Answers and mark guide

Q	Answer	Working	Marks
1	**See working**	n + (n + 1) = 2n + 1, which is odd.	3
2	**See working**	n + (n + 1) + (n + 2) = 3n + 3 = 3(n + 1).	3
3	**See working**	(2a + 1) + (2b + 1) = 2a + 2b + 2 = 2(a + b + 1).	3
4	**See working**	2a × 2b = 4ab.	3
5	**See working**	$(2n + 1)^2 = 4n^2 + 4n + 1 = 2(2n^2 + 2n) + 1$, which is odd.	4
6	**See working**	$= (n^2 + 2n + 1) - (n^2 - 2n + 1) = 4n$.	4
7	**See working**	$= 4n^2 + 4n = 4n(n + 1)$. n(n + 1) is a product of consecutive integers so is even, hence 4n(n + 1) is a multiple of 8.	5
8	**See working**	$n^2 + n = n(n + 1)$. One of two consecutive integers is even, so the product is even.	4
9	**See working**	$n^2 + (n + 1)^2 = 2n^2 + 2n + 1 = 2(n^2 + n) + 1$, which is odd.	4
10	**See working**	n + (n + 1) + (n + 2) + (n + 3) + (n + 4) = 5n + 10 = 5(n + 2).	4
11	**See working**	$(a + b)^2 - 4ab = (a - b)^2 \geq 0$, so $(a + b)^2 \geq 4ab$.	5
12	**See working**	$(n + 1)^2 - n^2 = 2n + 1$, which is odd.	4
13	**See working**	Using the difference of two squares: (4)(4n + 2) = 8(2n + 1).	5
14	**See working**	2n + (2n + 2) + (2n + 4) = 6n + 6 = 6(n + 1).	4
15	**See working**	$n^3 - n = (n - 1)n(n + 1)$, the product of three consecutive integers. One is a multiple of 3 and at least one is even, so the product is divisible by 6.	5
16	**See working**	$x^2 + 6x + 10 = (x + 3)^2 + 1 \geq 1 > 0$.	4
17	**See working**	Let x = 0.4545… Then 100x = 45.4545…, so 99x = 45 and x = 45/99 = 5/11.	4
18	**See working**	= 4n + 4 = 4(n + 1).	4
19	**See working**	n(n + 1): one of n and n + 1 is even, so the product is even.	3
20	**See working**	$(2a + 1)^2 + (2b + 1)^2 = 4a^2 + 4a + 4b^2 + 4b + 2 = 2(2a^2 + 2a + 2b^2 + 2b + 1)$.	5

My score: _____ / 80 Questions 1–15 = 60 marks (Foundation focus)