Unit 6

Systems of Linear Equations

3 weeks

Unit Content

▸ **Investigation 1:** Solving Systems of Linear Equations (3 days)

▸ **Investigation 2:** Solving Systems of Linear Equations by Substitution (4 days)

▸ **Investigation 3:** Solving Systems of Linear Equations by Elimination (3 days)

▸ **Performance Task:** Community Park (3 days)

▸ **End of Unit Test** (2 days, including review)

What Vocabulary Students Need to Know

▸ System of Linear Equations

▸ Substitution Method for Solving a System of Equations

▸ Elimination Method for Solving a System of Equations

▸ Solution of a System of Linear Equations

What Students Need to Be Able to Do

- Create equations that describe numbers or relationships

- Solve systems of equations

- Represent and solve systems of equations graphically

Investigation 1: Solving Systems of Linear Equations (3 days)

▸ **Students will**

▸ solve a system of linear equations by making a table, solving an equation in one variable, and graphing (both by hand and with the graphing calculator).

▸ use the solution to a system of equations to make comparisons of situations and solve practical problems.

Investigation 2: Solving Systems of Linear Equations by Substitution (4 days)

▶ Students will:

  ▶ use the substitution method to solve a system of linear equations.

  ▶ use the solution to a system of equations to make decisions and predictions.

  ▶ will understand that the underlying mathematical justification for the substitution technique is the substitution property of equality.

  ▶ substitute algebraic expressions for a variable.

Investigation 3: Solving Systems of Linear Equations by Elimination (3 days)

‣ Students will:

  ‣ use the elimination method to solve systems of linear equations.

  ‣ identify the characteristics of a system of linear equations that lend themselves to the elimination method

  ‣ interpret the solution to a system of equations within the context of the problem.

Performance Task: Community Park (4 days)

- Students will:
  - graph a community park on a coordinate plane.
  - write equations for lines given two points.
  - transform equations from standard to slope-intercept form.
  - solve systems of linear equations using graphing, substitution, and/or elimination methods.
  - demonstrate an understanding of ratio, area, and percent.

Essential Questions

▸ What does the number of solutions (none, one, or infinite) of a system of linear equations represent?

▸ What are the advantages and disadvantages of solving a system of linear equations graphically versus algebraically?

Investigation Exploration

▸ Break into four groups to explore 3 investigations in Unit 6 and the Performance Task (30 minute rotation)

  ▸ Investigation 1: Solving Systems of Linear Equations

  ▸ Investigation 2: Solving Systems of Linear Equations by Substitution

  ▸ Investigation 3: Solving Systems of Linear Equations by Elimination

  ▸ Performance Task: Community Park

Assessment Plan

▸ Investigation 1: Solving Systems of Linear Equations

> ▸ **Exit Slip 6.1** asks students to solve a system of linear equations graphically and to explain what the solution of that system represents.

> ▸ **Journal Entry** asks students to explain in their own words how to find the solution of a system of linear equations graphically.

Assessment Plan

▸ Investigation 2: Solving Systems of Linear Equations by Substitution

  ▸ **Exit Slip 6.2.1** requires students to solve a system of equations by substitution.

  ▸ **Journal Entry 1** asks students to explain the meaning of the word "substitution."

  ▸ **Journal Entry 2** has students explain how to use a table, a graph, or the substitution method to solve a system.

  ▸ **Exit Slip 6.2.2** requires students to use a system to find the breakeven point.

Assessment Plan

▸ Investigation 3: Solving Systems of Linear Equations by Elimination

  ▸ **Exit Slip 6.3.1** requires students to solve a system by elimination and identify the algebraic properties used.

  ▸ **Journal Entry 1** asks students to explain when the multiplication property must be used solving a system by the elimination method.

  ▸ **Journal Entry 2** asks students to explain how graphical features correspond to algebraic solutions of simultaneous equations.

  ▸ **Exit Slip 6.3.2** requires students to compare different methods of solving systems and to explain their choice of method in solving a particular system.

Common Core Content Standards (Priority standards are in bold)

▸ 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 11. Explain why the *x*-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear functions.***

Common Core Standards for Mathematical Practice (bold standards to be emphasized)

▸ Make sense of problems and persevere in solving them.

▸ Reason abstractly and quantitatively

▸ Construct viable arguments and critique the reasoning of others.

▸ **Model with mathematics.**

▸ Use appropriate tools strategically.

▸ Attend to precision.

▸ Look for and make use of structure.

▸ **Look for and express regularity in repeated reasoning.**

3-2-1 Reflection in Informal Groups

▸ List 3 things that correlate between the activities and the assessments.

▸ List 2 things to change within the activities or assessments.

▸ List 1 thing that is most helpful to implement within the unit.