

Solving Linear Equations Video Lecture

Sections 2.2 and 2.3

Course Learning Objective:

Solve linear equations.

Weekly Learning Objectives:

- 1) Define linear equations.**
- 2) Use both the addition and multiplication properties of equality to solve linear equations.**
- 3) Apply a general strategy for solving linear equations.**
- 4) Solve equations containing fractions.**
- 5) Solve equations containing decimals.**
- 6) Recognize identities and equations with no solution.**

Solving Linear Equations

A linear equation can be written in the form $ax + b = c$, where a doesn't equal 0.

Non-linear equations are more difficult to solve and would contain terms like:

When solving a linear equation there are 3 cases that could occur:

1 solution => **Conditional Equation**

Example: $x + 3 = 5$ is only true when $x = 2$

No Solution => **Contradiction**

Example: $x + 2 = x$ is always false, so answer would be No Solution or 

Infinite Solutions => **Identity**

Example: $2 + x = x + 2$ is always true, so answer would be $x = \text{all real numbers}$

Identity

Always True

Solution: all real #'s

Conditional

True for only
some values of x

Solution: $x = \#$

Contradiction

Always False

Solution: No Solution or 

**Goal of solving linear equations is to
isolate x by itself and get
 $x = \#$**

1) Clear fractions, decimals and groupings AND combine like terms

**CLEAR FRACTIONS OR DECIMALS BY MULTIPLYING EACH TERM ON
BOTH SIDES BY THE LCD.**

CLEAR GROUPINGS BY USING THE DISTRIBUTIVE PROPERTY

**2) Get variable terms together on one side of the equation, constants on
the other side:**

**ADD/SUBTRACT THE SAME VARIABLE TERM TO BOTH SIDES OF
THE EQUATION.**

and/or

ADD/SUBTRACT THE SAME NUMBER TO BOTH SIDES OF THE EQUATION.

3) Make the coefficient of the variable term a "one".

**DIVIDE BOTH SIDES OF THE EQUATION BY THE COEFFICIENT OF THE
VARIABLE IF IT ISN'T ALREADY A "ONE".**

****AT THIS POINT YOU SHOULD BE FINISHED. BE SURE THAT THE ANSWER IS IN
SIMPLEST FORM. CHECKING YOUR SOLUTION IS OPTIONAL.**

Ex: $4x - 3 - 8x + 1 = -5x + 9$

$$\text{Ex: } (8r - 3) - (7r + 1) = -6$$

$$\text{Ex: } 9(2m - 3) - 4(5 + 3m) = 5(4 + m) - 3$$

$$\text{Ex: } 6x - 4(x + 2) - 2x = 0$$

$$\text{Ex: } 3(6 - 4x) = 2(-6x + 9)$$

Note: If the solution is an identity or contradiction then your variables will always cancel out and disappear when solving. You will be left with either a:

True Statement

(like $0 = 0$)

Solution: **All real #'s**

False Statement

(like $0 = 1$)

Solution: **No Solution**

Examples:

$$\frac{1}{5}x - 7 = -\frac{4}{5}x + 7x$$

$$\frac{2}{3}x - \frac{3}{4} = \frac{3}{8} - \frac{1}{9}x + \frac{1}{6}$$

$$\frac{x+3}{5} - \frac{x-3}{4} = 1$$

$$\frac{2m-3}{3} - \frac{4m-2}{6} = 3$$

$$-.4x + 2.7 - 1.6x = -4.6x + 2.7$$

$$.02(5000) + .03p = .025(5000 + p)$$

$$-\frac{5}{6}q - (q - \frac{1}{2}) = \frac{1}{4}(q + 1)$$