

## 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.

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### Warm-Up

Evaluate each expression.

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

$\frac{1}{256}$

$(-\frac{1}{4})(-\frac{1}{4})(-\frac{1}{4})(-\frac{1}{4})$

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

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

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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!!

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

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

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

$\underline{10^3}$

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### Practice:

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

$10^6$

$4 \cdot (-2)^3$   
 $(-2)^2 \cdot (-2)^3$   
 $(-2)^5$

$2^{-2} y^{-2}$   
 $(2y)^2$

$-2 \cdot (-2)^3$   
 $(-2)^1 \cdot (-2)^3$   
 $(-2)^4$

2.  $7^{-3} 7^4$

$7^5$

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

$x^5$

4.  $3y^{-2} \bullet 2y^4$

$6y^2$

$3 \cdot y^{-2} \cdot 2 \cdot y^4$   
 $3 \cdot 2 \cdot y^{-2} \cdot y^4$

$6y^2$

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

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

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