Chapter 4 – Exponential Functions

4.4 – Simplifying Expressions Involving Exponents

Keep the **EXPONENT RULES** in your mind at all times.

One of the Keys of the exponent rules is "sameness".

- When you have the same base, (but possibly different exponents) you can combine powers.

e.g. $\frac{(x^3 \times x^4)}{x^7} = \frac{x^{3+4}}{x^7} = \frac{x^7}{x^7} = x^{7-7} = x^0 = 1$

- When you have the same exponent (but possibly different bases) you can "combine the bases under the same exponent".

e.g. $\frac{\sqrt[3]{12} \times \sqrt[3]{36}}{\sqrt[3]{16}} = \left(\frac{(12)(36)}{16}\right)^{\frac{1}{3}} = (27)^{\frac{1}{3}} = 3$

Now we turn to problems involving both numbers and variables being exponentized (not a word, but it should be because of how awesome it sounds).

Example 4.4.1

Simplify, leaving you answer with only positive exponents:

a) $\left(x^3\right)^2\left(x^{-8}\right)$

b) $\dfrac{z^4\left(z^{-2}\right)}{z^{-3}}$

c) $\sqrt{36x^{-6}}$

d) $\left(\dfrac{\left(3x^2y\right)^{-1}\left(x^3y^{-4}\right)}{\left(x^3y^2\right)^{-2}}\right)^{-2}$

e) $\left(\dfrac{\sqrt{16a^6}}{\left(a^3\right)^{-1}}\right)^{\frac{3}{2}}$

f) $\left(\dfrac{\left(6x^3\right)^2\left(6y^3\right)}{\left(9xy\right)^6}\right)^{-\frac{1}{3}}$

Class/Homework: Pg. 236 – 237 #2acef, 4acdf, 5, 6, 7ac (simplify BEFORE substituting!), 9ad