

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) $(a^m)^n$

$$= a^{m \times n}$$

or a^{mn}

MCF 3MI

$$x^3 \cdot x^7$$

7.2 The Laws of Exponents

Date: Dec. 2/19

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

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

g) $((2^7)^3)^2 = 2^{7 \times 3 \times 2} = 2^{42}$

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

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

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

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

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

$$\begin{array}{l} -2^2 \mid (-2)^2 \\ = -(2)(2) = (-2)(-2) \\ = -4 \quad = 4 \end{array}$$

Ex. 3: Simplify.

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

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) $((c^7)^2)^4 = c^{7 \cdot 2 \cdot 4} = c^{56}$

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

Ex. 4: Write each power in simplified form.

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

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

c) $(-125)^8$ as a base -5 power: $(-5^3)^8 = (-5)^{24}$

Today's Assigned Practice:

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