

Day 1: The Exponent Rules

By the end of the period you will:

- Be re-familiarized with the exponent laws/rules
- Apply the exponent rules to simplify expressions
- Begin to recognize what makes a power...a power

POWER

$$4^3$$

BASE

EXPONENT

Expanded Form vs. Single Power Form

● Expanded:

$$2 \times 2 \times 2$$

Single Power

$$2^3$$

$$7 \times 7 \times 7 \times 7 \times 7 \times 7$$

$$7^6$$

Exponent Laws

When **multiplying** exponents with the same base, keep the base the same and **ADD** the exponents together...

Product

Expanded Form

of Factors

Single Power

$$3^5 \times 3^4$$

$$(3 \times 3 \times 3 \times 3 \times 3) \times (3 \times 3 \times 3 \times 3)$$

9

$$3^9$$

$$= 3^{5+4}$$

$$2^3 \times 2^2$$

$$(2 \times 2 \times 2) \times (2 \times 2)$$

5

$$2^5$$

$$= 2^{3+2}$$

When **dividing** exponents with the same base, keep the base the same and **SUBTRACT** the exponents...

Product

Expanded Form

of Factors

Single Power

$$\frac{4^5}{4^3}$$

$$\frac{(\cancel{4} \times \cancel{4} \times \cancel{4} \times 4 \times 4)}{(\cancel{4} \times \cancel{4} \times \cancel{4})}$$

$$2$$

$$4^2$$

$$= 4^{5-3}$$

$$\frac{5^4}{5^2}$$

$$\frac{(\cancel{5} \times \cancel{5} \times 5 \times 5)}{(\cancel{5} \times \cancel{5})}$$

$$2$$

$$5^2$$

$$= 5^{4-2}$$

When simplifying a **power of a power**, keep the base the same and **MULTIPLY** the exponents together...

Product

Expanded Form

of Factors

Single Power

$$(2^3)^4$$

$$(2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2 \times 2)$$

$$12$$

$$2^{12}$$

$$= 2^{3 \times 4}$$

$$(4^2)^3$$

$$(4 \times 4) \times (4 \times 4) \times (4 \times 4)$$

$$6$$

$$4^6$$

$$= 4^{2 \times 3}$$

A power only has **ONE BASE**. The base is the **number or variable** that the exponent is connected to.

Ex. State the base for each of the following...

$$9^5$$

$$a^4$$

$$6a^2$$

$$32b^6$$

$$(2e)^2$$

Tricked you! When there is a bracket, it groups the number/variable and makes it **ONE BASE**. Therefore, the base is "2e"

Advanced: Applying the Exponent Law

- Simplify the Following Expressions.

$$3^3 \times 3^6 = 3^9$$

$$\frac{6^8}{6^6} = 6^2$$

$$(5^5)^2 = 5^{10}$$

$$3a^3 \times 3a^6 = 9a^9$$

$$\frac{16a^9}{4a^4} = 4a^5$$

$$5(a^5)^2 = 5a^{10}$$

$$(5a^5)^2 = 25a^{10}$$

B rackets
E xponents
D ivide
M ultiply
A dd
S ubtract

$$(c^6 \times c^8) \times (c^{14} \div c^7) = c^{21}$$

$$(2a^3 \times 2a^2)^3 = 64a^{15}$$