$ integrates first term $\frac{4}{-}$ integrates second term $\frac{5}{-}$ adds constant of integration	$\frac{1}{-} \quad \int x^{-2}(x^{\frac{2}{3}} - x^3) dx$ $\frac{2}{-} \quad \int x^{-\frac{4}{3}} - x dx$ $\frac{3}{-} \quad \frac{x^{-\frac{1}{3}}}{-\frac{1}{3}} \dots\dots\dots [\text{or } -3x^{-\frac{1}{3}}]$ $\frac{4}{-} \quad \dots\dots\dots - \frac{x^2}{2}$ $\frac{5}{-} \quad \dots\dots\dots + C$
10	ans: $k = 1$ (4 marks)	
	$\frac{1}{-}$ knows to make discriminant = 0 $\frac{2}{-}$ lists values of a, b and c $\frac{3}{-}$ substitutes and rearranges $\frac{4}{-}$ factorises and discards	$\frac{1}{-} \quad b^2 - 4ac = 0 \text{ for equal roots [stated/implied]}$ $\frac{2}{-} \quad a = k; b = k - 3; c = k$ $\frac{3}{-} \quad 9 - 6k - 3k^2 = 0$ $\frac{4}{-} \quad 3(3+k)(1-k); k = 1$

	Give 1 mark for each •	Illustration(s) for awarding each mark
11	ans: $y = 3x - \frac{6}{x} - 13$ (5 marks) –¹ knows to integrate –² prepares to integrate –³ integrates –⁴ subs to find C –⁵ expresses y in terms of x	–¹ $y = \int 3 + \frac{6}{x^2} dx$ –² $y = \int 3 + 6x^{-2} dx$ –³ $y = 3x + \frac{6x^{-1}}{-1} + C; y = 3x - \frac{6}{x} + C$ –⁴ $4 = 18 - 1 + C; C = -13$ –⁵ $y = 3x - \frac{6}{x} - 13$
		Total: 40 marks