Section 1.8: EXPONENTS AND ORDER OF OPERATIONS

When you are done with your homework you should be able to...

- π Evaluate exponential expressions
- π Simplify algebraic expressions with exponents
- π Use the order of operations agreement
- π Evaluate mathematical models

WARM-UP:

Determine whether the given number is a solution of the equation.

$$\frac{5m-1}{6} = \frac{3m-2}{4}$$
; -4

Write a numerical expression for each phrase. Then simplify the numerical expression.

1. 14 added to the product of 4 and -10

2. The quotient of -18 and the sum of -15 and 12

DEFINITION OF A NATURAL NUMBER EXPONENT

If b is a real number and n is a natural number,

_____ is read "the _____ of ___ or "___ to the ____ power. The expression ____ is called an ____

Example 1: Evaluate.

1.
$$(-5)^3$$

$$(-12)^2$$

ORDER OF OPERATIONS

1. Perform all	within	symbols
2. Evaluate all	expressions.	
3. Do all	and	in the order
in which they occur, working	g from	to
4. Finally, do all following procedures:	and	using one of the
π Work from	to	and do additions and
subtractions in the	in wh	ich they occur.

or

 π Rewrite subtractions as ______ of _____.

Combine _____ and ____ numbers

separately, and then _____ these results.

Example 2: Simplify.

1.
$$40 \div 4 \cdot 2$$

3.
$$(3.5)^2 - 3.5^2$$

2.
$$\frac{-5(7-2)-3(4-7)}{-13-(-5)}$$

$$4. \left[-\frac{4}{7} - \left(-\frac{2}{5} \right) \right] \left[-\frac{3}{8} + \left(-\frac{1}{9} \right) \right]$$

Example 3: Simplify each algebraic expression.

1.
$$-6x^2 + 18x^2$$

2.
$$4(7x^3-5)-[2(8x^3-1)+1]$$

3.
$$6-5[8-(2y-4)]$$

APPLICATIONS

In Palo Alto, CA, a government agency ordered computer-related companies to contribute to a pool of money to clean up underground water supplies. (The companies had stored toxic chemicals in leaking underground containers). The mathematical model $C = \frac{200x}{100-x}$ describes the cost, C, in tens of thousands of dollars, for removing x percent of the contaminants.

1. Find the cost, in tens of thousands of dollars, for removing 50% of the contaminants.

2. Find the cost, in tens of thousands of dollars, for removing 60% of the contaminants.

3. Describe what is happening to the cost of the cleanup as the percentage of contaminant removed increases.