Name: _____

Geometry Lesson 17

Date: _____

Objective: TSW use conditional statements.

Period: _____

In Lesson 10, you learned that a _____ statement has the form, "If *p*, then *q*." It is formed from two other statements: the hypothesis, *p*, and the conclusion, *q*. If you switch the statements, the result is the converse of the conditional statement, "_____."

Example 1 Analyzing the Truth Value and Converse of Conditional Statements
Consider the conditional statement, "If Sylvester walks to work, then it is a Wednesday."
a. State the hypothesis and conclusion of this statement, and write its converse.
SOLUTION

b. If the original statement is true, is the converse true?
SOLUTION

_____ of a Statement - The opposite of that statement. The negation of a statement *p* is "not *p*," and is written as $\sim p$.
Example: The negation of "a pentagon is regular" is "a pentagon is not regular."

Example 2 Examining the Negation of Conditional Statements
Identify the hypothesis and the conclusion in the statement below. Then, write the negation of each.
If a pentagon is regular, then it is equiangular.
SOLUTION

_____ of a Conditional Statement - When the hypothesis AND conclusion are both negated. The inverse of "If *p*, then *q*" is "If $\sim p$, then $\sim q$."

NOTE: The converse of a conditional statement and the inverse of the same conditional statement always have the _____ truth value: either both are true or both are false.

Logically _____ Statements - When two related conditional statements have the same truth value.

Example 3 Examining the Inverse of Conditional Statements
Write the inverse of the statement below. Is the statement true? Is the inverse of the statement true?
For two lines that are cut by a transversal, if alternate interior angles are congruent, then the lines are parallel.
SOLUTION

_____ of a Conditional Statement – When both the hypothesis and conclusion are exchanged and negated. The contrapositive of, "If p, then q," is, "if $\sim q$, then $\sim p$." A conditional statement and its contrapositive are logically equivalent statements: either both are _____ or both are _____.

We summarize the different types of conditional statements in this table.

	Form
Statement	If p, then q
Converse	If q, then p
Inverse	If $\sim p$, then $\sim q$
Contrapositive	If $\sim q$, then $\sim p$

Example 4 Examining the Contrapositive of Conditional Statements
a. Determine the contrapositive of the statement.
If Mai finishes school at 1 p.m., then it is a Thursday.
SOLUTION

b. Determine the contrapositive of the solution to part a. What do you notice?
SOLUTION

You Try!!!!

a. State the hypothesis and conclusion of this statement and its converse.

"*If a polygon is regular, then it is convex*"

b. If the statement in problem a is true, is the converse true?

c. Identify the hypothesis and the conclusion in the statement below. Then write the negation of each.

If Durrell buys juice, then he buys pretzels.

d. Write the inverse of the statement below. Is the statement true? Is the inverse of the statement true?

For two lines that are cut by a transversal, if the lines are parallel, then the same-side interior angles are congruent.

e. Determine the contrapositive of the statement.

If two angles are complementary, then the sum of their measures is 90°.

f. Determine the *converse* of the solution to problem e. What do you notice?