Section 1.8: EXPONENTS AND ORDER OF OPERATIONS
When you are done with your homework you should be able to...
$\pi$ Evaluate exponential expressions
$\pi$ Simplify algebraic expressions with exponents
$\pi$ Use the order of operations agreement
$\pi$ Evaluate mathematical models
WARM-UP:
Determine whether the given number is a solution of the equation.
$\frac{5 m-1}{6}=\frac{3 m-2}{4} ;-4$

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,
$\qquad$ of $\qquad$ " or " $\qquad$ to the $\qquad$ power. The expression $\qquad$ is called an $\qquad$ .

Example 1: Evaluate.

1. $(-5)^{3}$
2. $(-12)^{2}$

ORDER OF OPERATIONS

1. Perform all $\qquad$ within $\qquad$ symbols
2. Evaluate all $\qquad$ expressions.
3. Do all $\qquad$ and $\qquad$ in the order in which they occur, working from $\qquad$ to $\qquad$ .
4. Finally, do all $\qquad$ and $\qquad$ using one of the following procedures: $\pi$ Work from $\qquad$ to $\qquad$ and do additions and
subtractions in the $\qquad$ in which they occur.
or
$\pi$ Rewrite subtractions as of $\qquad$ .

Combine $\qquad$ and $\qquad$ numbers
separately, and then $\qquad$ these results.

Example 2: Simplify.

1. $40 \div 4 \cdot 2$
2. $\frac{-5(7-2)-3(4-7)}{-13-(-5)}$
3. $(3 \cdot 5)^{2}-3 \cdot 5^{2}$
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. $-6 x^{2}+18 x^{2}$
2. $4\left(7 x^{3}-5\right)-\left[2\left(8 x^{3}-1\right)+1\right]$
3. $6-5[8-(2 y-4)]$

## 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 $C=\frac{200 x}{100-x}$ 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.
