1.1 Intro to Variables and Models

Definition 1.1.1 (Variable)**.** a letter or character representing a variety of numbers or quantities

Definition 1.1.2 (Algebraic Expression)**.** a statement that relates variables and numbers (constants) through a combination of algebraic operations

What are operations? Which are the most common?

Example 1.1.1. Rewrite each example as an algebraic expression.

1. two more than a number

2. three less than a value

3. a number divided by six

4. four times a number

5. five more than three times a value

Evaluating Algebraic Expressions

- replace the variable with the given value
- simplify the expression using PEMDAS

Example 1.1.2. Evaluate each of the following:

1. $2 + 3x$; $x = 4$

2. $5(x - 2)$; $x = -3$

3. $2x - 7y$; $x = 3, y = 2$

4. $\dfrac{x + 7y - 4}{3x - y}$; $x = 1, y = 5$

Equations

Definition 1.1.3 (Equations)**.** An equation is a statement that two algebraic expressions are the same (equivalent). They always contain an equal (=) sign.

Definition 1.1.4 (Solution(s) of an Equation)**.** Solutions are values of a variable(s) that make an equation true meaning that when the expressions are evaluated, both sides of the equals sign are the same. We find the solutions by solving for a specific variable.

Example 1.1.3. Determine whether or not the given value is a solution to each.

1. $9x - 3 = 42$; $x = 6$

2. $9x - 3 = 42$; $x = 5$

3. $2(y + 3) = 5y - 3$; $y = 4$

4. $2(y + 3) = 5y - 3$; $y = 3$

Example 1.1.4. Write each sentence as an equation.

1. The quotient of a number and six is five.

2. Seven decreased by twice a number yields one.

Formulas & Models

Definition 1.1.5 (Formula)**.** an equation that expresses the relationship between two or more variables

Definition 1.1.6 (Mathematical Model)**.** a formula that describes real-world situations and processes

Example 1.1.5. The number of times my dogs bark in a day, B, is determined by the number of people who walk by my house, w.

1. Find the equation representing this situation.

2. How many times do they bark if two people walk by?

3. How many times do they bark if ten people walk by?

4. How many times do they bark if no one walks by?

5. How many times do they bark if -5 people walk by?