Today's Learning Goal(s):

By the end of the class, I will be:

a) investigate the rules of simplifying numerical expressions.
b) use the Exponent Laws involving products, quotients and powers of powers.

RULE 1

$2^6 \times 2^2 = 2^8$

$12^3 \times 12^4 = 12^7$

$10^{20} \times 10^5 = 10^{25}$

RULE 2

$2^6 \div 2^2 = 2^4$

$\frac{7^{11}}{7^6} = 7^5$

RULE 3

$(3^4)^2 = 3^8$

$(5^2)^3 = 5^6$

Summary: The key is to **KEEP THE BASE THE SAME!**

1) $a^m \times a^n$

$= a^{m+n}$

2) $a^m \div a^n$

$= a^{m-n}$

3) $(a^m)^n$

$= a^{m \times n}$

MCF 3MI

7.2 The Laws of Exponents

Date: May 9/19

Ex. 1: Write each expression as a single power.

a) $2^3 \times 2^7$ $= 2^{3+7} = 2^{10}$

b) $(11^8)(11^{15})(11)^1$ $= 11^{8+15+1} = 11^{24}$

c) $9^8 \div 9^3$ $= 9^{8-3} = 9^5$

d) $\frac{7^9}{7^3}$ $= 7^{9-3} = 7^6$

e) $(6^2)^{11}$ $= 6^{2\times 11} = 6^{22}$

f) $(6^2)(6^{11})$ $= 6^{2+11} = 6^{13}$

g) $\left((2^7)^5\right)^2$ $= 2^{7\times 5\times 2} = 2^{70}$

h) $9^8 \div (9^3 \times 9)^1$ $= 9^8 \div 9^{3+1} = 9^8 \div 9^4 = 9^{8-4} = 9^4$

i) $\frac{(5^3)(5^7)^2}{5^4}$ $= \frac{5^{-3} \cdot 5^{14}}{5^4} = 5^{3+14-4} = 5^{13}$

j) $\frac{99^6(99^9)^3}{(99^2)^9}$ $= \frac{99^6 \cdot 99^{27}}{99^{18}} = 99^{6+27-18} = 99^{15}$

Ex. 2: Simplify, then evaluate without using a calculator.

a) $\left(\frac{1}{7}\right)^{10} \div \left(\frac{1}{7}\right)^8$ $= \left(\frac{1}{7}\right)^{10-8} = \left(\frac{1}{7}\right)^2 = \frac{(1)^2}{(7)^2} = \frac{1}{49}$

b) $\left(\frac{-4}{3}\right)^6\left(\frac{-4}{3}\right)^2 \div \left(\frac{-4}{3}\right)^5$ $= \left(\frac{-4}{3}\right)^{6+2-5} = \left(\frac{-4}{3}\right)^3 = \frac{(-4)^3}{3^3} = \frac{-64}{27}$

Ex. 3: Simplify.

a) $x^7(x^3)^2$ $= x^7 \cdot x^{3\times 2} = x^7 \cdot x^6 = x^{7+6} = x^{13}$

b) $\frac{(m^4)^8}{m^3}$ $= \frac{m^{4\times 8}}{m^3} = \frac{m^{32}}{m^3} = m^{32-3} = m^{29}$

c) $\left((c^7)^2\right)^4$ $= c^{7\times 2\times 4} = c^{56}$

d) $(3x^2y^5)^3$ $= (3)^3(x^2)^3(y^5)^3 = 27x^6y^{15}$

Ex. 4: Write each power in simplified form.

a) 8^4 as a base 2 power $= (2^3)^4 = 2^{3\times 4} = 2^{12}$

b) $\left(\frac{1}{16}\right)^7$ as a base $\frac{1}{4}$ power $= \left(\left(\frac{1}{4}\right)^2\right)^7 = \left(\frac{1}{4}\right)^{2\times 7} = \left(\frac{1}{4}\right)^{14}$

c) $(-125)^8$ as a base -5 power $= \left((-5)^3\right)^8 = (-5)^{3\times 8} = (-5)^{24}$

$-2^4 = -(2)(2)(2)(2) = -16$

$(-2)^4 = (-2)(-2)(-2)(-2) = 16$

Be Prepared for the Unit 6 Summative!

Today's Homework:

pp. 399-401 # 1 – 3, 5 – 11, 14, 16, 17