

Unit 4: Linear Equations & Systems of Linear Equations

Algebra Prep Honors

30 meetings

Revised May 2026

Essential Questions

- What kinds of relationships can proportions represent in real-world situations?
- What is the difference between a proportional and non-proportional relationship?

Enduring Understandings with Unit Goals

EU 1: Unit Rate, the Constant of Proportionality, Rate of Change are all associated with slope

- Determine the Rate of Change from a table or graph
- Apply the slope formula to points in a real-world scenario

EU 2: A graph can be used to represent a scenario

- Graph real-world scenario using slope-intercept form
- Write the equation of a line, $y=mx$ or $y=mx+b$

EU 3: A system of equations consists of two or more linear equations which intersect in various ways

- Solve a system of equations through graphing
- Isolate the variable y in an equation and determine the number of solutions to a system
- Apply the substitution method to solve a system of equations

Standards

Common Core State Standards/College and Career Readiness Anchor Standards:

- **8.EE.B.5:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
- **8.EE.B.6:** Use similar triangles to explain why the slope m is the same between any two points on a non-vertical line in the coordinate plane; derive the equation $y=mx$ for a line through the origin and the equation $y=mx+b$ for a line intercepting the vertical axis at b .
- **8.EE.C.8. A:** 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.C.8. B:** Solve systems of two linear equations in two variables algebraically and estimate solutions by graphing the equations. Solve simple cases by inspection.
- **8.EE.C.8.C:** Solve real-world and mathematical problems leading to two linear equations in two variables.

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ISAAC Vision of the Graduate Competencies

Competency 1: Write effectively for a variety of purposes.

Competency 2: Speak to diverse audiences in an accountable manner.

Competency 3: Develop the behaviors needed to interact and contribute with others on a team.

Competency 4: Analyze and solve problems independently and collaboratively.

Competency 5: Be responsible, creative, and empathetic members of the community.

Unit Content Overview

1. Proportional Relationships and Rate of Change in Tables and Graphs

- Determine Proportionality in a Table or Graph
- Calculate/Find Constant of Proportionality (k) using a Table or Graph
- Calculate Slope as $\Delta y/\Delta x$
- Slope vs. Constant of Proportionality ($y=kx$ vs. $y=mx+b$)
- Vocabulary: coefficient, constant of proportionality, equivalent, graph, linear equation, proportional relationship, rate, rate of change, slope, table of values, variable

2. Slope-Intercept Form

- Graph equations in slope-intercept form
- Write a linear equation given a graph or real-world scenario
- Vocabulary: coefficient, constant of proportionality, equivalent, graph, linear equation, , rate of change, slope, variable, y-intercept

3. Systems of Linear Equations

- Solve systems of equations through graphing
- Determine the number of solutions to a system of equation by isolating y and comparing the rate of change and y-intercepts
- Use the substitution method to solve a system of equations
- Vocabulary: system, linear equation, slope, y-intercept, substitution, rate of change, variable

Interdisciplinary Connection:

- Language Arts – Word Problems
- Science – Word Problems

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Daily Learning Objectives with *TWPS Activities*

Students will be able to...

- Determine if a graph shows a proportional relationship and find the slope/constant of proportionality of a line given the graph
 - *TWPS – What error did the student make when determining the slope of the line? Explain using mathematical reasoning.*
- Calculate the slope/constant of proportionality between two points using the slope-formula
 - *TWPS – In some graphs, should the slope be calculated using points that are far apart to get a better overall understanding, or should we use points that are closer together for more accuracy?*
- Determine the rate of change given a linear equation in a variety of representations
 - *TWPS – In some real-world situations, does it make more sense to use non-linear relationships (like curves) instead of straight line with slopes? Explain using mathematical reasoning.*
- Graph a linear equation in slope-intercept form
 - *TWPS – Which of the three statements is the lie (Is/Of)? Explain using mathematical reasoning.*
- Write a linear equation in slope-intercept form given a graph
 - *TWPS – How could you write instructions for writing a linear equation in slope-intercept form given a graph? Explain using mathematical reasoning.*
- Create an equation in slope-intercept form from a real-world scenario
 - *TWPS – Which of the four linear equations does not belong with the rest? Explain using mathematical reasoning.*
- Compare rates of change and initial values to determine the number of solutions in a system of linear equations
 - *TWPS – If two different lines have the same slope but different y-intercepts, what does that tell us about them? Explain using mathematical reasoning.*
- Solve a system of equations through graphing
 - *TWPS – Explain using mathematical reasoning the difference between the three graphed systems of linear equations.*
- Determine the number of solutions of a system of equations by isolating y
 - *TWPS – How is solving an equation with two variables different from solving an equation with one variable? Explain using mathematical reasoning.*
- Find the solution to the system of equations using substitution *
 - *TWPS – When given an equation in standard form ($3x - 2y = 12$), what steps would you take to isolate y? Explain using mathematical reasoning.*
 - *TWPS – How can you determine if a point is the correct solution to the system of equations? Explain using mathematical reasoning.*

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Instructional Strategies/Differentiated Instruction

- TWPS
- Whole-group instruction
- Creating authentic connections for students
- Rephrasing and restatement of information and concepts
- Guided notes
- Student-led instruction
- Independent problem-solving
- Collaborative problem-solving
- Cross-curricular problem solving (independent and collaborative)
- Accountable Talk
- Manipulatives
- Visuals to support instruction
- Small group instruction
- Pre-teaching and reteaching
- Explicit instruction
- Color-coding
- Small group check in

EL DIFFERENTIATED INSTRUCTION:

- Word Walls with visuals
- TWPS (Think, Write, Pair, Share)
- Pre-reading strategies
- Culturally responsive teaching
- Explicit Modeling
- Key Vocabulary
- Graphic Organizers
- Strategic Grouping
- Non-verbal Assessments

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Assessments

FORMATIVE ASSESSMENTS:

- Accountable Talk Discussions
- Daily Think-Write-Pair Share (TWPS)
- Daily Do Now
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Student-led instruction
- Cumulative Homework
- Performance Task – Family Reunion of Linear Equations
 - Summative Performance Task Assessment Rubric

SUMMATIVE ASSESSMENTS:

- Pear Assessment Quiz 1 – EU 1
- Pear Assessment Quiz 2 – EU 2
- Unit 4 Test – EU 1, EU 2, and EU 3
- Performance Task – Family Reunion of Linear Equations

Unit Task

Unit Task Name: Family Reunion of Linear Equations

Description: Students are provided with two catering options for a family reunion they will be hosting. They will need to create a table of values, a linear equation, and a graph for each option (EU 1, EU 2). Students will then analyze their results to determine which catering company provides a better deal for a certain number of attendees and explain their work (EU 3). Students will be utilizing the skills learned in this unit to create and solve this system of linear equations.

Evaluation: Summative Performance Task Assessment Rubric

Unit Resources

- Worksheets
- Calculator
- Laptops
- SBAC Prep Online
- Pear Assessment
- Quizizz
- Individual Whiteboards
- 2 Truths & One Lie
- State Common Core Standards Transition Tasks
- Online resources