Name: _____ Date: _____

Student Exploration: Critter Count

Vocabulary: array, commutative property, factor, multiple, multiplication, product

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. Suppose you are at a very large party and need to know how many people are there. Why might counting the guests be difficult? _____

   _____

2. You notice that the party guests are sitting six to a table. How would you figure out how many guests there are? _____

   _____

Gizmo Warm-up

When you see a **multiplication** expression, like 2 × 3, what does it mean? The *Critter Count* Gizmo shows what is actually happening when you multiply two numbers.

1. Check that the multiplication expression shown on the Gizmo is 2 × 3. If not, use the up and down arrows ( ) to change the expression to 2 × 3.

   How many leaves are there? _____ How many ladybugs are on each leaf? _____

2. Change the first number in the expression (the 2) by clicking the up and down arrows.

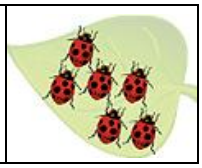
   What changes? _____

   _____

3. Change the second number in the expression (the 3) by clicking the up and down arrows.

   What changes? _____

   _____

Activity A: **Counting party guests**	Get the Gizmo ready: • Check that **Show multiplication** is selected. • Set the expression to 7 × 6. • Check that **Group** is selected.	

The ladybugs are gathering for their annual picnic. They settle down on seven leaves, with six ladybugs on each leaf.

1. Numbers that are multiplied together are called **factors**.
   What are the factors in the expression shown in the Gizmo? _____ and _____

2. The result (answer) of multiplication is called the **product**. Click **Count** and watch.

   A. What is the product of 7 and 6? _____

   B. What does the product tell you about the ladybugs? _____

   C. Based on what you see in the **Count** box, how does 7 × 6 relate to addition?

   _____

   _____

3. When you add 6 to itself many times, the numbers you get are **multiples** of 6. For example, 6 + 6 = 12, so 12 is a multiple of 6. What are the first nine multiples of 6?

   1 × 6 = _____ 2 × 6 = _____ 3 × 6 = _____ 4 × 6 = _____ 5 × 6 = _____

   6 × 6 = _____ 7 × 6 = _____ 8 × 6 = _____ 9 × 6 = _____

4. Write the multiplication problem and answer for each item below. The first has been done for you. Check your answers to B – D with the Gizmo. Use units on your answer if you can.

   A. Five leaves, two butterflies on each leaf. 5 × 2 = 10 butterflies

   B. Six webs, three spiders on each web. _____

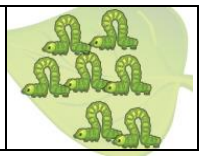
   C. 3 + 3 + 3 + 3 _____

   D. 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 _____

   Challenge:

   E. Sally sold 3 boxes of eggs. Each box holds 12 eggs. _____

   F. At the ladybug picnic, there are 5 leaves. Each leaf has 4 ladybugs. Each ladybug eats 2 aphids. _____

Activity B: **Crashing the party**	Get the Gizmo ready: • Set the expression to 3 × 7. • Select **Inchworms**.	

Here come the inchworms! Hungry inchworms descend on the ladybugs' picnic. The inchworms scare away the ladybugs and eat up all the leaves.

1. Select **Array** and watch the leaves disappear. (The inchworms ate them all!) The inchworms are now shown in a rectangular display called an **array**. This is another way to model 3 × 7.

   A. How many horizontal rows are in the array? _____

   B. How many vertical columns are in the array? _____

   C. How does the array model relate to the "group" model with the critters on leaves?

   Rows are _____ Columns are _____

   D. Click **Count**. What is the product of 3 and 7? _____

2. Now change the expression to 7 × 3.

   A. How many horizontal rows are in this array? _____

   B. How many vertical columns are in this array? _____

   C. Click **Count**. What is the product of 7 and 3? _____

3. The **commutative property** says that the order of numbers doesn't matter – the answer will be the same. Use the Gizmo to test the commutative property for multiplying. (For example, compare 6 × 4 and 4 × 6.)

   A. What numbers did you test? _____

   B. What did you find? _____

   C. Does the commutative property seem to work for multiplying? _____

4. Challenge: Explain why the commutative property works for multiplication. (Hint: Arrays are rectangular. Think about the size of a 3-by-7 rectangle compared to a 7-by-3 rectangle.)

   _____

   _____

   _____