

## Multiplying Powers with the Same Base

To multiply powers with the same base, add the exponents.

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

Examples:  
 $4^2 \cdot 4^6 =$

**Why it Works:** Use repeated multiplication to rewrite the product of powers:  $2^4 \times 2^3 = ?$

1. Expand each into the product numbers below.

$$\begin{array}{ccccccc} & 2^4 & & \times & & 2^3 & = ? \\ ( & & ) & \times & ( & & ) = \end{array}$$

### Multiplying Powers

What is each expression written using each base only once?

a)  $12^4 \cdot 12^3 =$

b)  $(5)^{-2} \cdot (-5)^7 =$

c)  $8^3 \cdot 8^6 =$

c)

d)  $(0.5)^{-3} \cdot (0.5)^{-8} =$

e)  $9^{-3} \cdot 9^2 \cdot 9^6 =$

f)  $2^{-1} \cdot 2^7 \cdot 2^{-12} =$

f)

### Multiplying Powers in Algebraic Expressions

What is the simplified form of each expression?

a)  $4z^5 \cdot 9z^{-12} =$

b)  $2a \cdot 9b^4 \cdot 3a^2 =$

Got it? What is the simplified form of each expression in the following parts?

a)  $5x^4 \cdot x^9 \cdot 3x =$

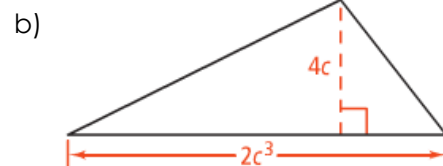
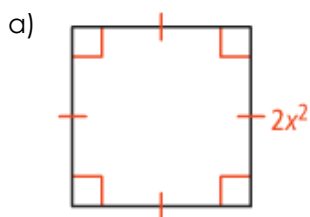
b)  $-4c^3 \cdot 7d^2 \cdot 2c^{-2} =$

c)  $j^2 \cdot k^{-2} \cdot 12j =$

d) Explain how to simplify the expression  $x^a \cdot x^b \cdot x^c =$

### Finding the Area of Geometric Figures

Find the area of each of the following.



<b>Raising a Power to a Power</b>		
To raise a power to a power, multiply the exponents.	$(a^m)^n =$	Examples: $(4^2)^6 =$

**Why it Works:** Use repeated multiplication to rewrite the product of powers:  $(5^2)^4 = ?$

1. Expand into the product numbers LEAVING  $5^2$  as  $5^2$ .

$$(5^2)^4 = ( \quad ) \times ( \quad ) \times ( \quad ) \times ( \quad )$$

$$( \quad \times \quad ) \times ( \quad \times \quad ) \times ( \quad \times \quad ) \times ( \quad \times \quad ) =$$

### Simplifying a Power Raised to a Power

What is each expression written using each base only once?

a)  $(n^4)^7 =$                       b)  $(p^5)^4 =$                       c)  $(p^4)^5 =$                       d)  $(p^{-5})^4 =$

- e) Is  $(a^m)^n = (a^n)^m$  true for all integers  $m$  and  $n$ ? Explain.

### Simplifying an Expression with Powers

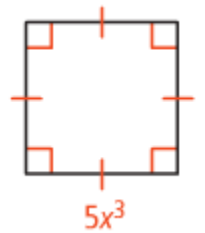
What is the simplified form of each expression?

a)  $y^3(y^5)^{-2} =$                       b)  $x^2(x^6)^{-4} =$                       c)  $w^{-2}(w^7)^3 =$                       d)  $(r^{-5})^{-2}r^3 =$

<b>Raising a Product to a Power</b>		
To raise a product to a power, raise each factor to the power and multiply.	$(ab)^n =$	Examples: $(3x)^4 =$

### Simplifying a Product Raised to a Power

Find the expression that represents the area of the square.



What is the simplified form of each expression?

a)  $(7m^9)^3 =$                       b)  $(2z)^{-4} =$                       c)  $(3g^4)^{-2} =$

### Simplifying an Expression with Products

What is the simplified form of  $(n^5)^2(4mn^{-2})^3$ ?

What is the simplified form of each expression?

a)  $(x^{-2})^2(3xy^5)^4$                       b)  $(3c^5)^4(c^2)^3$                       c)  $(6ab)^3(5a^{-3})^2$