

U2D2_T- Exponent Laws Part II

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U2D2_T-
Exponent ...

U2D2 Day 2: Exponent Laws (Part 2)

Simplifying Exponential Equations:

Power of a Power

Expression	Expanded Form	Single Power
$(4^2)^3$	$(4^2)(4^2)(4^2) = 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$	4^6
$(5^3)^2$	$(5^3)(5^3) = 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5$	5^6
$(x^4)^2$	$(x^4)(x^4) = x \cdot x \cdot x \cdot x \cdot x \cdot x$	x^8
$(y^3)^4$	$(y^3)(y^3)(y^3)(y^3) = y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y = y^{12}$	y^{12}

Generalized Rule: Power Rule

For a power to a power...

Keep the base and multiply
the exponents

$$(x^a)^b = x^{a \cdot b}$$

Working With Exponent Laws

(using all three laws)

Simplify:

1. a) $(x^5)^2$

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

$$= x^{10}$$

b) $(10b^2)^3$

$$= (10)^3 (b^2)^3$$

$$= 1000 b^6$$

NOTE:
Only if everything in bracket is multiplied or divided, we give each factor its own bracket.

c) $[(x^3)(x^2)]^3$

$$= (x^{3+2})^3$$

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

$$= x^{15}$$

d) $-4ab^2 \div 2ab$

$$\begin{aligned} \text{OR } (x^3)(x^2)^3 &= \frac{-4ab^2}{2ab^1} \\ &= x^9 x^6 &= -2b^{2-1} \\ &= x^{15} &= -2b \end{aligned}$$

e) $\frac{(7mn^2)^2}{7mn}$

$$= \frac{(7^2)(m^2)(n^2)^2}{7mn}$$

$$= \frac{7^2 m^2 n^4}{7mn}$$

$$= 7mn^3$$

f) $(-6x^5y^4)^2$

$$= (-6)^2 (x^5)^2 (y^4)^2$$

$$= 36x^{10}y^8$$

$$\begin{aligned}
 & \text{g) } \left(\frac{x^5}{-3y^3} \right)^2 \\
 &= \frac{(x^5)^2}{(-3)^2 (y^3)^2} \\
 &= \frac{x^{10}}{9y^6}
 \end{aligned}$$

Simplify first and then evaluate

1. $(3x^2y)^2$ for $x = 2, y = 3$

$$\begin{aligned}
 &= (3)^2 (x^2)^2 (y)^2 \\
 &= 9x^4y^2 \\
 &= 9(2)^4(3)^2 \\
 &= 9(16)(9) \\
 &= 1296
 \end{aligned}$$

$$\begin{array}{r}
 144 \times 10 \\
 - 144 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 81 \\
 16 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 80 \times 16 \\
 80 \times 8 \times 2 = 1280 \\
 640 \times 2 = 1280 \\
 + 16 \\
 \hline
 \end{array}$$

Simplify first and then evaluate

$$\begin{aligned} 2. \quad & \left(\frac{-3a^3}{5a^3} \right)^2 \quad \text{for } a = 3 \\ & = \frac{(-3)^2 (a^3)^2}{(5)^2 (a^3)^2} \\ & = \frac{9}{25} \end{aligned}$$

Scientific Notation

3 100 000 written in scientific notation is:

$$3.1 \times 10^6$$

Simplify:

$$\begin{aligned} & \underline{(3.1 \times 10^9)} (\underline{2.0 \times 10^5}) \\ & = 3.1 \times 2.0 \times 10^9 \times 10^5 \\ & = 6.2 \times 10^{14} \end{aligned}$$