Bates TECHNICAL COLLEGE **Student Tutoring Center**

Math

Solving an Algebraic Equation

Algebraic equations are made from a series of operations. To solve an equation, use the inverse of each operation.

Operation	→	Inverse operation used to solve the equation
Addition	→	Subtraction
Subtraction	→	Addition
Multiplication	→	Division
Division	→	Multiplication

Examples:

$$X + 4 = 11$$
$$X + 4 - 4 = 11 - 4$$
$$X = 7$$

$$X - 4 = 11$$
$$X - 4 + 4 = 11 + 4$$
$$X = 15$$

Rule 1: Any inverse operation performed one side of the " = " must be performed on the other side.

$$3x = 6$$
$$\frac{3x}{3} = \frac{x}{3}$$
$$X = 2$$

$$\frac{x}{6} = 2$$
$$6 \cdot \frac{x}{6} = 6 \cdot 2$$
$$X = 12$$

Equations with more than one operation

Examples:

$$2x - 7 = 19$$
$$2x - 7 + 7 = 19 + 7$$
$$\frac{2x}{2} = \frac{26}{2}$$
$$X = 13$$

$$4x - x + 2 = 17$$
$$3x + 2 = 17$$
$$3x + 2 - 2 = 17 - 2$$
$$3x = 15$$

Rule 2: Do addition or subtraction first

Rule 3: Do division or multiplication second

Equations with parenthesis

Examples:

$$4(x + 3) = 20$$
$$4 \cdot x + 4 \cdot 3 = 20$$
$$4x + 12 = 20$$
$$4x + 12 - 12 = 20 - 12$$
$$\frac{4x}{4} = \frac{8}{4}$$
$$X = 2$$

1. Remove parenthesis
2. Combine like terms
3. Use the inverse of each operation
4. Do addition and subtraction
5. Do multiplication and division

$$5(x - 1) = 4(x + 4)$$
$$5 \cdot x - 5 \cdot 1 = 4 \cdot x + 4 \cdot 4$$
$$5x - 5 = 4x + 16$$
$$5x - 5 + 5 = 4x + 16 + 5$$
$$5x = 4x + 21$$
$$5x - 4x = 4x + 21 - 4x$$
$$X = 21$$