

8-7: It's In The System

Unit Goals, Focus Questions, and Mathematical Reflections

Unit Goals

Linear Equations Develop understanding of linear equations and systems of linear equations

- Recognize linear equations in two variables in standard form $Ax+By=C$
- Recognize that a linear equation in the form $Ax+By=C$ has infinitely many solutions (x,y) and the graph of those solutions is always a straight line
- Recognize that the form $Ax+By=C$ of linear equations is equivalent to the form $y=mx+b$ for linear equations
- Continue to develop skills in solving a linear equation in two variables by graphing and with algebraic methods
- Recognize that solving a system of linear equations is equivalent to finding values of the variables that will simultaneously satisfy all equations in the system
- Develop skills in solving systems of linear equations by graphing solutions of separate equations; writing the system of equations in equivalent $y=mx+b$ form; or using combinations of the system to eliminate one variable
- Recognize that systems of linear equations in the form $\begin{cases} Ax + By = C \\ Dx + Ey = F \end{cases}$ may have exactly one solution, which is the intersection point of the lines represented by the equations; infinitely many solutions, which is represented by a single line for both equations; or no solution, which is represented by two parallel lines
- Choose between graphing and symbolic methods to efficiently find the solution to a particular system of linear equations
- Gain fluency with symbol manipulation in solving systems of linear equations
- Solve problems that involve systems of linear equations

Linear Inequalities Develop understanding of graphing and symbolic methods for solving linear inequalities with one and two variables

- Recognize differences between strict and inclusive inequalities
- Continue to develop skill in solving a linear inequality in two variables by graphing and symbolic methods
- Develop skill in solving systems of linear inequalities by graphing solutions of each inequality and finding the region of feasible points that satisfy both inequalities; and solving inequalities to find pairs of numbers that satisfy both inequalities
- Choose between graphing and symbolic methods to efficiently find the region of feasible points to a particular system of linear inequalities
- Solve a simple system consisting of a linear equation and a quadratic equation in two variables symbolically and graphically
- Solve problems that involve linear inequalities or systems of linear inequalities

8-7 It's in the System: Focus Questions (FQ) and Mathematical Reflections

| Investigation 1 Linear Equations With Two Variables | Investigation 2 Solving Linear Systems Symbolically | Investigation 3 Systems of Functions and Inequalities | Investigation 4 Systems of Linear Inequalities |
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| <p>Problem 1.1 Shirts and Caps: Solving Equations With Two Variables FQ: What kind of solution will be found for an equation with two variables such as $3x + 5y = 13$? What will the graphs of those two solutions look like?</p> <p>Problem 1.2 Connecting $Ax + By = C$ and $y = mx + b$ FQ: How can change an equation from $Ax + By = C$ form to an equivalent $y = mx + b$ form and vice versa?</p> <p>Problem 1.3 Booster Club Members: Intersecting Lines FQ: What does it mean to find the common solution to two linear equations with two variables?</p> | <p>Problem 2.1 Shirts and Caps Again: Solving Systems With $y = mx + b$ FQ: How can you solve a system of two linear equations with two variables by writing each equation in equivalent $y = mx + b$ form? What are the solution possibilities for the system? How are solutions in the graph of the system?</p> <p>Problem 2.2 Taco Truck Lunch: Solving System by Combining Equations I FQ: How can you solve a system of linear equations by combining the two equations into a single equation using addition or subtraction?</p> <p>Problem 2.3 Solving Systems by Combining Equations II FQ: How can you rewrite the equations in a system to make an equivalent system or equation?</p> | <p>Problem 3.1 Comparing Security Services: Linear Inequalities FQ: How can you use graphs to find the solutions of an inequality such as $ax + b < cx + d$? How can the solutions be represented on a number-line graph?</p> <p>Problem 3.2 Solving Linear Inequalities Symbolically FQ: How does applying the same operation to each side of an inequality change (or not) the relationship of the two quantities being compared? How can linear inequalities be solved using strategies to strategies for solving linear equations?</p> <p>Problem 3.3 Operating at a Profit: Systems of Lines and Curves FQ: What are the possible solutions for a system that includes one linear and one quadratic function and how can you find these solutions?</p> | <p>Problem 4.1 Limited Driving Miles: Inequalities With Two Variables FQ: If a problem involves solving an inequality such as $ax + by \leq c$, how many solutions would you expect to find? What would a coordinate graph of the solution look like?</p> <p>Problem 4.2 What Makes a Car Green: Solving Inequalities by Graphing I FQ: What would a graph of solutions (in the first quadrant) to an inequality $Ax + By \leq C$ look like?</p> <p>Problem 4.3 Feasible Points: Solving Inequalities by Graphing II FQ: How can you predict the shape of the graph of an inequality from it symbolic statement ($Ax + By \leq C$)?</p> <p>Problem 4.4 Miles of Emissions: Systems of Linear Inequalities FQ: What are some strategies for solving a system of linear inequalities?</p> |
| <p>Mathematical Reflections</p> <ol style="list-style-type: none"> 1. What pattern will result from plotting all points (x,y) that satisfy an equation in the form $Ax + By = C$? 2. How can you change linear equations in the form $Ax + By = C$ to $y = mx + b$ form and vice versa? Explain when one form might be more useful than the other. 3. How can you use a graph to find values of x and y that satisfy systems of two linear equations in the form $Ax + By = C$? | <p>Mathematical Reflections</p> <ol style="list-style-type: none"> 1. What is the goal in solving a system of linear equations? 2. What strategies can you use to solve a system of linear equations? 3. How can you check a possible solution of a system of linear equations? | <p>Mathematical Reflections</p> <ol style="list-style-type: none"> 1. How can you use coordinate graphs to solve linear equations such as $ax + b = cx + d$ and linear inequalities such as $ax + b < cx + d$? 2. How can you use symbolic reasoning to solve inequalities such as $ax + b < cx + d$? 3. What strategies can you use to solve systems of equations and inequalities that involve linear and quadratic functions or lines and circles? | <p>Mathematical Reflections</p> <ol style="list-style-type: none"> 1. Suppose you are given one linear inequality with two variables. How could you use a graph to find solutions of the inequality? 2. Suppose you were given a system of two linear inequalities. How could you use a graph to find solutions of the system? |