

Unit 1: Linear Functions
Algebra 1
15 Class Meetings
Created July 2020, Revised May 2022

Essential Questions

- What does the slope of the line indicate about the line?
- What real-world information can you gain from an equation of a line?

Enduring Understandings with Unit Goals

EU 1: The slope of an equation describes the vertical change and horizontal change of a line between two points.

- Determine the slope of a line in an equation and on a graph.

EU 2: The graph of a line can be represented using a linear equation.

- Represent a line using an equation and a graph.

EU 3: The relationship between two lines can be determined by comparing their slopes and y-intercepts.

- Determine if a line is parallel or perpendicular to another line using their slopes and y-intercepts.

Standards

Common Core State Standards:

- **HS.F.IF.B.6:** Calculate and interpret the average rate of change of a function over a specified interval. Estimate the rate of change from a graph.
- **HS.F.IF.C.7:** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
- **HS.F.IF.B.4:** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
- **HS.F.IF.LE.A.1.B:** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
- **HS.F.IF.LE.A.2:** Construct linear functions given a graph, a description of a relationship, or two input-output pairs.
- **HS.F.IF.LE.B.5:** Interpret the parameters in a linear function in terms of a context.
- **HS.A.CED.A.2:** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- **HS.G.GPE.B.5:** Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

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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. Rate of Change and Slope

- Find the Slope of a Line Using the Rate of Change
- Find the Slope of a Line Using a Graph
- Find the Slope of a Line Using Points
- Vocabulary: slope, line, ordered pair, coordinate, x-axis, y-axis, rate, graph, coordinate plane, constant of proportionality, origin

2. Slope – Intercept Form

- Identify Slope and y-intercept
- Graph a Linear Equation
- Vocabulary: slope, line, ordered pair, coordinate, x-axis, y-axis, rate, graph, coordinate plane, origin, constant of proportionality, x-intercept, y-intercept

3. Equations in Other Forms

- Identify Parts of an Equation in Point-Slope Form
- Rearrange Equations in Standard Form
- Graph Equations in All Forms
- Vocabulary: slope, line, ordered pair, coordinate, x-axis, y-axis, rate, graph, coordinate plane, coefficient, standard form, point-slope form, additive inverse, multiplicative inverse

4. Writing Equations

- Write an Equation in Slope-Intercept Form
- Write an Equation in Point-Slope Form
- Vocabulary: standard form, point-slope form, slope-intercept form, additive inverse, multiplicative inverse

5. Parallel and Perpendicular Lines

- Write an Equation of a Parallel Line
- Write an Equation of a Perpendicular Line
- Classify Lines
- Solve a Real-World Problem
- Vocabulary: slope, reciprocal, intersection, parallel lines, perpendicular lines, ninety-degree angle, straight line, 180-degree angle

Interdisciplinary Connection:

- Language Arts- Accountable Talk, Word Problems

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Daily Learning Objectives with TWPS Activities

Students will be able to...

- Domain, Range, and the Replacement Set
 - *Do Now: Linear and Non-Linear Graphs*
- Determine the slope of a line given a graph
 - *Do Now: Plotting Ordered Pairs (revisited)*
- Calculate the slope of a line using the slope formula**
 - *Do Now: Equation of a Line (SBAC Prep)*
 - *Do Now: Literal Equations*
- Graph linear equations given the slope-intercept form of the equation
 - *Do Now: Finding a Missing Value*
- Write and explain the equation of a line in slope-intercept form
 - *Do Now: Finding the Range given the Domain and an Equation*
- Graph and describe linear equations given in the point-slope form or standard form of the equation
 - *Do Now: Finding the Slope of a line in Two Different Ways*
- Write and explain the equation of a line in point-slope form
 - *Do Now: Functions (revisited)*
- Analyze whether lines are parallel, perpendicular, or neither
 - *Do Now: Using Two Points to write the Standard Form of a Linear Equation*
- Create equations for parallel and perpendicular lines
 - *Do Now: Classifying and Plotting Numbers on the Number Line*

Instructional Strategies/Differentiated Instruction

- Whole-group instruction
- Creating authentic connections for students
- Rephrasing and restatement of information and concepts
- Guided notes
- Student-led instruction
- Small group instruction
- Independent problem-solving
- Collaborative problem-solving
- Cross-curricular problem solving (independent and collaborative)
- Accountable Talk
- Manipulatives
- Homework

EL DIFFERENTIATED INSTRUCTION:

- Word Walls with visuals
- TWPS (Think, Write, Pair, Share)

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- Pre-reading strategies
- Culturally responsive teaching
- Explicit Modeling
- Key Vocabulary
- Graphic Organizers
- Strategic Grouping
- Non-verbal Assessments

Assessments

FORMATIVE ASSESSMENTS:

- Warm-ups (SBAC)
- Accountable Talk Discussions
- Daily Think-Write-Pair Share (TWPS)
- Daily Do Now
- Warm-ups (SBAC prep)
- ABCD Cards
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Student-led instruction
- Homework

SUMMATIVE ASSESSMENTS:

- Quiz on EU 1 and EU 2
- IAB: Analyze and Solve Linear Equations (EU 1, EU 2, EU 3)
- Performance Task - Hiking with George

Unit Task

Performance Task Name: Hiking with George

Description: Students will use information learned during this unit about how slope represents a rate of change of a line (EU 1), how linear functions can be represented with an equation (EU 2), and how slopes of two lines can help determine what kind of relationship they have (EU 3) to solve a series of real-world problems involving George as he is on his hiking trip. Students will be given some real-world scenarios in which they will use their knowledge of linear functions to create graphs and equations. They will need to translate what the graphs and equations mean in the real world and how the graphs compare to one another. They will then have to use their graphs and equations to make predictions and solve problems related to the real-world scenarios.

Evaluation: Summative Assessment and Future Rubric in 2021-2022 school year

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Unit Resources

- Flipped Google Classroom Videos
- Worksheets
- Calculator
- Laptops
- SBAC Prep Online
- Kahn Academy
- Match Fishtank
- Map.Mathshell.org
- Online resources