**Module 4 Lesson 3:**

**Rules of Exponents**

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**Learning Target:**

* **I can use the rules of exponents to simplify expressions involving positive, negative, zero, and rational exponents.**

**Rules of Exponents:**



**Fractional Exponents:**

**Rule:** $a^{^{p}/\_{r}}$ **is the same as** $\sqrt[r]{a^{p}}$ **or** $(\sqrt[r]{a} )^{p}$

**Simplify each of the following using the rules of exponents:**

**Ex.** $(2a^{4}c^{7})^{3}$ **Ex.** $(-5xy^{3})^{4}$

**Ex.** $(4p^{2}q^{3})^{2}(-3p^{5}q^{2})^{3}$ **Ex.** $\frac{24 a^{7} b^{10}c^{2}}{18 a b^{10} c^{5}}$

**Ex.** $(8x^{12}w^{3})^{\frac{2}{3}}$ **Ex.** $(16a^{3}b^{6})^{\frac{3}{4}}$

**Ex. Compute:** $16^{^{3}/\_{2}} + 10^{0}- 27^{^{2}/\_{3}}$

**Now let’s take a look at negative exponents………**

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**Simplify the following and express the final answer without using any negative exponents.**

**Ex.** $(4x^{-2}y^{3})^{-1}$ **Ex.** $\frac{14 a^{-3} b^{4} c^{-8}}{-21 a^{5} b^{-1} c^{-6}}$

**Ex.** $(-8w^{-21}y^{24})^{-\frac{2}{3}}$ **Ex.** $(4f^{-2}g^{3})(-f^{3}g^{-4})³$

**Ex.** $(\frac{-2u^{-4}v^{5}}{3u^{7}v^{2}} )^{-3}$ **Ex.** $(-\frac{15x^{5}y^{-1}z^{2}}{25x^{0}y^{3}z^{-2}} )^{-2}$

**Ex.** $(4p^{-3}r^{5})^{-2}$ **Ex.** $(-3x^{7}y^{-1})^{-4}$

**Ex.** $\frac{\left(-2x\right)^{-2}(y^{-5})}{(3x^{3})^{-3}}$ **Ex.** $\frac{18a^{-2}c^{8}d^{-3}}{30a^{5}c^{-1}d^{-6}}$