

# Geometry Lesson 10

Objective: TSW use conditional statements.

\_\_\_\_\_ Statement - A statement in the form, "If  $p$ , then  $q$ ," where  $p$  is the hypothesis and  $q$  is the conclusion. For example: *If it is morning, then the sun is in the east.*

\_\_\_\_\_ - The part of the statement that is between the words *if* and *then*. In the statement above, the hypothesis,  $p$ , is "it is morning."

\_\_\_\_\_ - The part of the statement that follows the word *then*. In the statement above, the conclusion,  $q$ , is "the sun is in the east."

## Example 1 Identifying the Hypothesis and Conclusion

Identify the hypothesis and conclusion of each conditional statement.

a. *If  $2x + 1 = 5$ , then  $x = 2$ .*

SOLUTION

b. *If a plant is growing, then it needs water.*

SOLUTION

### Math Reasoning

**Connect** Using the formula you learned in Lesson 9, write the sample statement so it is true.

\_\_\_\_\_ Value – Whether conditional statements are true or false. A statement is only false when the hypothesis is true and the conclusion is false. For example: *If a rectangle has a width of 5 feet and a height of 4 feet, then its area is 30 square feet.*

The hypothesis is true, but the conclusion of this statement is false. Since the hypothesis is true but the conclusion is false, the statement's truth value is \_\_\_\_\_.

If a conditional statement's hypothesis is false, then the statement could still be \_\_\_\_\_. For example, consider the statement, "If Ai wins the lottery, he will take a vacation." The hypothesis is false if Ai does not win the lottery, but the statement is still true, because the statement only applies if Ai does win the lottery.

## Example 2 Evaluating the Truth Value of a Conditional Statement

Determine whether each statement is true or false. If it is false, explain your reasoning.

a. *If an angle is obtuse, it measures  $120^\circ$ .*

SOLUTION

b. *If two parallel lines intersect, then they form acute angles.*

SOLUTION

\_\_\_\_\_ of a Statement - The statement formed by exchanging the hypothesis and conclusion. The converse of a statement "if  $p$ , then  $q$ " has the form "if  $q$ , then  $p$ ."

Consider the following conditional statement: *If it is morning, then the sun is in the east.*

The converse of this statement is: \_\_\_\_\_

Even if a conditional statement is true, the converse of that statement is not necessarily true.

For example:

*If an animal is a duck, then it can fly.*

The converse of this statement is: \_\_\_\_\_

This statement is not true. There are many animals that can fly that are not ducks.

### Math Reasoning

**Analyze** What is the result of taking the converse of a converse statement?

#### Example 3 Stating Converses

Write the converse of each statement and determine whether the converse is true.

a. *If an animal is a dog, then it has four legs.*

SOLUTION

b. *If  $x = 4$ , then  $3x + 7 = 19$ .*

SOLUTION

#### Example 4 Application: Biology

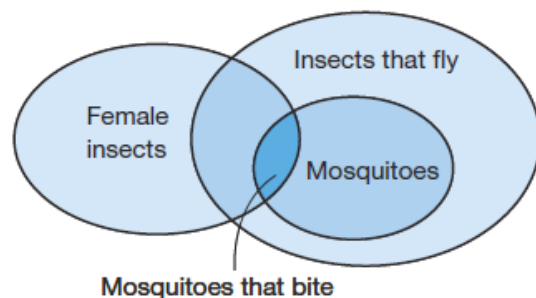
Write the converse of each conditional statement. Use the Venn diagram to determine if the converse is true.

a. *If an insect is a mosquito, then it can fly.*

SOLUTION

b. *If a mosquito bites, then it is female.*

SOLUTION



#### You Try!!!!

Find the converse of each statement and determine whether it is true.

d. *If  $x^2 = 9$ , then  $x = 3$  or  $-3$ .*

e. *If it is Thanksgiving Day, then it is Thursday.*

f. *If a cardinal is a male, then it is bright red.*