

Question 10 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	For even numbers $n = 2m$, $n^2 - 2n + 2 = 4m^2 - 4m + 2$ $= 4(m^2 - m) + 2$	M1	This mark is given for showing the case for all even numbers
	This is a multiple of 4 with 2 added, so cannot be divisible by 4	A1	This mark is given for a correct conclusion with a reason why $n^2 + 2$ is not divisible by 4 for all even numbers
	For odd numbers $n = 2m + 1$, $n^2 - 2n + 2 = (2m + 1)^2 - 2(2m + 1) + 2$ $= 4m^2 + 4m - 4m + 1$ $= 4m^2 + 1$	M1	This mark is given for showing the case for all odd numbers
	This is a multiple of 4 with 1 added, so cannot be divisible by 4 Hence, for all $n \in \mathbb{N}$, $n^2 - 2n + 2$ is not divisible by 4	A1	This mark is given for a correct conclusion with a reason why $n^2 + 2$ is not divisible by 4 for all odd numbers and a full concluding statement that for all $n \in \mathbb{N}$, $n + 2$ is not divisible by 4
(b)	For example, for $x = 4.8$ $ 4x - 19 = 0.2$ and $(x - 4) = 0.8$	M1	This mark is given for showing that the statement is not true (for any case $4.6 < x < 5$)
	The statement is sometimes true; For example, for $x = 6$ $ 4x - 19 = 5$ and $(x - 4) = 2$	A1	This mark is given for a correct statement and an example where the statement is true