Name: _____ Date: _____

Student Exploration: Conditional Statements

Vocabulary: conclusion, conditional statement, converse, hypothesis

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)
Consider the true statement, "If it's snowing, then it's cold outside."

1. Suppose it's snowing. Does that mean it's cold outside? _____ Explain. _____

2. Suppose it's cold outside. Does that mean it's snowing? _____ Explain. _____

Gizmo Overview
In the *Conditional Statements* Gizmo, you will use word tiles to practice writing **conditional statements** (if-then statements) and identifying the parts of conditional statements. You will also determine whether conditionals and other related statements are true or false.

Here's how the Gizmo looks at first:

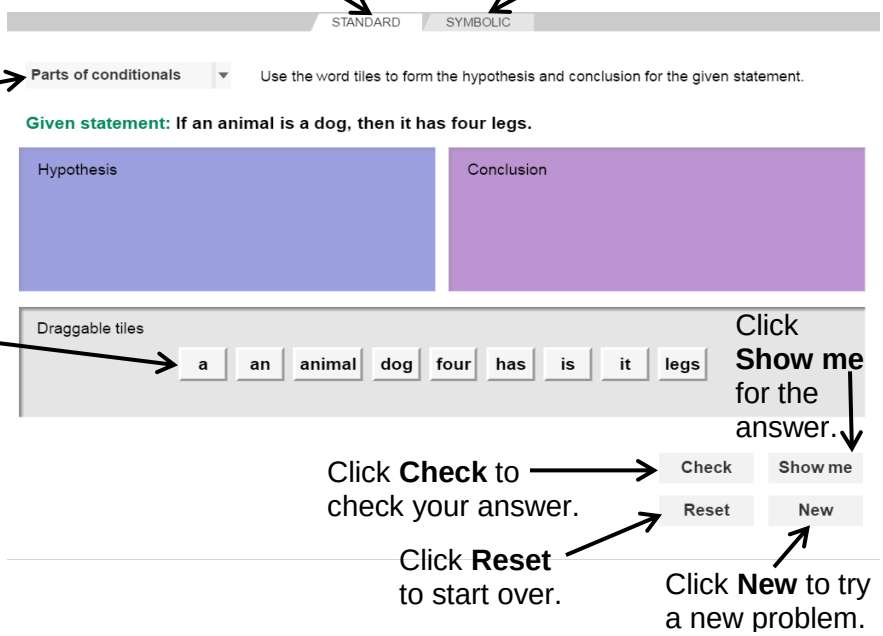
At the top, click the tabs to select a "mode": **STANDARD** (words) or **SYMBOLIC** (with symbols).

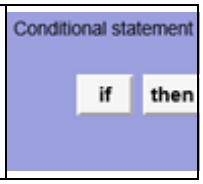
You can choose four different problem types from this dropdown menu:

- **Parts of conditionals**
- **Writing conditionals**
- **Writing converses**
- **Truth values**

Here are the word tiles. Your job is to place them in the correct order in the bins above.

(Note that the bins will be different depending on which problem type you have selected.)



Activity A: **Conditionals**	Get the Gizmo ready: • Be sure the **STANDARD** tab is selected. • Select **Parts of conditionals** in the dropdown list.	

In a conditional statement, the **hypothesis** is the "if" part, and the **conclusion** is the "then" part.

1. You should see the statement to the right at the top of the Gizmo.

   Given statement: If an animal is a dog, then it has four legs.

   A. What is the hypothesis in this statement? _____

   Form the hypothesis in the Gizmo by dragging word tiles into the **Hypothesis** bin. Use the small black arrows to help you place the tiles in the correct order.

   B. What is the conclusion in this statement? _____

   Form the conclusion by dragging word tiles into the **Conclusion** bin. Click **Check** to see if your answers are correct. If not, make some changes and click **Check** again.

2. With **Parts of conditionals** still selected, click the **SYMBOLIC** tab. You should see the statement shown to the right.

   Given statement: $p \rightarrow q$. If an animal is a dog, then it has four legs.

   A. The symbolic statement $p \rightarrow q$ is read, "If p then q." Which letter do you think stands for the hypothesis? _____ Which one stands for the conclusion? _____

   B. Drag the word tiles into the bins to form p and q. Then click **Check** to see if your answers are correct. What are p and q?

   p: _____

   q: _____

   C. Compare your answers for this statement on the **SYMBOLIC** tab to your answers on the **STANDARD** tab. What do you notice? _____

   _____

3. Click **New**. Work through more **Parts of conditionals** problems in the Gizmo, in both **STANDARD** and **SYMBOLIC** form.

