

Directions - Use this guide to learn about conditional statements. Read each section carefully and answer each question. Section 2-1 in the textbook (starts on p. 33) can be used as a reference as you are working.

A **conditional statement** is a statement written in the form of "If _____, then _____."

Examples:

- 1) If today is Monday, then yesterday was Sunday.
- 2) If you do all of your homework, then you are allowed to go to the football game.
- 3) If $2x = 10$, then $x = 5$.

Please give your own example of a **conditional statement**: _____

There are two pieces of a conditional statement: the **Hypothesis** and the **Conclusion**.

Hypothesis: the clause that comes after the "If"

Conclusion: the clause that comes after the "Then"

Examples:

- 1) If today is Monday, then yesterday was Sunday.

Hypothesis: Today is Monday.

Conclusion: Yesterday was Sunday.

- 2) If you do all of your homework, then you are allowed to go to the football game.

Hypothesis: _____

Conclusion: _____

- 3) If $2x = 10$, then $x = 5$.

Hypothesis: _____

Conclusion: _____

The **converse** of a conditional statement is formed by interchanging the hypothesis and the conclusion.

Examples:

- 1) Original Conditional: If today is Monday, then yesterday was Sunday.

Converse: If yesterday was Sunday, then today is Monday.

- 2) Original Conditional: If you do all of your homework, then you are allowed to go to the football game.

Converse: If you are allowed to go to the football game, then you do all of your homework.

- 3) Original Conditional: If $2x = 10$, then $x = 5$.

Converse: _____

- 4) Write the converse of the conditional statement that you made up above.

A conditional statement is false if an example can be found for which the hypothesis is true but the conclusion is false. This type of example is called a counterexample.

Example: If I live in Pennsylvania, then I live in Doylestown.

Counterexample: If I live in Chalfont, the hypothesis is still true (I live in Pennsylvania), but it contradicts the conclusion.

Sometimes a conditional statement will be true, but its converse will be false.

Example: If I go to CB West High School, then I go to school in Central Bucks School District.
Converse: If I go to school in Central Bucks School District, then I go to school at CB West High School.

Counterexample for the Converse: If I go to Tohickon Middle School, the hypothesis is still true (I go to school in Central Bucks School District), but it contradicts the conclusion.

Write an example of a false conditional statement and provide a counterexample to show that it is false.

If the conditional statement and the converse are both true, then the statement can be rewritten as a biconditional statement.

Example 1: If A is the midpoint of BC, then $BA \cong AC$.
Converse: If $BA \cong AC$, then A is the midpoint of BC.

Because both of these are true, we can write it as a biconditional using the phrase "if and only if."

Biconditional: A is the midpoint of BC if and only if $BA \cong AC$.

All definitions in Geometry can be rewritten as biconditional statements.

Example 2: If AB bisects $\angle CAD$, then $\angle CAB \cong \angle BAD$.

Converse: _____

Biconditional: _____

Example 3: If $\angle 1$ and $\angle 2$ are supplementary angles, then $m\angle 1 + m\angle 2 = 180$.

Converse: _____

Biconditional: _____