

Name: _____

Class/Block: _____ Date: _____

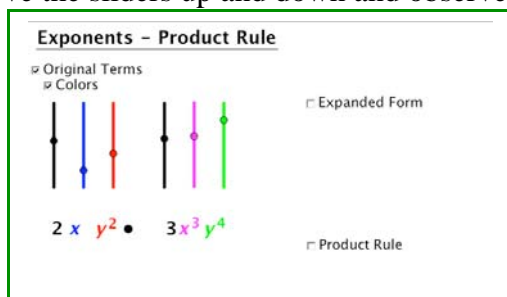
Exploration: Product Rule

Introduction

In this exploration you will use the *Exponents: Product Rule* applet to explore properties of product of exponents.

Step 1: Launch the *Exponents: Product Rule* applet

- Check the **Colors** checkbox to make each part of the term a different color.
- Move the sliders up and down and observe what happens to the coefficient and terms.



Step 2: Move the sliders to *set up the problem provided*. → $x^3 \cdot x^5$

- Move the **black** slider until the number at the front of the term (the coefficient) disappears
- Move the **red** and **green** sliders until the variable **y** disappears
- Move the **blue** slider until the exponent associated with **x** is equal to 3
- Move the **pink** slider until the exponent associated with the other **x** is equal to 5

Step 3: Check the *Expanded Form* checkbox to see the term multiplied out.

☒ Expanded Form

- Notice how many times the term is repeated.

$x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x$

How does the number of times repeated relate to the exponent outside the parentheses?

Step 4: Check the *Product Rule* checkbox to see how the expanded form can be simplified.

Step 5: Fill in the table for example provided.

☒ Product Rule

$$x^{3+5} = x^8$$

Example:

Original Expression	Expanded Form	Power to a Power Rule with Solution
$x^3 \cdot x^5$	$x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x$	$x^{3+5} = x^8$

Name: _____

Class/Block: _____ Date: _____

Directions: Set up each problem in the applet. Fill in the table. Answer the associated questions.

Problem 1.

Original Expression	Expanded Form	Power to a Power Rule with Solution
$x^2 \cdot x^4$		

1a. In the *Expanded Form*, how does the number of times x is repeated relate to the exponents?

1b. When you multiply terms with the same base, what operation do you perform on the exponents?

Problem 2.

Original Expression	Expanded Form	Power to a Power Rule with Solution
$x^3y^4 \cdot x^2y$		
$x^5y^1 \cdot x^2y^5$		

2a. In the *Expanded Form*, how does the number of times the base is repeated relate to the exponents?

2b. Explain what you do with the exponents when you have more than one variable?

Problem 3.

Original Expression	Expanded Form	Power to a Power Rule with Solution
$10x^4 \cdot 2x^3$		

3a. In the given expression, what do you do to the exponents related to x?

3b. In the given expression, what do you do to the coefficients?

Name: _____

Class/Block: _____ Date: _____

Problem 4.

Original Expression	Expanded Form	Power to a Power Rule with Solution
$5x^4y^3 \cdot 3xy$		

4a. What do you do to the coefficient when using the *product rule*?

Problem 5. Expand your thinking

Note: This problem cannot be set up in the *Product Rule* applet but you can use what you know about the product rule to help solve the problem.

Original Expression	Expanded Form	Power to a Power Rule with Solution
$x^2y^3z^5 \cdot y^3z^2$		

5a. Explain how you solve the problem when you have multiple bases with exponents in one problem.

Conclusion:

a. State the *product rule* in your own words.

b. Give an example of the *product rule*.