

Parent Newsletter

Chapter 4: Solving Systems of Linear Equations

Standards

Common Core:

8.EE.8a: Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

8.EE.8b: Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.

8.EE.8c: Solve real-world and mathematical problems leading to two linear equations in two variables.

A.CED.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

A.REI.5: Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

A.REI.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

A.REI.12: Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Essential Questions

How can you solve a system of linear equations?

How can you use substitution to solve a system of linear equations?

How can you use elimination to solve a system of linear equations?

Can a system of linear equations have no solution?

Can a system of linear equations have many solutions?

How can you sketch the graph of a system of linear inequalities?

Students will...

Write and solve systems of linear equations by graphing.

Write and solve systems of linear equations by substitution.

Write and solve systems of linear equations by elimination.

Solve systems of linear equations having no solution or infinitely many solutions.

Solve linear equations by graphing a system of linear equations.

Write and graph systems of linear inequalities in two variables.

Solve real-life problems.

Key Terms

A **system of linear equations** is a set of two or more linear equations in the same variables.

A **solution of a system of linear equations** in two variables is an ordered pair that is a solution of each equation in the system.

A **system of linear inequalities** is a set of two or more linear inequalities in the same variables.

A **solution of a system of linear inequalities** in two variables is an ordered pair that is a solution of each inequality in the system.

The **graph of a system of linear inequalities** is the graph of all the solutions of the system.



Game

- Linear System Sleuths

This is available online in the *Game Closet* at www.bigideasmath.com

Key Ideas

Solving a System of Linear Equations by Graphing

- Step 1: Graph each equation in the same coordinate plane.
- Step 2: Estimate the point of intersection.
- Step 3: Check the point from Step 2 by substituting for x and y in each equation of the original system.

Solving a System of Linear Equations by Substitution

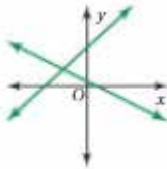
- Step 1: Solve one of the equations for one of the variables.
- Step 2: Substitute the expression from Step 1 into the other equation and solve for the other variable.
- Step 3: Substitute the value from Step 2 into one of the original equations and solve.

Solving a System of Linear Equations by Elimination

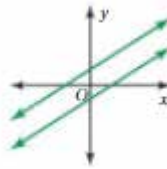
- Step 1: Multiply, if necessary, one or both equations by a constant so at least one pair of like terms has the same or opposite coefficients.
- Step 2: Add or subtract the equations to eliminate one of the variables.
- Step 3: Solve the resulting equation for the remaining variable.
- Step 4: Substitute the value from Step 3 into one of the original equations and solve.

Solutions of Systems of Linear Equations

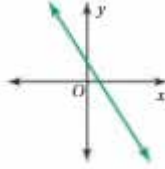
A system of linear equations can have *one solution*, *no solution*, or *infinitely many solutions*.



One solution
The lines intersect.



No solution
The lines are parallel.



Infinitely many solutions
The lines are the same.

Solving Equations Using Graphs

Step 1: To solve the equation $ax + b = cx + d$, write two linear equations.

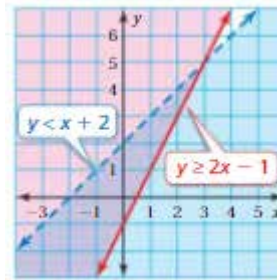
$$ax + b = cx + d$$

$y = ax + b$ and $y = cx + d$

Step 2: Graph the system of linear equations. The x -value of the solution of the system of linear equations is the solution of the equation $ax + b = cx + d$.

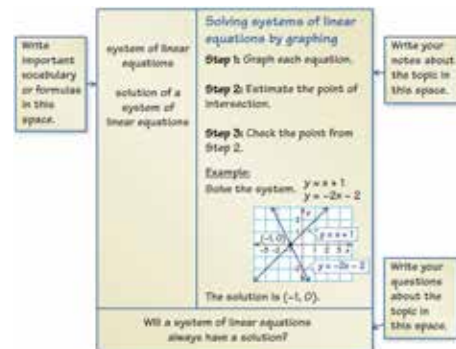
Graphing a System of Linear Inequalities

- Step 1: Graph each inequality in the same coordinate plane.
- Step 2: Find the intersection of the half-planes. This intersection is the graph of the system.



Reference Tools

A **Notetaking Organizer** can be used to write notes, vocabulary, and questions about a topic.



Quick Review

- When solving a system of linear equations by elimination, line up like terms vertically so that you can add the terms in each column.
- A system of linear equations can have one solution, no solution, or infinitely many solutions.
- When graphing a system of linear inequalities, the intersection of the half-planes is the graph of the system.
- Any solution of a system of linear inequalities is an ordered pair that is a solution to each of the inequalities.

What's the Point?

The STEM Videos available online show ways to use mathematics in real-life situations.

The Chapter 4: Gold Alloys STEM Video is available online at www.bigideasmath.com.