Name: _____   Date: _____

Learning Goal 2.3	I can evaluate an expression using order of operations with powers and applying exponent laws.

Variable Something that can change.
    - in math, it's represented by a letter, usually x

- all the exponent laws still apply, but you can't evaluate.

Example Simplify the following expressions. Show all your work.

a. $y^7 \times y^{12}$

$= y^{7+12}$

$= y^{19}$

b. $\dfrac{q^{78}}{q^{42}}$

$= q^{78-42}$

$= q^{36}$

c. $\dfrac{a^{23}}{b^{17}}$

$= \dfrac{a^{23}}{b^{17}}$

$\neq ab^{40}$

d. $(x^{13})^4$

$= x^{13 \times 4}$

$= x^{52}$

Example Simplify the following expressions. Show all your work.

e. $\left(\dfrac{3}{4a}\right)^3$

$= \dfrac{3^3}{4^3 a^3}$ ← answer for no-calc test

$= \dfrac{27}{64a^3}$ ← answer for calc test

f. $(3xy)^4$

$\left(= 3^4 x^{1 \times 4} y^{1 \times 4}\right)$

$\rightarrow = 3^4 x^4 y^4$

$= 81x^4 y^4$

g. $(m^2 n^5)^3$

$= m^{2 \times 3} n^{5 \times 3}$

$= m^6 n^{15}$

h. $(-2ab)(-4m^3 n^2)$

$= 8abm^3 n^2$

i. $\left(\dfrac{c^5}{d^3}\right)^{-4}$ j. $(c^3d^4)^{-5}$ k. $(2xy^{-4})^5$ l. $(-3a^{-4}b^{-5})^{-3}$

i.

$= \left(\dfrac{d^3}{c^5}\right)^4$

$= \dfrac{d^{3\times4}}{c^{5\times4}}$

$= \dfrac{d^{12}}{c^{20}}$

j.

$= \dfrac{c^{5x-4}}{d^{3x-4}}$

$= \dfrac{c^{-20}}{d^{-12}}$

$= \dfrac{d^{12}}{c^{20}}$

(j second work)

$= \left(\dfrac{1}{c^3d^4}\right)^5$

$= \dfrac{1^5}{c^{3\times5}d^{4\times5}}$

$= \dfrac{1}{c^{15}d^{20}}$

k.

$= \left(\dfrac{2x}{y^4}\right)^5$

$= \dfrac{2^5 x^{1\times5}}{y^{4\times5}}$

$= \dfrac{2^5 x^5}{y^{20}}$

$= \dfrac{32x^6}{y^{20}}$

l.

$= \left(\dfrac{-3}{a^4b^5}\right)^{-3}$

$= \left(\dfrac{a^4b^5}{-3}\right)^3$

$= \dfrac{a^{4\times3} b^{5\times3}}{(-3)^3}$

$= \dfrac{a^{12} b^{15}}{-27}$

$= -\dfrac{a^{12}b^{15}}{27}$

m. $\dfrac{x^9y^5}{x^6y^{-2}}$

$= \dfrac{x^9 y^5 y^2}{x^6}$

$= \dfrac{x^9 y^7}{x^6}$

$= x^3 y^7$

n. $\dfrac{a^4}{a^5} \times a^{-6}$

$= a^{-1} \times a^{-6}$

$= a^{-7}$

$= \dfrac{1}{a^7}$

Simplify vs Evaluate   Expressions (no = sign)

Simplify: to write an expression with only one copy of each variable and no negative exponents

Evaluate: find what the expression is equal to (no variables yet!)