LINEAR EXPRESSIONS AND EQUATION

A *Linear Expression* is a kind of algebraic expression that has its variable(s) to have a power of at most 1. For example $x + 1$ is a linear expression.

A *Linear Equation* is simply a linear expression equated to a number or another linear expression. For example: $x + 1 = 3$, $2 + b = x + 1$.

Solving Linear Equations

To solve an equation generally means to find the value of the unknown(s) that satisfies the equation(s).

In solving any given equation(s), one can do the following without changing the equations.

- Add same quantity to both sides of the equation.
- Subtract same quantity to both sides of the equation.
- Multiply both sides by same quantity.
- Divide both sides with same quantity (*not zero*)

In fact, we say, an equation is balanced, if we do the same thing to both sides of the equation. It is important also to check your solution by substituting back the value obtained into the original equations and seeing if the left hand side of the equation is indeed equal to the right hand side.

Examples

1. $3x + 2 = 8$

   Solving
   $3x + 2 = 8$
   $3x + 2 - 2 = 8 - 2 = 6$
   $3x = 6$
   $\frac{3x}{3} = \frac{6}{3} = 2$
   $\boldsymbol{x = 2}$

2. $5y = 8 + 3y$

   Solving
   $5y = 8 + 3y$
   $5y - 3y = 8 + 3y - 3y = 8$
   $2y = 8$
   $\frac{2y}{2} = \frac{8}{2} = 4$
   $\boldsymbol{y = 4}$

3. $3(4y-7)=0$

Solving

$3(4y-7)=0$

$12y-21=0$

$12y-21+21=0+21=21$

$12y=21$

$\frac{12y}{12}=\frac{21}{12}=\frac{7}{4}$

$\boldsymbol{y=\frac{7}{4}\ or\ 1\frac{3}{4}}$

4. $8+4a-7=4-a$

Solving

$8+4a-7=4-a$

$8+4a-7+7=4-a+7$

$8+4a=11-a$

$8+4a-8=11-a-8=3-a$

$4a=3-a$

$4a+a=3-a+a=3$

$5a=3$

$\frac{5a}{5}=\frac{3}{5}$

$\boldsymbol{a=\frac{3}{5}}$