Solving Equations and Inequalities

Summary

1. Use reverse order of operations to solve equations.
2. You can check your solutions numerically (plug the value of the variable into the original equation) or visually (find the x-coordinates of the intersection points).
3. When solving inequalities, flip the inequality sign if you multiply or divide both sides by a negative number.

When solving an equation, our goal is to get the variable, usually x, alone on one side of the equal sign.

To do this, we use **reverse order of operations**:

1. Undo any addition or subtraction.
2. Undo any multiplication or division.
3. Undo any exponents.
4. Get rid of parentheses.

You can make sure your answer is correct by **plugging it in** to the original problem and seeing if the left side and right side are equal.

Example 1. Solve each of the following. Round to 2 decimal places when necessary.

(a) $3x + 4 = 16$

(b) $-2x - 9 = 17 - x$

(c) $\frac{1}{2}x + 3 = \frac{2}{5}x$

(d) $2.1x - 7 = 23.83$

(e) $2(x - 10) = 4(x - 5) - 2x$

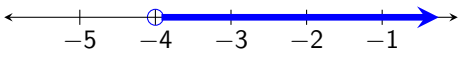
(f) $3(x + 4) + 3x = 2(3x + 5) - 2$

Inequalities

Inequalities typically give you an infinite number of solutions.

For instance, there are an infinite number of values that you can substitute into x for $x > -4$ to make it true.

Since we can't list every possible solution, we can shade a region on a number line to represent this solution.



Summary of Graphing Inequalities

If your variable is on the **left side** when graphing an inequality, you can use the following table to help you graph:

Expression	Circle	Shade
$x <$	Open	Left
$x >$	Open	Right
$x \leq$	Closed	Left
$x \geq$	Closed	Right

With solving inequalities, you must remember to flip the inequality sign if you multiply or divide **both sides** by a **negative number**.

Example 2. Solve and graph each.

(a) $3x - 5 > -17$

(b) $-4x + 10 \leq 38$

(c) $2(x + 4) - 5 > 2x + 3$

(d) $3(x + 1) \geq 3x + 2$