12. Let $n$ be a natural number. For each of the following statements, decide whether it is true or false. If true, give a proof; if false, give a counterexample.

A  If $n$ is a multiple of 9 then so is $n^2$.

B  If $n^2$ is a multiple of 9 then so is $n$.

Answers

A

Suppose $n = 9m$ for some natural number [positive integer], $m$.

Then $n^2 = 81m^2 = 9(9m^2)$

Hence $n^2$ is a multiple of 9, so A is true.

B

False. Accept any valid counterexample: $n = 3, 6, 12, 15, 21$ etc