

## SOLVING EQUATIONS AND INEQUALITIES

Algebraic **equations** are mathematical equations that contain a letter or variable which represents a number.

- To solve an algebraic equation, inverse operations are used.
- Multi-step equations involve many different mathematical operations that must be evaluated in order to solve the equation.
- Equations can be solved using addition, subtraction, multiplication and division.

Algebraic **inequalities** are mathematical equations that compare two quantities using greater than  $>$ ; greater than or equal to  $\geq$ ; less than,  $<$ ; and less than or equal to  $\leq$ .

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**Systems of equations** are two linear equations can be solved for an ordered pair that will make both equations true. System of equations can be solved by using algebraic substitution, the addition method or the subtraction method.



## How to use solving equations and inequalities

To evaluate **multi-step equations and inequalities**, inverse operations are used.

- With multi-step equations and inequalities, it is very important to **isolate the variable** before evaluating.
- Isolating the variable means to get the variable alone on one side of the equation.
- **The only rule that must be remembered when evaluating inequalities is that when a variable is multiplied or divided by a negative number the sign is reversed.**

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simplified form as shown.

Another use of equations is called systems of equations. **Systems of equations** are two linear equations can be solved for an ordered pair that will make both equations true.



- Solving for systems of equations can be done by **algebraic substitution**. Algebraic substitution means that one equation is substituted in the other equation. Consider the equations,  $y = 2x$  and  $3x + y = 35$ , solving with algebraic substitution is as follows:

$$\begin{array}{l}
 \text{Ex. } y = 2x \\
 3x + y = 35 \\
 3x + (2x) = 35 \\
 5x = 35 \\
 x = 7 \\
 y = 2x \\
 y = 2(7) \\
 y = 14
 \end{array}$$

Once one variable is found, it is substituted back into one of the equations to find the other variable.

Another method of solving systems of equations is by using the **addition method or subtraction method**.

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## Try This!

1. Solve for  $x$ ,  $x/6 + 21 = 27$

2. Solve for  $x$ ,  $9 - 5x = -31$

3. Solve for  $x$ ,  $8x - 10 < 46$

4. S

5. S

6. S

7. S



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8. What is the solution set for the equations,  $y = 5x$  and  $y - 3x = 26$  using **algebraic substitution**?

9. What is the solution set for the equations,  $2x - 3y = 14$  and  $5x + 3y = 21$  using the **addition method**?

10. What is the solution set for the equations,  $6x + 8y = 72$  and  $3x + 8y = 30$  using the **substitution method**?