

Properties of Exponents Day 2

Power of a Power (Multiply Powers)

a. $(2^3)^4 = 2^{12}$

$(2 \cdot 2 \cdot 2)^4$

$(2 \cdot 2 \cdot 2)(2 \cdot 2 \cdot 2)(2 \cdot 2 \cdot 2)(2 \cdot 2 \cdot 2) = 2^{12}$

b. $(3^5)^2 = 3^{10}$

c. $(5^2)^x$

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

d. $(b^2)^5 = b^{10}$

Power of a Product

a. $(2 \cdot 3)^4 = 2^4 \cdot 3^4$

$$(2 \cdot 3)(2 \cdot 3)(2 \cdot 3)(2 \cdot 3)$$

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3$$

$$2^4 \cdot 3^4$$

c. $(2x^2)^3 = 2^3 x^6$

b. $(3x)^5 = 3^5 x^5$

d. $(m^3 \cdot p^2)^4$

$$m^{12} p^8$$

8. $(5w^3x^4)^{-2}$

$$5^{-2} w^{-6} x^{-8}$$

9. $(4x^{-5}y^3)^2$

$$4^2 x^{-10} y^6$$

Products and Powers to a Power

A) $(x^5)^2(x^6)^3$

$$x^{10} \cdot x^{18}$$

$$x^{28}$$

B) $(x^2)^8(x^3)^{10}$

$$x^{16} \cdot x^{30}$$

$$x^{46}$$

B) $(x^5y^2)^4(x^6y^4)^4$

C) $(x^2y^5)^7(x^3y^6)^5$

D) $(x^5y^2z^3)^2(x^6y^4z^3)^5$

$$x^{10} y^4 z^6 \cdot x^{30} y^{20} z^{15}$$

$$x^{40} y^{24} z^{21}$$

E) $(4x^2y^3z^4)^2(2x^5y^6z^7)^3$

$$4^2 x^4 y^6 z^8 \cdot 2^3 x^{15} y^{18} z^{21}$$

$$(16) \quad (8)$$

$$128 x^{19} y^{24} z^{29}$$

Main Ideas	Details
	<p>Powers of a Fraction</p> <p>1. Simplify</p> <p>a. $\left(\frac{3}{5}\right)^3 = \frac{3^3}{5^3}$</p> <p>b. $\left(\frac{c}{5}\right)^2 = \frac{c^2}{5^2}$</p> <p>c. $\left(\frac{4}{n}\right)^5 = \frac{4^5}{n^5}$</p> <p>d. $\left(\frac{c^2}{5n}\right)^3 = \frac{c^6}{5^3 n^3}$</p>

Quotients of Powers: Subtract Powers

3. Simplify

a. $\frac{2^{10}}{2^3} = 2^7$

b. $\frac{3^6}{3^2} = 3^{6-2} = 3^4$ c. $\frac{10^9}{10^3} = 10^6$

$$\frac{3^6}{3^2} = \frac{\cancel{3} \cdot \cancel{3} \cdot 3 \cdot 3 \cdot 3 \cdot 3}{\cancel{3} \cdot \cancel{3}} = 3^4$$

d. $\frac{2^3}{2^5} = 2^{3-5} = 2^{-2}$

e. $\frac{7^x}{7^y} = 7^{x-y}$

f. $\frac{3^5}{3^5} = 3^{5-5}$
 $= 3^0$
 $= 1$

g. $\frac{b^5}{b^3} = b^2 = b^{5-3}$

h. $\frac{b^6}{b^{10}} = b^{-4}$
 $= b^{6-10}$

Use the quotient rule for exponents to simplify.

$$1. \frac{6x^5y^{15}}{11x^2y^5} = \frac{6x^{5-2}y^{15-5}}{11} \\ = \frac{6x^3y^{10}}{11}$$

$$2. \frac{5x^{-2}y^{-5}}{20x^4y^9} \\ = \frac{1x^{-2-4}y^{-5-9}}{4} \\ = \frac{1x^{-6}y^{-14}}{4}$$

$$3. \frac{2x^{-2}y^{-5}}{9x^{-4}y^{-9}} = \frac{2x^{-2-(-4)}y^{-5-(-9)}}{9} \\ = \frac{2x^2y^4}{9}$$

$$4. \frac{16x^{-6}y^{-4}}{8x^2y^{-3}} \\ = \frac{2x^{-6-2}y^{-4-(-3)}}{1} \\ = 2x^{-8}y^{-1}$$