

PROPERTIES OF EXPONENTS

Mr. Contreras wrote the expression shown on the board. Use the expression to answer a-b.

4^3

- Which value represents the base, and which represents the exponent?
- Noah believes the expression simplifies to 64 while Mirna believes it simplifies to 12. Who is correct? Explain your choice.

Understanding exponent properties will help us simplify numeric and algebraic expressions. In c & d, write the expanded form of the expression. Then, simplify the expression as a single base raised to an exponent.

c. $3^2 \cdot 3^5$ _____ \rightarrow _____

d. $\frac{5^5}{5^2}$ _____ \rightarrow _____

The examples above show us two properties that can be used to simplify expressions where like bases are being multiplied or divided as described below.

MULTIPLYING LIKE BASES

$$a^x \cdot a^y = \underline{\hspace{2cm}}$$

When like bases are being multiplied, keep the _____ and _____ their exponents.

DIVIDING LIKE BASES

$$\frac{a^x}{a^y} = \underline{\hspace{2cm}}$$

When like bases are being divided, keep the _____ and _____ their exponents.

Use the properties above to simplify each expression as a single base raised to a power.

1.	$8^7 \cdot 8^3$	2.	$\frac{m^9}{m^6}$	3.	$a^6 \cdot a^3 \cdot a$
4.	$\frac{7^2 \cdot 7^5}{7^3}$	5.	$\frac{d^8}{d^2} \cdot d^7$		

To explore two additional properties, write expressions e and f in expanded form and then simplify.

e. $(2^2)^3$ _____ \rightarrow _____

f. $(4x^2)^2$ _____ \rightarrow _____

Use the observed patterns above to complete the description of the exponent properties below.

POWER TO A POWER

$(a^x)^y =$ _____

When raising a base with an exponent to another exponent, keep the _____ and _____ the exponents.

PRODUCT TO A POWER

$(ab)^x =$ _____

When raising a product to a power, _____ the power to each factor.

Apply the properties of exponents to simplify each expression below.

6. $(xy)^3$	7. $(h^4)^2 \cdot (h^3)^4$	8. $\frac{(2^3)^2}{2^5}$
9. $(m^3n^2)^5$	10. $\frac{6^9}{(6^3)^2}$	

Apply the properties of exponents to answer 11-13.

11. Three students wrote the following equality statements. Circle the name of any student who is correct.

CALEB

$(x^4)^3 = (x^3)^4$

ELLIE

$13^4 \times 13^7 = (13^4)^7$

FLORIAN

$\frac{y^8 \cdot y}{y^3} = (y^2)^3$

12. Find the value of x needed to make the statement below true.

$$\frac{b^6 \cdot b^6}{(b^2)^3} = (b^3)^x$$

13. Find the value of x needed to make the statement below true.

$$\frac{(g^6)^2}{(g^2)^x} = g^6$$