**Reviewing the Exponent Laws**

am is a power in exponential form where: ***m*** is the exponent ***a*** is the base ***m*** is a power of base *a*

In expanded form, am = a x a x a x a … (multiply ***a*** by itself as many times as given by the value of m, exponent)

To **simplify** an expression means to leave the final answer in exponential form.]

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| **RULE** | **EXAMPLE** | **PRACTICE** |
| 1) MULTIPLICATION of POWERSkeep the base, add the exponents. | $$a^{2}×a^{5}=a^{7}$$ | Simplify $\left(2a^{2}b^{3}\right)(-3a^{4}b^{6})$  |
| 2) DIVISION of POWERSkeep the base, subtract the exponents. | $$a^{5}÷a^{2}=a^{3}$$ | Simplify $\frac{27x^{9}}{3x^{-6}}$ |
| 3) POWER of a POWERkeep the base, multiply the exponents. | $$(a^{2})^{5}=a^{10}$$ | Simplify $(a^{-2})^{-3}×3a^{6}$ |
| 4) POWER of a PRODUCTdistribute the exponent over the brackets to each term inside. Then apply rule #3 | $$\left(2a^{3}b^{2}\right)^{4}=\left(2^{1}\right)^{4}\left(a^{3}\right)^{4}\left(b^{2}\right)^{4}$$ $=\left(2^{1×4}\right)(a^{3×4})(b^{2×4})$ $=2^{4}a^{12}b^{8}$ $=16a^{12}b^{8}$ | Simplify$ \left(-2a^{2}b^{5}\right)^{3}$ |
| 5) POWER of a QUOTIENTsame as rule #4 | $$\left(\frac{a^{3}}{b^{2}}\right)^{3}=\frac{\left(a^{3}\right)^{3}}{\left(b^{2}\right)^{3}}$$ $=\frac{a^{3×3}}{b^{2×3}}$ $=\frac{a^{9}}{b^{6}}$ | Simplify $(\frac{12x^{5}}{4y^{3}})^{3}$ |
| 6) NEGATIVE EXPONENTreciprocate the base, switch the sign of the exponent | $$a^{-2}=\frac{1}{a^{2}}$$ | $$\left(\frac{2}{3}\right)^{-2}=\left(\frac{3}{2}\right)^{2}$$ = 9/4 | Simplify $(\frac{2x^{3}}{3y^{2}})^{-3}$ |
| 7) ZERO EXPONENTdepending on the sign of the base, it is either equal to 1 or -1 | $$x^{0}=1$$ | $$-x^{0}=-1$$ | Simplify $-(14a^{3}b^{-4})^{0}$ |

**Ex1.** Use the exponent laws to simplify the following. (Remember more than one law can be used to simplify an expression completely.)

**a.** (4ab4)(-5a3b2) **b.** (12b2)(8b-4) ÷ (6b-10)

**c.** ($-\frac{1}{2}$ c2d3)4 **d**. $\frac{(t^{7})^{3} (t)}{t^{16}}$

**Ex2.** Use the laws of exponents to simplify the following:

**a.** $\frac{\left(-m^{2}n^{3}\right)^{2}(mn^{-4})}{(mn^{3})^{4}}$ **b.** $\frac{x(x^{4a+1})}{x^{a+3}}$

**c.** $\frac{\left(3^{4}+2^{6}\right)^{0}}{3^{-1}}$ **d.** $\frac{\left(2^{-1}+4^{-2}\right)}{\left(2^{-2}+4^{-1}\right)}$