

Linear Equations

A linear equation in one variable is any equation of that may be written in the form $Ax + B = C$ where A, B, and C are real number coefficients and x represents any real number that is a solution. Another way to define a linear equation in one variable is that the equation may always be written so that all the terms are either constants or some multiple of the variable raised to only the first power.

Examples:

$3x + \frac{2}{5}x - 4 = 2x$ is a linear equation.

$3(x - 3) = 2x + 5$ is a linear equation since when we multiply out the left side we get the equation $3x - 9 = 2x + 5$.

$3/x + 4 = 5$ is not a linear equation since the term $3/x$ is the same as $3x^{-1}$, a term with power other than 1.

Method To Solve Linear Equations:

To solve linear equations, remember to do the following:

- Apply the [Distributive Property](#), if needed, to multiply out all quantities. Then [Combine Like Terms](#).
- Note: If there are fractions, apply the [Multiplication Property of Equality](#) to multiply all terms of both sides of the equation by the LCD of all fractions to cancel the denominators. Apply the [Distributive Property](#) again and then combine like terms.
- Use the [Addition Property of Equality](#) to move all variable terms to one side of the equation and move all numerical terms to the other side of the equation.
- Use the [Division Property of Equality](#) or the [Multiplication Property of Equality](#) to solve for x.
- Check your answer and work for accuracy.

Example: Solve $x/4 - 3(x + 1) + 5 = 4x - 1$

First, apply the [Distributive Property](#) to get $x/4 - 3x - 3 + 5 = 4x - 1$.

Next, [Combine Like Terms](#) to give you $x/4 - 3x + 2 = 4x - 1$.

Now, use the [Multiplication Property of Equality](#) to multiply both sides of the equation by 4 to give you $4(x/4 - 3x + 2) = 4(4x - 1)$ which simplifies to $x - 12x + 8 = 16x - 4$ after we apply the [Distributive Property](#) again.

[Combine Like Terms](#) to get $-11x + 8 = 16x - 4$.

Now, use the [Addition Property of Equality](#) to move all x-terms to one side of = and move all numerical terms to the other side.

$$-11x + 11x + 8 = 16x + 11x - 4$$

$$8 = 27x - 4$$

$$8 + 4 = 27x - 4 + 4$$

[Combine Like Terms](#) to get $12 = 27x$.

Use the [Division Property of Equality](#) to finally solve.

$$12/27 = x$$
