Name: Date:

**Student Exploration: Critter Count**

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

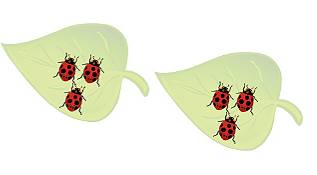
**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

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? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

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**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 (1013SE4) to change the expression to 2 × 3.

How many leaves are there? \_\_\_\_\_\_\_ How many ladybugs are on each leaf? \_\_\_\_\_\_\_

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

What changes? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

What changes? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **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. | 1013SE2 |

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 \_\_\_\_\_\_\_

1. The result (answer) of multiplication is called the **product**. Click **Count** and watch.
   1. What is the product of 7 and 6? \_\_\_\_\_\_\_
   2. What does the product tell you about the ladybugs? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Based on what you see in the **Count** box, how does 7 × 6 relate to addition?

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1. 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 = \_\_\_\_\_

1. 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.

5 × 2 = 10 butterflies

* 1. Five leaves, two butterflies on each leaf. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. Six webs, three spiders on each web. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. 3 + 3 + 3 + 3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  4. 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Challenge:

* 1. Sally sold 3 boxes of eggs. Each box holds 12 eggs. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. At the ladybug picnic, there are 5 leaves. Each

leaf has 4 ladybugs. Each ladybug eats 2 aphids. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **Activity B:**  **Crashing the party** | Get the Gizmo ready:   * Set the expression to 3 × 7. * Select **Inchworms**. | 1013SE3 |

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.
   1. How many horizontal rows are in the array? \_\_\_\_\_\_\_
   2. How many vertical columns are in the array? \_\_\_\_\_\_\_
   3. How does the array model relate to the “group” model with the critters on leaves?

Rows are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Columns are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Click **Count**. What is the product of 3 and 7? \_\_\_\_\_\_\_

1. Now change the expression to 7 × 3.
   1. How many horizontal rows are in this array? \_\_\_\_\_\_\_
   2. How many vertical columns are in this array? \_\_\_\_\_\_\_
   3. Click **Count**. What is the product of 7 and 3? \_\_\_\_\_\_\_

1. 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.)
   1. What numbers did you test? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. What did you find? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Does the commutative property seem to work for multiplying? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. 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.)

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