2-4 Deductive Reasoning

Objective   To use the Law of Detachment and the Law of Syllogism

Deductive reasoning (sometimes called logical reasoning) is the process of reasoning logically from given statements or facts to a conclusion.

Essential Understanding   Given true statements, you can use deductive reasoning to make a valid or true conclusion.

take note

Property   Law of Detachment

Law	Symbols
If the hypothesis of a true conditional is true, then the conclusion is true.	If $p \rightarrow q$ is true and p is true, then q is true.

1. What can you conclude from the given information?
   a. If there is lightning, then it is not safe to be out in the open.
      Marla sees lightning from the soccer field.
   b. If a figure is a square, then its sides have equal length.
      Figure *ABCD* has sides of equal length.

Another law of deductive reasoning is the Law of Syllogism. The **Law of Syllogism** allows you to state a conclusion from two true conditional statements when the conclusion of one statement is the hypothesis of the other statement.

take note

Property Law of Syllogism

Symbols

If $\quad p \rightarrow q \quad$ is true

and $\quad q \rightarrow r \quad$ is true,

then $\quad p \quad \rightarrow \quad r \quad$ is true.

Example

If it is July, then you are on summer vacation.

If you are on summer vacation, then you work at a smoothie shop.

You conclude: If it is July, then you work at a smoothie shop.

2. What can you conclude from the given information? What is your reasoning?

   a. If a whole number ends in 0, then it is divisible by 10.
      If a whole number is divisible by 10, then it is divisible by 5.

   b. If $\overrightarrow{AB}$ and $\overrightarrow{AD}$ are opposite rays, then the two rays form a straight angle.
      If two rays are opposite rays, then the two rays form a straight angle.

3. a. What can you conclude from the given
information? What is your reasoning?
If a river is more than 4000 mi long,
then it is longer than the Amazon.
If a river is longer than the Amazon,
then it is the longest river in the world.
The Nile is 4132 mi long.