

Unit 26 Algebraic Expressions and Equations

1. Algebraic Expressions

- A. Algebraic expressions contain letters, numbers, and operation signs.
- The letters are called **variables**. They represent **unknown** quantities.
 - The numbers are called **constants**. They represent **known** quantities.
- B. The multiplication sign is often omitted in algebraic expressions.
 $5y$ means $(5)(y)$ and xy means $(x)(y)$. In algebra, x does not mean multiplication.
- C. Evaluating algebraic expressions
- Replace all variables with their given values.
 - Following the order of operations (Unit 5), calculate the result.

Evaluate: $2y + 3$ when $y = 4$ $x^2 - 2$ when $x = 3$ $5x - y^2$ when $x = 6$ and $y = 4$

$$(2)(4) + 3$$

$$8 + 3 = 11$$

$$(3)^2 - 2$$

$$9 - 2 = 7$$

$$(5)(6) - (4)^2$$

$$30 - 16 = 14$$

2. Algebraic Equations

- A. An **equation** represents two equal expressions.
- B. Solving an algebraic equation requires finding the value of the variable which will make the equation true. The value is found by isolating the variable on one side of the equation.
- C. **Equal opposite math operations** are used to isolate the variable.
- D. Examples: Solving for x using equal opposite math operations.

Addition Equation
(use subtraction)

$$x + 3 = 10$$

$$x + 3 - 3 = 10 - 3$$

$$x = 7$$

Subtraction Equation
(use addition)

$$x - 3 = 10$$

$$x - 3 + 3 = 10 + 3$$

$$x = 13$$

Multiplication Equation
(use division)

$$2x = 10$$

$$2x/2 = (10)/2$$

$$x = 5$$

Division Equation
(use multiplication)

$$\frac{x}{2} = 10$$

$$\left(\frac{x}{2}\right)(2) = (10)(2)$$

$$x = 20$$

Note how the equation is still in balance after equal operations have been done to both sides.

3. Writing algebraic expressions and equations

- A. Writing the relationships between the constants, variables, and math operations of a problem with an expression or equation will make the problem easier to solve.
- Represent the variables (unknown quantities) with letters.
 - Represent the constants (known quantities) with numbers.
 - State the required math operations in proper order.
- B. This is the expression for 4 increased by 3 times a number.
- C. Using equations to solve problems

$$4 + 3x$$

1. John is 12 years old. He is twice the age of his sister. An equation to solve for his sister's age is $(2)(x) = 12$.
- $x =$ sister's age
- $$2x = 12$$
- $$\frac{2x}{2} = \frac{12}{2}$$
- $$x = 6$$

2. An equation to find the cost of 1 Coke when 3 Cokes cost \$1.80 would be $3x = \$1.80$.
- $x =$ cost of 1 Coke
- $$3x = \$1.80$$
- $$\frac{3x}{3} = \frac{\$1.80}{3}$$
- $$x = \$0.60$$