Geometry Topic 5—Conditional Statements and Converses

**Objective: Conditional Statements**

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is an \_\_\_\_\_\_\_\_\_\_\_\_\_\_ statement, such as “If you do your chores, then you can go to the movies.” Every conditional has two parts. The part following *if* is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the part following *then* is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Example 1: Identify the hypothesis and conclusion of each conditional statement.

A. If Georgia won the Rose Bowl game, then Georgia was college football’s national champion.

B. If T – 38 = 3, then T = 41.

C. If two lines are parallel, then the lines are coplanar.

You can rewrite many sentences so that they form conditionals. You may have to add words to make it grammatically correct, but it is important to keep the words in the same order.

Example 2: Write a conditional from each sentence.

A. A rectangle has four right angles. B. A tiger is an animal.

C. A square has four congruent sides. D. When it rains we stay inside for gym class.

A conditional can have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_. To show that a conditional is true, show that every time the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is true, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is also true. To show that a conditional is \_\_\_\_\_\_\_\_\_\_\_\_\_\_, you need to find one \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for which the hypothesis IS true and the conclusion is false.

Example 3: Find a counterexample to show that each conditional below is false.

A. If it is February, then there are only 28 days in the month.

B. If the name of the state contains the word *New*, then the state borders an ocean.

C. If , then .

**Objective: Writing converses of conditionals**

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a conditional statement switches the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Consider the vertical angle theorem we learned in Topic 4: “If two lines intersect to form vertical angles, then the angles have the same measure.”

But what if you change the structure of the theorem's sentence? Consider the following statement: "If two angles have the same measure, then they are vertical angles." Is this new statement true or false? Can you think of an example that would make this statement false?

The example you found to make the converse false is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Example 5: Write the converse of each conditional below. You may have to add words to make it grammatically correct, but the phrases need to be in the correct order.

A. If two lines intersect to form right angles, then they are perpendicular.

B. If two angles are supplementary, then they add to 180 degrees.

C. If x = 9, then x + 3 = 12.

Example 6: Write the converse of each conditional below. What is its truth value? Give a counterexample if the truth value is false.

A. If x = 2, then .

B. If a figure is a square, then it has four sides.

C. If a point has an x-coordinate of 0, then it lies on the y-axis.

D. If two angles are congruent, then they have the same measure.