

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 $x = 56$.