Exponent Rules Pattern Investigation

_____
(name / date / period)

Remember

Identify the base in 4^3. What information does it give you?

Identify the exponent in 4^3. What information does it give you?

Understand

Explain how 2^3 different from $2 \bullet 3$?

Analyze and Create: Write the **Problem** expression in **E•x•p•a•n•d•e•d F•o•r•m**, then simplify the expression by writing the correct **Exponential Form**. At the bottom of each section, write a rule explaining to other people how to simply expressions with many exponents.

Multiplying Numbers with Exponents

Problem	E•x•p•a•n•d•e•d F•o•r•m	Exponential Form
1. $2^2 \bullet 2^3$	$\underline{2 \bullet 2} \bullet \underline{2 \bullet 2 \bullet 2}$	
2. $3^4 \bullet 3^2$		
3. $4^2 \bullet 4^5$		
4. $5^2 \bullet 5^4 \bullet 5^3$		
5. $(10^3)(10)$		
6. $(10^5)(10^3)(10^2)$		
7. $(x^2)(x^3)$		
8. $(p^4)(p^5)(p)$		

Look at the original exponents in the **Problem** *and the exponents in the* **Exponential Form** *. Write the rule for multiplying numbers with integer exponents:*

Exponents Raised to an Exponent (a.k.a. Power to a Power)

Problem	E•x•p•a•n•d•e•d F•o•r•m	Exponential Form
1. $(2^3)^2$	$2^3 \bullet 2^3 = \underline{2 \bullet 2 \bullet 2} \bullet \underline{2 \bullet 2 \bullet 2}$	
2. $(2^2)^3$		
3. $(2^2)^4$		
4. $(2^3)^3$		
5. $(2^2)^4$		
6. $(a^5)^2$		
7. $(w^5)^3$		
8. $(g^5)^3$		

Look at the original exponents in the **Problem** *and the exponents in the* **Exponential Form** *. Write the rule for an exponent raised to an exponent:*

Dividing Numbers with Exponents

Problem	E•x•p•a•n•d•e•d F•o•r•m	Exponential Form
1. $2^5 \div 2^2 = \frac{2^5}{2^2}$	$\frac{2 \bullet 2 \bullet 2 \bullet 2 \bullet 2}{2 \bullet 2}$	
2. $4^6 \div 4^2 = \frac{4^6}{4^2}$		
3. $5^6 \div 5^2 = \frac{5^6}{5^2}$		
4. $3^5 \div 3^3 = \frac{3^5}{3^3}$		
5. $10^7 \div 10^4 = \frac{10^7}{10^4}$		
6. $r^4 \div r^2 = \frac{r^4}{r^2}$		
7. $s^7 \div s^3 = \frac{s^7}{s^3}$		
8. $m^{10} \div m^3 = \frac{m^{10}}{m^3}$		

Look at the original exponents in the **Problem** *and the exponents in the* **Exponential Form** *. Write the rule for dividing numbers with integer exponents:*

Create and Evaluate

Rewrite your rule for multiplying numbers with exponents.	Which rule is the same as your rule? A. $x^a \bullet x^b = x^{a+b}$ B. $\frac{x^a}{x^b} = x^{a-b}$ C. $(x^a)^b = x^{a \bullet b}$
Rewrite your rule for a power raised to a power.	Which rule is the same as your rule? A. $\frac{x^a}{x^b} = x^{a-b}$ B. $(x^a)^b = x^{a \bullet b}$ C. $x^a \bullet x^b = x^{a+b}$
Rewrite your rule for dividing numbers with exponents.	Which rule is the same as your rule? A. $x^a \bullet x^b = x^{a+b}$ B. $(x^a)^b = x^{a \bullet b}$ C. $\frac{x^a}{x^b} = x^{a-b}$