

Warm - up

Product of Powers
+
power to power

A decorative border of watermelon slices surrounds the central text. The slices are cut into various shapes, including wedges and rounds, showing the red flesh, green rind, and black seeds.

Let's Review:

coefficient $4x^3$ **exponent**
base

Coefficient - the number multiplied times the base (after the exponent is applied)

Base - the factor being raised to a power.

Exponent - the number of times the factor is multiplied.

Try it!

$$2^3 = 2 \cdot 2 \cdot 2 = 8$$

$$x^4 = x \cdot x \cdot x \cdot x$$

$$5^3 = 5 \cdot 5 \cdot 5 = 125$$

$\underbrace{\quad}_{25}$

$$5x^2 = (x=3)$$

$$5(3)^2 = 5(9) = 45$$

Solve the half sheet on your own.

	Value		Value		Value
$2 \cdot 2 =$	4	$2^1 \cdot 2^1$	4	2^2	4
$4 \cdot 4 \cdot 4 =$	64	$4^2 \cdot 4^1$	64	4^3	64
$5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 =$	3125	$5^2 \cdot 5^3$	3125	5^5	3125

What pattern did you notice about multiplying exponents? Discuss with your group. How would you simplify $a^3 \cdot a^4$?

When multiplying bases that are the same, add the exponents

$$a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot a = a^7$$

$$a^{3+4} = a^7$$

Product of Powers:

$$a^m \cdot a^n = a^{m+n}$$

You Try It!

$$x^7 \cdot x^3 = x^{7+3} = \boxed{x^{10}}$$

$$(2x)4x = 8x^{1+1} = \boxed{8x^2}$$

$$(4x^3)(3x^6) = 12x^{3+6} = \boxed{12x^9}$$

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Power of a Power:

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

$$(b^4)^3 =$$

$$b^4 \cdot b^4 \cdot b^4$$

$$\begin{array}{l} b \cdot b \cdot b \cdot b \\ b \cdot b \cdot b \cdot b \\ b \cdot b \cdot b \cdot b \end{array} = b^{12}$$

$$(y^3)^7 = y^{3 \cdot 7}$$
$$= y^{21}$$

Power of a Product:

$$(a^m b^n)^c = a^{cm} b^{cn}$$

$$(ab)^4 =$$

$$(ab)(ab)(ab)(ab)$$

$$\boxed{a^4 b^4}$$

$$(-2xr^3)^2 = -2^2 x^2 r^{3 \cdot 2}$$

$$= -2^2 x^2 r^6$$

$$(-2 \cdot -2)$$

$$\boxed{= 4x^2 r^6}$$

$$-4(n^2)^5 =$$

$$-4n^{2 \cdot 5}$$

$$\boxed{-4n^{10}}$$