

Content and Language Objective:

Students will learn the product rule for exponents and be able to explain in their own words how the product rule is used when dealing with exponents.

Warm-Up

Evaluate each expression.

1. $\left(-\frac{1}{4}\right)^4 = -\frac{1^4}{4^4} = \frac{1}{256} \quad \left(-\frac{1}{4}\right)\left(-\frac{1}{4}\right)\left(-\frac{1}{4}\right)\left(-\frac{1}{4}\right)$

2. $\left(-\frac{1}{4}\right)^{-3} = \left(-\frac{4}{1}\right)\left(-\frac{4}{1}\right)\left(-\frac{4}{1}\right) = -\frac{64}{1} = -64$

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The Product Rule for Exponents

We can calculate products of exponential expressions *provided their bases are the same!*

Example:

$$4^2 \bullet 4^3 = (4 \bullet 4) \bullet (4 \bullet 4 \bullet 4) = 4^5$$

This expression has a total of $2 + 3 = 5$ factors of 4.

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The Product Rule:

To multiply exponential expressions with like bases, add exponents.

Try It!!

$$x^4 \bullet x^3 \bullet y^2 \bullet x^5$$

$$y^2 \cdot x^{12}$$
$$x^{12}y^2$$

$$10^5 \bullet 10^{-2}$$
$$10^3$$

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Practice:

1. $10^2 \bullet 10^4$ 10^6

2. $7^3 7^{-4}$ $7^{-1} = \frac{1}{7}$

3. $x^3 x^{-2} x^4$ x^5

4. $3y^2 \bullet 2y^{-4}$
 $3 \cdot 2 \cdot y^2 \cdot y^{-4} = 6y^{-2} = \frac{6}{y^2}$

$$3x^2 + 2x^2 = 5x^2$$

$$3x^2 + 2x^4 = 3x^2 + 2x^4$$

$$3x^2 + 3x^4 = 3x^2 + 3x^4$$