

Name: _____ Date: _____

Student Exploration: Critter Count

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

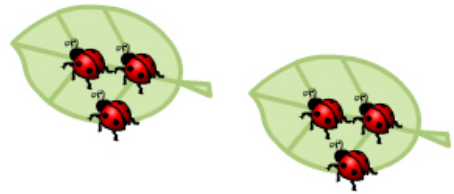
Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

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.



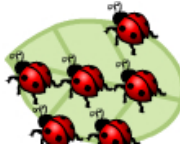
1. Check that the multiplication expression shown on the Gizmo is 2×3 . If not, use the up and down arrows (▲▼) to change the expression to 2×3 .

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	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> • Check that Show multiplication is selected. • Set the expression to 7×6. • Check that Group is selected. 	
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The ladybugs are gathering for their annual picnic. They settle down on seven leaves, with six ladybugs on each leaf.

- Numbers that are multiplied together are called **factors**.
 What are the factors in the expression shown in the Gizmo? _____ and _____
- The result (answer) of multiplication is called the **product**. Click **Count** and watch.
 - What is the product of 7 and 6? _____
 - What does the product tell you about the ladybugs? _____
 - Based on what you see in the **Count** box, how does 7×6 relate to addition?

- 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?

$1 \times 6 = \underline{\quad}$ $2 \times 6 = \underline{\quad}$ $3 \times 6 = \underline{\quad}$ $4 \times 6 = \underline{\quad}$ $5 \times 6 = \underline{\quad}$

$6 \times 6 = \underline{\quad}$ $7 \times 6 = \underline{\quad}$ $8 \times 6 = \underline{\quad}$ $9 \times 6 = \underline{\quad}$

- 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. $5 \times 2 = 10$ 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	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> • Set the expression to 3×7. • Select Inchworms. 	
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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.)
