Notes: Property of Exponents Part 1

Key

Rule 1: $a^{-m} = \frac{1}{a^m}$ **Example:** $x^{-2} = \frac{1}{x^2}$

Note: negative exponents on top move to the bottom and become positive

"I Do"

(#1) $4a^{-2}$

$\frac{4}{a^2}$

"We Do"

(#2) x^2y^{-4}

$\frac{x^2}{y^4}$

"You Do"

(#3) $3xy^{-3}z$

$\frac{3xz}{y^3}$

Rule 2: $\frac{1}{a^{-m}} = a^m$ **Example:** $\frac{1}{x^{-3}} = x^3$

Note: Negative exponents on the bottom move to the top and become positive

"I Do"

(#4) $\frac{5x}{3y^{-2}}$

$\frac{5xy^2}{3}$

"We Do"

(#5) $\frac{xy^2}{4^{-2}z}$

① $\frac{4^2xy^2}{z}$ ② $\frac{16xy^2}{z}$

"You Do"

(#6) $\frac{x^{-2}yz^2}{2^{-3}}$

① $\frac{2^3yz^2}{x^2}$ ② $\frac{8yz^2}{x^2}$

Rule 3: $a^0 = 1$ **Example:** $x^0 = 1$

Note: any base with an exponent of 0 becomes 1

"I Do"

(#7) $8x^0$ ① $x^0 = 1$

② $8 \cdot 1$

③ $= 8$

"We Do"

(#8) $\frac{x^2y^0}{z^{-2}}$ ① $y^0 = 1$

② $\frac{x^2 \cdot 1}{z^{-2}}$

③ x^2z^2

"You Do"

(#9) $\frac{3^0a^2b^{-2}}{c^{-2}}$

① $3^0 = 1$

② $\frac{1 \cdot a^2c^2}{b^2}$

③ $\frac{a^2c^2}{b^2}$

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Rule 4: $a^m \cdot a^n = a^{m+n}$ Example: $x^1 \cdot x^2 \cdot x^3 = x^{1+2+3}$ $\boxed{x^6}$

Note: when multiplying the SAME Base ADD exponents

"I Do"

#10) $(4x^2y)(-2xy^4)$

① $-8x^{2+1}y^{1+4}$

② $\boxed{-8x^3y^5}$

"We Do"

(#11) $(4h^{\frac{1}{3}}k^2)(h^{\frac{4}{3}}2k^4)$

① $8h^{\frac{1}{3}+\frac{4}{3}}k^{2+4}$

② $\boxed{8hk^6}$

"You Do"

(#12) $\dfrac{(x^2y^2z^3)(x^{-5}y^2)}{3w^2}$

① $\dfrac{x^{2+-5}y^{2+2}z^3}{3w^2}$

② $\dfrac{x^{-3}y^4z^3}{3w^2}$ ③ $\boxed{\dfrac{y^4z^3}{3x^3w^2}}$

Rule 5: $(a^m)^n = a^{m \cdot n}$ Example: $(4a^3)^2 =$ ① $(4)^2 a^{3 \cdot 2}$ $\boxed{16a^6}$

Note: distribute, multiply outside Exponent in

"I Do"

#13) $(3x^2z)^3$

① $(3)^3 x^{2 \cdot 3} z^{1 \cdot 3}$

② $\boxed{27x^6z^3}$

"We Do"

(#14) $(-5x^2y)^2(-2xy)^3$

① $(-5)^2x^{2 \cdot 2}y^{1 \cdot 2}(-2)^3x^{1 \cdot 3}y^{1 \cdot 3}$

② $25x^4y^2 \cdot -8x^3y^3$

③ $-200x^{4+3}y^{2+3}$

④ $\boxed{-200x^7y^5}$

"You Do"

(#15) $-(2a^{-2})^3(3xy^2z)^3$

① $-(8a^{-6})(27x^3y^6z^3)$

② $-8a^{-6}27x^3y^6z^3$

③ $\boxed{\dfrac{-216x^3y^6z^3}{a^6}}$

Putting the Rules Together :)

"I Do"

#16) $\dfrac{(2x^{-2}y)^3(4xy^0)^2}{3z^2}$

① $\dfrac{(8x^{-6}y^3)(16x^2y^0)}{3z^2}$

② $\dfrac{128x^{-4}y^3}{3z^2}$ ③ $\boxed{\dfrac{128y^3}{3x^4z^2}}$

"We Do"

(#17) $(4x^{-2}y^3)(3xy^2)$

① $12x^{-1}y^5$

② $\boxed{\dfrac{12y^5}{x}}$

"You Do"

(#18) $x^2 \cdot x^{-3} \cdot x$

① x^{2+-3+1}

② x^0

③ $\boxed{1}$

Scientific Notation!

"I Do"

#17) $(1.3 \times 10^5)(12.3 \times 10^8)$

15.99×10^{13} $\boxed{1.599 \times 10^{14}}$

"We Do"

(#18) $(2.5 \times 10^4)(3 \times 10^6)$

$\boxed{7.5 \times 10^{10}}$

"You Do"

(#19) $(6 \times 10^8)(4.2 \times 10^{-3})$

25.2×10^5 $\boxed{2.52 \times 10^6}$