

## EQUATION SOLVING

The goal in solving equations is to isolate the variable, with a coefficient of one, on one side of the equation. In other words, we want  $x =$  a number.

### Definitions:

**Equation** – a number sentence with an equal sign (=)

**Solution** – a number that when substituted for the variable makes the equation true

**Variable** – a letter that represents an unknown value

**Helpful Hint:** Some students find it helpful to learn that to “undo” subtraction, you add; to “undo” addition, you subtract; to “undo” multiplication, you divide; to “undo” division, you multiply. For example,

$x + 3 = 10$       To “undo” the addition of 3, subtract 3 from both sides of the equation giving a solution of  $x = 7$ .

$x - 3 = 10$       To “undo” the subtraction of 3, add 3 to both sides of the equation giving a solution of  $x = 13$ .

$3x = 15$       To “undo” the multiplication by 3, divide both sides of the equation by 3 giving a solution of  $x = 5$ .

$\frac{x}{3} = 15$       To “undo” the division by 3, multiply both sides of the equation by 3 giving a solution of  $x = 45$ .

$-3x = 15$       You must divide both side of the equation by negative 3, not 3, so that the final solution,  $x = -5$  will have a positive  $x$ .

$\frac{3}{8}x = 21$       When dividing by a fraction, you change the operation to multiplication by the reciprocal of the second fraction. So, instead of “undoing” the multiplication by dividing both sides of the equation by  $\frac{3}{8}$ , it is easier to just multiply both sides of the equation by the reciprocal of the fraction. In this case, both sides of the equation would be multiplied by the reciprocal of  $\frac{3}{8}$  which is  $\frac{8}{3}$  giving a solution of  $x = 56$ .