

I More on Evaluating Algebraic Expressions

Reminder: The Order of Operations Agreement

1. **Perform operations within the innermost grouping and work outwards. If the expression involves a fraction, treat the numerator and denominator as if they were each a group. Grouping can include parentheses, brackets, a root, or absolute value bars.**
2. **Evaluate all exponential expressions.**
3. **Perform multiplication and/or division as they occur, working from left to right.**
4. **Perform addition and/or subtraction as they occur, working from left to right.**

Ex 1: Evaluate: $\frac{12 \cdot 2 - 3^2}{[4^3 - (-3)^3] + 1}$

Ex 2: Evaluate: $3^2 - 80 \div 2^3 \cdot 3 - 12$

Ex 3: Evaluate: $\left(\frac{(3-4)^2 - 3|-12|}{8 - 3 \cdot 2^2 + 11} \right)^2$

II Simplifying Algebraic Expressions

The **terms** of an algebraic expression are those parts separated by addition (or subtraction). The numerical part of the term is called its **coefficient**. The parts of each term that are multiplied are called the **factors** of the term. One of the greatest challenges to algebra students is remembering that factors are multiplied and terms are added or

subtracted. **Like terms** (those that have the same variable factors) can be added by combining the coefficients. An algebraic expression is simplified when parentheses have been removed and like terms have been combined.

Ex 4: Simplify: $-3(x+3) + 2(3x-1) + 4(6-2x)$

Ex 5: Simplify: $-18x + 2[3x - 2(x+3)] + 4$

III Translating as an algebraic expression

Ex 6: Write the English phrase as an algebraic expression. Then simplify. Let x represent the number.

- a) A number increased by the difference between 5 and twice the number

- b) The product of 6 and the sum of a number, twice the number, and -2 .

IV Mathematical models

We examined mathematical models in lesson 1 some. Remember, a mathematical model is a formula to represent a real life situation.

Ex 7: Suppose the upper limit of range of a heart rate of an individual is given by

$$H = \frac{2}{3}(220 - a)$$

in beats per minute where a is the age and the lower limit of range of a

heart rate of an individual is given by $H = \frac{2}{5}(220 - a)$.

- a) Find the upper and lower limit for someone aged 43.

- b) Suppose the actual upper limit for a 43 year old is 121 beats per minute. Does the mathematical model overestimate or underestimate the actual heart rate and by how much?