Name: _____ Date: _____

Student Exploration: Multiplying Exponential Expressions

Vocabulary: base, exponent, expression

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

1. What is a shorter, simpler way to express each of the following expressions?

    A. $x + x + x =$ _____
                              B. $x \bullet x \bullet x =$ _____

2. How could you write the expression below in a shorter, simpler way?

    $(x \bullet x \bullet x) + (x \bullet x \bullet x) + (x \bullet x \bullet x) =$ _____

Gizmo Overview

In the *Multiplying Exponential Expressions* Gizmo, you multiply **expressions** with exponents, step-by-step. An **exponent** is a number, written to the right of and just above a number or expression (called the **base**), that indicates how many times the base is multiplied by itself.

Here's how the Gizmo looks at first:

The expression for you to simplify is here.

The tiles give you four choices for the next step. Choose the one you think is correct and drag it into the white area above.

Click **Undo** to undo your last choice.

Click **New** to go to a different problem.

Read your feedback in the Gizmo. (No feedback is given for correct answers.)

Click **Proceed** to go to the next step.

Continue until the expression is simplified. Then click **New** for a new problem to work on.

Activity:	Get the Gizmo ready:	
Simplifying products	• You should see the expression $6^3 \cdot 6^4$. If not, click **Refresh** in your browser.	⚠️

1. When you begin, you should see the expression shown to the right at the top of the Gizmo.

   > Rewrite with a single exponent $6^3 \cdot 6^4$

   A. First, write $6^3 \cdot 6^4$ as the product of repeated factors below.

      $6^3 \cdot 6^4 = $ _____

   B. How many factors of 6 did you write, total? _____

   C. What mathematical operation can you perform on the exponents 3 and 4 to get the

      number of 6's being multiplied in $6^3 \cdot 6^4$? _____

   D. In the Gizmo, choose the correct step. If your choice is incorrect, read the given

      feedback and try again. What is the answer? _____

   E. Write a rule that explains how to multiply exponential expressions with like bases.

      _____

   F. Express that general rule as a formula: $x^a \cdot x^b =$ _____

2. Click **New**. You should now see the expression shown at the right in the Gizmo.

   > Simplify $-8w^5y^3 \cdot 2w^4y^7$

   A. In the expression $-8w^5y^3 \cdot 2w^4y^7$, what three pairs of factors can be combined or simplified?

      _____ and _____   _____ and _____   _____ and _____

   B. In the Gizmo, choose the first correct step. How does writing the expression like this

      help you simplify the expression? _____

      _____

   C. Choose the last correct step. What is the final simplified answer? _____

3. Click **New**. Work through more problems in the Gizmo. Be sure to read feedback as you do.

   (Activity continued on next page)

Activity (continued from previous page)

4. Simplify each expression below. Write all your steps in the space below each problem.

A. $3^4 \cdot 3^2$

E. $a^9 \cdot b^3 \cdot a \cdot b^2$

B. $2m^6 \cdot 4m^4$

F. $-4c^9 \cdot 7c^6$

C. $x^8 \cdot y^7 \cdot y^6$

G. $10m^7n \cdot 5mn^9$

D. $5y^2z \cdot -3y^4z^8$

H. $-6x^4y^5 \cdot -2xy^7z^3$