

Definition of Exponents and Exponent Properties (Multiply and Divide)

Definition of an exponent – An expression like x^n is called a power and is read “x to the nth power.” The variable x is called the base, and n is called the exponent. The exponent indicates the number of times the base is used as a factor.

Examples:

$$7^3 = 7 \cdot 7 \cdot 7 = 343$$

$$x^5 \rightarrow x \cdot x \cdot x \cdot x \cdot x$$

$$y^2 w^4 = y \cdot y \cdot w \cdot w \cdot w \cdot w$$

Using the definition of exponents explore what happens when like bases are multiplied...

$$\begin{array}{c} x^3 * x^8 \\ x \cdot x \cdot x * x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \\ \hline x^{11} \end{array}$$

$$\begin{array}{c} 2^4 * 2^2 \\ 2 \cdot 2 \cdot 2 \cdot 2 * 2 \cdot 2 \\ \hline 2^6 \rightarrow 64 \end{array}$$

$$\begin{array}{c} (x^2 y)(x^3 y^4) \\ (x \cdot x \cdot y)(x \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y) \\ \hline x^5 y^5 \end{array}$$

Can you generalize what has happened? *add exponents*

Using the definition of exponents explore what happens when like bases are divided...

$$\begin{array}{c} \frac{x^9}{x^3} \\ \frac{x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x}{x \cdot x \cdot x} \\ \hline x^6 \end{array}$$

$$\begin{array}{c} \frac{2^8}{2^5} \\ \frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} \\ \hline 2^3 \rightarrow 8 \end{array}$$

$$\begin{array}{c} \frac{y^2 w^4}{y^2 w^3} \\ \frac{y \cdot y \cdot w \cdot w \cdot w \cdot w}{y \cdot y \cdot w \cdot w \cdot w} \\ \hline w \end{array}$$

Can you generalize what has happened? *subtract exponents*

What about coefficients?! What do we do with those?! What if I have to multiply and divide?!

perform operation / reduce

$$\begin{array}{c} 2y * 3xy^8 \\ 6xy^9 \end{array}$$

$$\begin{array}{c} \frac{-108z^5 a^{10}}{81z^3 a^4} \\ \frac{-4z^2 a^6}{3} \end{array}$$

simplify numerator & denominator

$$\begin{array}{c} \frac{(10c^3)(25c^9)}{(150c)(-5c^7)} \\ \frac{250c^{12}}{-750c^8} \\ \frac{-1c^4}{3} \end{array}$$

Unit 2 4.2p

Properties of Exponents: Multiply and Divide Practice

1. $x^3 * x^6 * x^1$
 x^{10}

2. $a^3 * b^6 * a^7 * b^2$
 $a^{10} b^8$

3. $4c^8 * 8c^3$
 $32c^{11}$

4. $(k^9)(7k^3)$
 $7k^{12}$

5. $(-4d^4)(9d)$
 $-36d^5$

6. $(5x^2)(2x)(-3x^7)$
 $-30x^{10}$

7. $(2x^6y^2)(-9x^3y^5)$
 $-18x^9y^7$

8. $\frac{12^8}{12^6}$
 12^2

9. $\frac{h^{15}j^{22}}{h^9j^{19}}$
 h^6j^3

10. $\frac{10r^{14}}{2r^8}$
 $5r^6$

11. $\frac{8c^5}{10c^2}$
 $\frac{4c^3}{5}$

12. $\frac{25y^{17}}{15y}$
 $\frac{5y^{16}}{3}$

13. $\frac{-32a^8b^{13}}{40ab^{10}}$
 $\frac{-4a^7b^3}{5}$

14. $\frac{-52f^5g}{-4f^9g^5}$
 $\frac{13}{f^4g^4}$

15. $\frac{18x^7y^7z^3}{(24x^3)(3x^2yz^2)}$
 $\frac{18x^7y^7z^3}{72x^5yz^2}$
 $\frac{1x^2y^6z}{4}$

16. $(-f^{14}a^{19}l^{12}a^2)(-l^{10}a^3la)$
 $a^{25}f^{14}l^{23}$

17. $\frac{-7a^5bc^6 * 16ab^2c}{28a^3bc^4}$
 $\frac{-112a^6b^3c^7}{28a^3bc^4}$
 $-4a^3b^2c^3$

*18. $(-2x^5)^3$
 $-8x^{15}$