

Section 6.1 How Do We Reason?

We reason by stating facts and making conclusions based on the facts. The start of a conclusion is usually indicated by a word such as

Therefore, Thus, So, Hence, Ergo,

To make a conclusion we apply an *inference rule*.

The most common inference rule is *modus ponens* (mode that affirms). If A and B be are statements and “if A then B ” and A are both true, then we can conclude that B is true.

Quiz. How did you learn the modus ponens rule as a child?

Another common inference rule is *modus tollens* (mode that denies). If A and B be are statements and “if A then B ” is true and B is false, then we can conclude that A is false.

Quiz. How did you learn the modus tollens rule as a child?

When a conclusion is made that does not follow from stated facts the reasoning is called a *non sequitur* (it does not follow).

Quiz. What is a non sequitur that you have observed?

Some dictionary-type definitions of *logic*:

- The study of the principles of reasoning, especially of the structure of statements and of methods to determine their validity.
- A system of reasoning.
- Valid reasoning.

A *calculus* is a language of expressions, where each expression has a value and there are rules to transform one expression into another that has the same value.