(Activity A continued on next page)

Activity A (continued from previous page)

4. At the top left corner of the Gizmo, select **Writing conditionals**.

   A. Click the **STANDARD** tab. You should see the statement shown to the right.

   Given statement: A car has wheels.

   If you had to write this statement as an if-then sentence, how would you do it? (You can add some words, such as "object.") Fill in the blanks below with your sentence.

   If an object _____, then it _____

   In the Gizmo, drag the word tiles into the **Conditional statement** bin to form that sentence. Click **Check** to verify your answer.

   B. Click the **SYMBOLIC** tab. Will the conditional for this statement be the same as the one for the **STANDARD** tab? _____ Explain. _____

   _____

   Drag the word tiles into the bin to form the conditional.

5. Click **New**. Work through another problem from the **Writing conditionals** menu in the Gizmo.

   A. What statement did you get? _____

   B. What conditional statement is equivalent to that statement?

   _____

   Click **Check** to verify your answer.

   C. Click **New**. Continue working through **Writing conditionals** problems in the Gizmo.

6. Write a conditional statement that means the same thing as each statement given below.

   A. A dog barks. _____

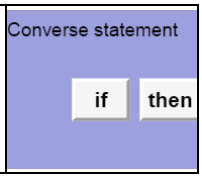
   B. A camera takes pictures. _____

   C. A square has four sides. _____

   D. A bicycle has pedals. _____

   E. A pine tree has needles. _____

   F. Half of 4 is 2. _____

Activity B: **Converses and truth values**	Get the Gizmo ready: • Click on the **STANDARD** tab. • Select **Writing converses** from the dropdown.	

1. You should see, "If a number is 7, then it is an integer," at the top of the Gizmo.

   A. What are the hypothesis and conclusion of the given statement?

   Hypothesis: _____ Conclusion: _____

   B. The **converse** of a conditional is formed by switching the hypothesis and conclusion. What is the converse of the given statement?

   _____

   Drag the tiles into the bin to form the converse. Click **Check** to verify your answer.

2. With **Writing converses** chosen, select the **SYMBOLIC** tab. You should see the statement, "$p \rightarrow q$, p: a number is 7, q: a number is an integer". (Note: "$p \rightarrow q$" means, "If p, then q.")

   A. Write the converse of $p \rightarrow q$ in symbolic form here: _____ $\rightarrow$ _____

   B. Drag the tiles into the bin to form the converse in words. What is the converse?

   _____

3. Click **New**. Work through more **Writing converses** problems in the Gizmo.

4. Choose **Truth value** from the dropdown menu. Click on the **STANDARD** tab.

   A. The given statement in the Gizmo is, "If you are in California, then you are in Los Angeles." Is this statement true or false? _____ Explain. _____

   _____

   B. The converse is, "If you are in Los Angeles, then you are in California." Is this statement true or false? _____ Explain. _____

   _____

   Choose the truth values for both statements from the **Select truth value** dropdown menus in the Gizmo. Then click **Check** to verify your answers.

(Activity B continued on next page)

Activity B (continued from previous page)

5. With **Truth value** still chosen, click the **SYMBOLIC** tab. You should see the information below at the top of the Gizmo.

   Given information: p: you are in California q: you are in Los Angeles

   Are the truth values of $p \rightarrow q$ and $q \rightarrow p$ the same as the conditional and converse on the **STANDARD** tab? _____ Explain. _____

   _____

   Choose the correct answers from the **Select truth value** dropdown menus and click **Check**.

6. Give an example of a conditional statement that is true and has a true converse. _____

   _____

7. Give an example of a conditional statement that is false and has a true converse. _____

   _____

8. Click **New**. Work through more **Truth values** problems in the Gizmo.

9. State the truth value of each conditional statement. Then write its converse and state the truth value of the converse.

   A. Conditional: If an object is an oven, then it heats food. Truth value: _____

      Converse: _____ Truth value: _____

   B. Conditional: If a figure is a pentagon, then it has five sides. Truth value: _____

      Converse: _____ Truth value: _____

   C. Conditional: If an object is a stop sign, then it is blue. Truth value: _____

      Converse: _____ Truth value: _____

   D. Conditional: If an animal is a kangaroo, then it hops. Truth value: _____

      Converse: _____ Truth value: _____

   E. Conditional: If a woman has children, then she is a mother. Truth value: _____

      Converse: _____ Truth value: _____