# INTERMEDIATE ALGEBRA

## 66. SOLVING A QUADRATIC EQUATION

To solve a quadratic equation, put it in the $ax^2 + bx + c = 0$ form, **factor** the left side (if you can), and set each factor equal to 0 separately to get the two solutions. To solve $x^2 + 12 = 7x$, first rewrite it as $x^2 - 7x + 12 = 0$. Then factor the left side:

$$(x - 3)(x - 4) = 0$$
$$x - 3 = 0 \text{ or } x - 4 = 0$$
$$x = 3 \text{ or } 4$$

Sometimes the left side might not be obviously factorable. You can always use the **quadratic formula.** Just plug in the coefficients $a$, $b$, and $c$ from $ax^2 + bx + c = 0$ into the formula:

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

To solve $x^2 + 4x + 2 = 0$, plug $a = 1$, $b = 4$, and $c = 2$ into the formula:

$$x = \frac{-4 \pm \sqrt{4^2 - 4 \times 1 \times 2}}{2 \times 1}$$
$$= \frac{-4 \pm \sqrt{8}}{2} = -2 \pm \sqrt{2}$$

## 67. SOLVING A SYSTEM OF EQUATIONS

You can solve for two variables only if you have two distinct equations. Two forms of the same equation will not be adequate. **Combine the equations in such a way that one of the variables cancels out.** To solve the two equations $4x + 3y = 8$ and $x + y = 3$, multiply both sides of the second equation by $-3$ to get: $-3x - 3y = -9$. Now add the equations; the $3y$ and the $-3y$ cancel out, leaving: $x = -1$. Plug that back into either one of the original equations and you'll find that $y = 4$.

## 68. SOLVING AN EQUATION THAT INCLUDES ABSOLUTE VALUE SIGNS

To solve an equation that includes absolute value signs, **think about the two different cases.** For example, to solve the equation $|x - 12| = 3$, think of it as two equations:

$$x - 12 = 3 \text{ or } x - 12 = -3$$
$$x = 15 \text{ or } 9$$

## 69. SOLVING AN INEQUALITY

To solve an inequality, do whatever is necessary to both sides to **isolate the variable.** Just remember that when you **multiply or divide both sides by a negative number,** you must **reverse the sign.** To solve $-5x + 7 < -3$, subtract 7 from both sides to get: $-5x < -10$. Now divide both sides by $-5$, remembering to reverse the sign: $x > 2$.

## 70. GRAPHING INEQUALITIES

To graph a range of values, use a thick, black line over the number line, and at the end(s) of the range, use a **solid circle** if the point ***is*** **included** or an **open circle** if the point is ***not*** **included.** The figure here shows the graph of $-3 < x \leq 5$.