

7-4 & 7-5 New Multiplication & Division Exponent Rules

$$(3^6)^2 = 3^6 * 3^6 = 3^{(6+6)} = 3^{12}$$

$$= 3^{(6*2)} = 3^{12}$$

$$(g^4)^3 = g^4 * g^4 * g^4 = g^{(4+4+4)} = g^{12}$$

$$= g^{(4*3)} = g^{12}$$

Rule #5:

$$(a^x)^y = \underline{a^{x \cdot y}}$$

When you raise a power to a power, you multiply the exponents.

Applying the property: $(a^x)^y = a^{xy}$

$$(x^3)^6 = x^{18}$$

$$c^5(c^3)^{-2} = c^5 \cdot c^{-6} = \frac{1}{c^1}$$

$$(n^4)^3 * n^5 = n^{17}$$

$$(a^4)^2 * (a^2)^5 = a^8 * a^{10} = a^{18}$$

$$\begin{aligned}
 (5y^2)^3 &= 5y^2 * 5y^2 * 5y^2 &= (5 * 5 * 5) * (y^2 * y^2 * y^2) \\
 & &= 5^3 * y^6 \\
 & &= 125y^6
 \end{aligned}$$

$$\begin{aligned}
 (4g^5)^2 &= (4g^5)(4g^5) &= (4 * 4)(g^5 * g^5) \\
 & &= 4^2 * g^{10} \\
 & &= 16g^{10}
 \end{aligned}$$

Rule #6: $(ab)^n = \underline{a^n \cdot b^n}$

A product raised to a power is equal to each term in the product
raised to the power and multiplied

Apply Rule #6: $(ab)^n = a^n b^n$

$$(x^{-2})^2(3xy^2)^4 = x^{-4} \cdot (3^4) \cdot x^4 \cdot y^8$$

$$(c^2)^3(c^5)^4 = c^6 \cdot c^{20} = c^{26}$$

$$(3b^{-2})^2(a^2b^4)^3 = 3^2 b^{-4} \cdot a^6 b^{12} = 9a^6 b^8$$

$$(mg^4)^{-1}(mg^4) = \frac{1}{mg^4} \cdot \frac{mg^4}{mg^4} = 1$$

$$\left(\frac{y}{x}\right)^3 = \frac{y}{x} * \frac{y}{x} * \frac{y}{x} = \frac{y^{(3)}}{x^{(3)}}$$

$$\frac{x^3}{x^3}$$

$$\left(\frac{4}{x^2}\right)^3 = \frac{4}{x^2} * \frac{4}{x^2} * \frac{4}{x^2} = \frac{4^{(3)}}{(x^2)^{(3)}} = \frac{64}{x^6}$$

Rule #7: $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

Raising a quotient to a power is equal to each term in
quotient raised power then divided

Applying Rule: $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

$$\left(\frac{3}{x^2}\right)^2 = \frac{3^2}{(x^2)^2} = \frac{9}{x^4}$$

$$-[2]^{-4} = -\frac{1}{16}$$

$$(-2)^{-4} = \frac{1}{16}$$

$$\left(\frac{-2x}{y}\right)^{-4} = \frac{y^4}{16x^4} = \frac{(y)^{-4}}{(-2)^4(x)^{-4}}$$

$$\left(\frac{7a}{m}\right)^{-2} = \frac{m^2}{49a^2}$$

$$\left(\frac{n^4 n}{n^{-2}}\right)^{-4} = \frac{n^{-20}}{n^8} = \frac{1}{n^{20} \cdot n^8} = \frac{1}{n^{28}}$$

$$\left(\frac{-2m^5}{m^2}\right)^{-4} = \frac{1}{16m^{12}}$$

$$\left(\left(\frac{(-2x)^2 z}{(-3y)^{-4}}\right)^3\right)^2 =$$

$$\left(\left(\frac{(-2x)^2 z}{(-3y)^{-4}} \right)^3 \right)^2 =$$

Solving Equations with exponents:

If $a^x = a^y$ then $x = y$

For two exponential expressions with the same base to be equal, their exponents must also be equal.

$$25^3 = 5^x$$

$$(5^2)^3 = 5^x$$

$$5^6 = 5^x$$

$$6 = x$$

Check: $25^3 = 5^6$

$$8^2 = 2^x$$

$$4^x = 2^6$$

$$2^x = \frac{1}{32}$$

$$\left(\frac{7a}{b^{-2}} \right)^{-3} = (7ab^2)^{-3}$$
$$= 7^{-3} a^{-3} b^{-6}$$
$$7^3 \overline{a^3 b^6} \leftarrow$$

