



**W**e will continue our work with exponents. In this activity, you will develop another exponent rule allowing you to work with even more types of exponential expressions.

- Assuming the information available on the internet doubles every year, how much information will be available ...
  - 4 years from now?  $\underline{2^4}$
  - 4 years from then?  $\underline{2^4 \cdot 2^4} = (2^4)^\square =$
  - 4 years from then?  $\underline{2^4 \cdot 2^4 \cdot 2^4} = (2^4)^\square =$
  - 4 years from now, 4 years from then and 4 years from then means \_\_\_\_\_ years from now or  $2^\square$
- Suppose the amount of information available on the web is  $x$  times as much every year. How much information will be available ...
  - 3 years from now?  $\underline{x^3}$
  - 3 years from then?  $\underline{x^3 \cdot x^3} = (x^3)^2 =$
  - 3 years from then?  $\underline{x^3 \cdot x^3 \cdot x^3} = (x^3)^\square =$
  - 3 years from then?  $\underline{x^3 \cdot x^3 \cdot x^3 \cdot x^3} = (x^3)^\square =$
  - 3 years from then?  $\underline{x^3 \cdot x^3 \cdot x^3 \cdot x^3 \cdot x^3} = (x^3)^\square =$
  - 3 years from now, 3 years from then, 3 years from then, 3 years from then, and 3 years from then means \_\_\_\_\_ years from now or  $x^\square$
- What is a shortcut for problems like these? Explain.



### Power of a Power Rule - (Part of Skill 12)

When raising a power to another power, multiply the exponents.

$$(b^m)^n = b^{m \cdot n}$$

- Use exponent rules to simplify and write each expression with one positive exponent.
 

a. $(3^{12})^2 =$	b. $(2^3)^7 =$	c. $(x^8)^2 =$
d. $(6^0)^{-4} =$	e. $(p^{-6})^{-3} =$	f. $(5^{-4})^3 =$
g. $(y^{-7})^9 =$	h. $(m^{10})^0 =$	i. $(c^{-8})^{-3} =$

Take note

### Property Raising a Product to a Power

**Words** To raise a product to a power, raise each factor to the power and multiply.

**Algebra**  $(ab)^n = a^n b^n$ , where  $a \neq 0$ ,  $b \neq 0$ , and  $n$  is a rational number

**Examples**  $(3x)^4 = 3^4 x^4 = 81x^4$        $(4b)^3 = 4^3 b^3 = 64b^3$

### Problem 3 Simplifying a Product Raised to a Power

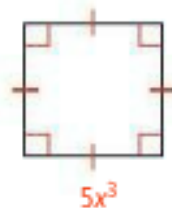
**Multiple Choice** Which expression represents the area of the square?

A  $10x^3$

C  $25x^5$

B  $5x^6$

D  $25x^6$



**Got It?** 3. What is the simplified form of each expression?

a.  $(7m^9)^3$

b.  $(2z)^{-4}$

c.  $(3g^4)^{-2}$

### Problem 4 Simplifying an Expression With Products

What is the simplified form of  $(n^{\frac{1}{2}})^{10}(4mn^{-\frac{2}{3}})^3$ ?

**Got It?** 4. What is the simplified form of each expression?

a.  $(x^{-2})^2(3xy^5)^4$

b.  $(3c^{\frac{5}{4}})^4(c^2)^3$

c.  $(6ab)^3(5a^{-3})^2$

### Problem 5 Raising a Number in Scientific Notation to a Power STEM

**Aircraft** The expression  $\frac{1}{2}mv^2$  gives the kinetic energy, in joules, of an object with a mass of  $m$  kg traveling at a speed of  $v$  meters per second. What is the kinetic energy of an experimental unmanned jet with a mass of  $1.3 \times 10^3$  kg traveling at a speed of about  $3.1 \times 10^3$  m/s?

**Got It?** 5. What is the kinetic energy of an aircraft with a mass of  $2.5 \times 10^5$  kg traveling at a speed of  $3 \times 10^2$  m/s?