Paper: 1MA1/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
16 **Q1**		$2(2n-3)$ even	C1 C1 C1 C1	correct expansion of brackets to give at least 3 terms from $n^2-2n-2n+4$ arrives at n^2-2-n^2+4n-4 oe reduces to $2(2n-3)$ or $4n-6$ for conclusion e.g. $2(2n-3)$ always even, $4n-6$ is always even since both are even numbers, they are multiples of 2.

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
12 **Q2**	Statement supported by algebra	B1 M1 A1 C1	writing a general expression for an odd number eg $2n+1$ (dep) for expanding ("odd number")^2 with at least 3 out of 4 correct terms for correct simplified expansion, eg $4n^2 + 4n + 1$ (dep A1) for a concluding statement eg $4(n^2 + n) +1$ (is one more than a multiple of 4)	Could be $2n - 1$, $2n + 3$, etc Note that $4n^2 + 4n + 2$ or $2n^2 + 4n +1$ in expansion of $(2n + 1)^2$ is to be regarded as 3 correct terms

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Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
13 **Q3**	Proof shown	C2 (C1	for complete argument, eg $n(n-1)$ is the product of two consecutive integers and must be even as either n or $n-1$ must be even **or** gives correct reasoning for n odd **and** n even n odd: odd × odd = odd and odd – odd = even n even: even × even = even and even – even = even **or** n odd: $(2n+1)^2 - (2n+1) = 4n^2 + 2n = 2(2n^2 + n)$ n even: $(2n)^2 - (2n) = 4n^2 - 2n = 2(2n^2 - n)$ for factorising, eg $n(n-1)$ **OR** gives correct reasoning for n odd **or** n even **OR** gives a partial explanation using n odd **and** n even, eg $\text{odd}^2 - \text{odd} = \text{even}$ and $\text{even}^2 - \text{even} = \text{even}$)	

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
15 **Q4**	proof	C1	for writing an expression for an odd number, eg $2n + 1$ or $2n – 1$ (assuming n is any integer) **or** states n is even and eg $(n + 1)$ or $(n + 3)$ as odd numbers	
		C1	for a correct expression of the form $(2n + 1)^2 − (2n – 1)^2$ expanded eg $4n^2 + 12n + 9 – (4n^2 + 4n + 1)$ or $4n^2 + 4n + 1 – (4n^2 – 4n + 1)$ **or** $(2n + 1 + 2n – 1)(2n + 1 – (2n – 1))$ **or** when n is even and eg $(n^2 + 6n + 9) – (n^2 + 2n + 1)$ $(=4n + 8)$	Expansion of $(2n – 1)^2 − (2n + 1)^2$ oe is acceptable
		C1	for a correct simplified expression as a multiple of 8 eg $8n + 8$ or $8n$ **or** when n is even **and** eg $4n + 8$ **and** full explanation as to why $4(n+2)$ is always a multiple of 8	

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
15 **Q5**	Proof	M1	for correct expressions for two consecutive even numbers eg $2n$ and $2n+2$	$(2n)^2 + (2n + 2)^2$ $= 4n^2 + 4n^2 + 8n + 4$ $= 8n^2 + 8n + 4 = 4(2n^2 + 2n + 1)$
		M1	(dep M1) for expanding both expressions with at least one expansion fully correct eg $4n^2$ and $4n^2 + 4n + 4n + 4$ **or** for factorising both terms and intention to square correctly eg $(2n)^2$ and $2^2(n+1)^2$	**Or** $(2n)^2 + (2n - 2)^2$ $= 4n^2 + 4n^2 - 8n + 4$ $= 8n^2 - 8n + 4 = 4(2n^2 - 2n + 1)$
		A1	complete proof	**Or** $(2n)^2 + (2n + 2)^2$ $= 4(n)^2 + 4(n + 1)^2$ $= 4(n^2 + (n + 1)^2)$

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Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
16 (a) **Q6**	Proof	M1	for expansion of $(2m + 1)^2$ or $(2n – 1)^2$, all 4 terms correct with or without signs (and no additional terms) or 3 out of 4 terms correct with signs, eg $4m^2 + 2m + 2m + 1$ or $4n^2 – 2n – 2n + 1$ **or** for correct expansion of $4(m + n)(m – n +1)$ or $(m + n)(m – n +1)$ eg $4m^2 – 4mn + 4m + 4mn – 4n^2 + 4n$ oe or $m^2 – mn + m + mn – n^2 + n$ oe **or** for $\left[2m+1+2n-1\right]\left[(2m+1)-(2n-1)\right]$	Note that, for example, $4m + 1$ is regarded as 3 terms in the expansion of $(2m + 1)^2$
		M1	for correct expression after expansion for $(2m + 1)^2 – (2n – 1)^2$ eg $(4m^2 + 4m + 1) – (4n^2 – 4n + 1)$ or $4m^2 + 4m + 1 – 4n^2 + 4n – 1$ oe $(= 4m^2 + 4m – 4n^2 + 4n)$ **or** for $\left[2m+1+2n-1\right]\left[2m+1-2n+1\right]$	
		C1	for a complete proof without any errors, eg uses difference of two squares to show that LHS = RHS **or** expands both sides and shows that LHS = RHS **or** expands and simplifies LHS and factorises convincingly to get RHS	Must see correct expression $4m^2 – 4n^2 + 4m + 4n$ $= 4[(m^2 – n^2) + (m + n)]$ $= 4[(m + n)(m – n) + (m + n)]$ $= 4(m + n)(m – n + 1)$
(b)	Yes (supported)	C1	for yes with explanation, eg $2m + 1$ and $2n – 1$ are odd numbers (for any positive integer value of m, n) and the right-hand side is a multiple of 4	

Paper: 1MA1/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
17 **Q7**		Completes proof	M1 C1	Expands both expressions eg $\frac{1}{2}(n^2 + n + n^2 + n + 2n + 2)$ **or** $n^2 + n$ and $n^2 + n + 2n + 2$ **or** factorises $\frac{1}{2}(n+1)(n+n+2)$ Completes proof with explanation and reference to $(n+1)^2$

Paper: 1MA1/3H				
Question	**Working**	**Answer**	**Mark**	**Notes**
19 **Q8**		Proof (supported)	M1 M1 M1 M1 C1	starts process to find point of intersection by substituting, eg $(10 + 2y)^2 + y^2$ (= 20) for expanding, eg $4y^2 + 20y + 20y + 100$ (3 out of 4 terms correct) (dep M2) for 3-term quadratic equation ready for solving, eg $5y^2 + 40y + 80 = 0$ (dep on previous M1) for method to solve an equation of the form $ay^2 + by + c = 0$, eg by factorising or correct substitution into quadratic formula fully correct method leading to $y = –4$ or $x = 2$ or $(y + 4)^2 = 0$ or $(x – 2)^2 = 0$ and statement, eg only one point of intersection so the line is a tangent to the circle