Breakdown the statement

"if x is even then x^2 is even."

In symbols, that's: $\forall x\big(\mathrm{Even}(x) \rightarrow \mathrm{Even}(x^2)\big)$

Let's break down the statement to understand what the proof needs to look like:

$\forall x$ comes first. We need to introduce an arbitrary variable

$\mathrm{Even}(x) \rightarrow \mathrm{Even}(x^2)$ is left. We prove implications by assuming the hypothesis and setting the conclusion as our goal

$\mathrm{Even}(x)$ is our starting assumption, $\mathrm{Even}(x^2)$ is our goal

Let's do another!

First a definition

Rational

A real number x is rational if (and only if) there exist integers p and q, with $q \neq 0$ such that $x = p/q$.

$\texttt{Rational}(x) \coloneqq \exists p \exists q(\texttt{Integer}(p) \wedge \texttt{Integer}(q) \wedge (x = p/q) \wedge q \neq 0)$

Doing a Proof

$\forall x \forall y([\texttt{rational}(x) \wedge \texttt{rational}(y)] \rightarrow \texttt{rational}(xy))$
"The product of two rational numbers is rational."

DON'T just jump right in!
Look at the statement, make sure you know:
1. What every word in the statement means.
2. What the statement as a whole means.
3. Where to start.
4. What your target is.

Now You Try

Even
An integer x is even if (and only if) there exists an integer z, such that $x = 2z$.

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Help me adjust my explanation!

The sum of two even numbers is even.

Make sure you know:
1. What every word in the statement means.
2. What the statement as a whole means.
3. Where to start.
4. What your target is.

1. Write the statement in predicate logic.
2. Write an English proof.
3. If you have lots of extra time, try writing the symbolic proof instead.