

Lesson 4.1- SWBAT rewrite expressions using law of exponents.

Kick off-
Rewrite each of the following with an exponent.

1) $5 \cdot 5 \cdot 5$ 2) $x \cdot x \cdot x \cdot x$ 3) $(-9) \cdot (-9)$

5^3 x^4 -9^2

Rewrite each of the following in expanded form. (Like above!)

4) 6^3 5) y^5 6) $(-2)^3$

$6 \cdot 6 \cdot 6$ $y \cdot y \cdot y \cdot y \cdot y$ $(-2) \cdot (-2) \cdot (-2)$

Evaluate $3^2 \cdot 3^4$. Write your answer in exponential form.

$3 \cdot 3$ $3 \cdot 3 \cdot 3 \cdot 3$

Therefore, the expanded form of $3^2 \cdot 3^4$ is 3^6

How many threes did you write out? **six** So, $3^2 \cdot 3^4 = 3^6$

Rule #1: When multiplying powers with the **same base**, you **add the exponents.**

Ex: Number base: $2^5 \cdot 2^4 \cdot 2^3 = 2^9$ Variable base: $x^2 \cdot y^2 \cdot y^4 \cdot x^5 = x^7 y^6$

Find equivalent expressions of each. (rewrite each one!)

1) $6^5 \cdot 6^5 = 6^{10}$ 2) $3^4 \cdot 3^5 \cdot 3 = 3^{10}$ 3) $2^{-2} \cdot 2^7 \cdot 2^4 = 2^9$

4) $5 \cdot 5^6 = 5^7$ 5) $9^3 \cdot 3^6$ **Keep the same** $9^3 \cdot 3^6$ 6) $w^5 \cdot w^6$ **Will**

7) $(5x^2)(3x^3) = 15x^5$ 8) $(-6db^3)(-2a^2b^7) = 12a^2b^{10}$ 9) $(3ab)(-5a^2bc^3) = -15a^3b^2c^3$

* Multiply coefficients
add exponents.

Expand Each of the following, then simplify!

1) $\frac{5^9}{5^4} = 5^5$ 2) $\frac{x^4}{x^2} = x^2$ 3) $\frac{2^5}{2} = 2^4$

Rule #2: When dividing powers with the **same base**, you **subtract the exponents**

Ex: Number base: Variable base:

Find equivalent expressions of each. (rewrite each one!)

1) $\frac{9^5}{9^2} = 9^3$ 2) $\frac{3^6}{3^3} = 3^3$ 3) $\frac{2^5 3^6}{2^3 3^2} = 2^2 3^4$

4) $\frac{x^{50}}{y^{25}}$
keep the same

5) $\frac{x^{14}y}{y^4}$
 $x^{14}y^{-3}$

6) $\frac{x^6x^4}{x^3}$
 $\frac{x^6}{x^3} = x^3$

7) $\frac{4x^{50}}{2x^{25}}$
 $2x^{25}$

8) $\frac{5x^3}{15x^{-2}}$
 $\frac{1}{3}x^5$

9) $\frac{14x^{11}}{21x^2}$
 $\frac{2}{3}x^9$

Simplify using Laws of Exponents

1) $(5^2)^3$
 $(5^2)(5^2)(5^2)$
 $= 5^6$

2) $(7^3)^4$
 $= 7^{12}$

3) $(2^{10})^2$
 2^{20}

Rule #3: When raising a power to a power, keep the base and **multiply** the exponents.

Ex: $(4^2)^5 = 4^{10}$ $(x^3)^7 = x^{21}$

1) $(2^9)^5$
 2^{45}

2) $(x^4 \cdot x^2)^2$
 $(x^6)^2$
 x^{12}

3) $(3x^3)^2$
 $9x^6$

4) $(2x^3)^2$
 2^2x^6

5) $(-3y^5)^2$
 $(-3)^2y^{10}$

6) $(5x^2yz^3)^4$
 $5^4x^8y^4z^{12}$