## *7-2 Multiplying Powers With the Same Base*

Goal: Come up with a shortcut (formula) for multiplying expressions with the *same* base.

$$a^m \cdot a^n = \_\_\_\_\_$$

*If you get it, don't yell it out because we want everyone to have a chance to figure it out.

**Complete the following table to assist with your conclusion.**

**Directions: Complete the table.**

| Problem | Expand | Simplified Exponential Form |
|---|---|---|
| 1. $2^3 \cdot 2^2$ | $(2 \cdot 2 \cdot 2) \cdot (2 \cdot 2) = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$ | $2^5$ |
| 2. $x^4 \cdot x^2$ | | |
| 3. $r^3 \cdot r^5$ | | |
| 4. $c^1 \cdot c^6$ | | |
| 5. $a^m \cdot a^n$ | Write the formula or rule. → | |

*This shortcut ONLY applies to exponents, when you have the same base, not coefficients. Put a circle around the coefficient and a square around the exponent for the following expression.

$$-3\ x^{\ 5}$$

What do you think a shortcut would be when multiplying 2 values in scientific notation?

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Scientific Notation Example: Be sure to leave answers in scientific notation.

$(1.8 \times 10^{11})(2.7 \times 10^{8}) = (1.8 \cdot 2.7)(10^{11} \cdot 10^{8})$ Associative and Commutative Prop. of Mult.

$= (4.86)(10^{11+8})$ Multiply the numbers in the first set of parentheses. Add the exponents for the powers of 10.

$= 4.86 \times 10^{19}$ Simplify the exponent.

**Simplify each expression.**

**1.** $(7a^{-1})(-3a^5)$

**2.** $-3j^6 \cdot 12j$

**3.** $(m)(m^4)(m^2)$

**4.** $(8h^3)(-5h^{-4})$

**5.** $x^3y^{-1} \cdot xy \cdot x^{-2}y^2$

**6.** $(-3f^2g^{-3})(2fg)(7f^3g^{-2})$

**Simplify each expression. Write each answer in scientific notation.**

**7.** $(2 \times 10^6)(4 \times 10^9)$

**8.** $(-3 \times 10^8)(3 \times 10^{-5})$

**9.** $(-7 \times 10^{11})(-8 \times 10^{-4})$

**10.** $(6 \times 10^{-7})(-6 \times 10^{-4})$