Unit 05 Linear Functions

Content Area: **Mathematics**
Course(s): **Algebra I**
Time Period: **November**
Length: **17 days**
Status: **Published**

Unit Overview

In this unit, students will recall and add to their knowledge of slope (rate of change). This unit will focus on the relationship between graphs, tables, and equations of linear functions and how they are directly dependent on the slope and y-intercept. The unit will also cover parallel and perpendicular lines, and the graphing of inequalities, horizontal, and vertical lines. Application in the form of word problems involving linear functions will also be covered in this unit. Students will analyze various slopes and describe their meaning.

Enduring Understandings

- Any two equations for the same line are equivalent.

- If the ratio of two variables is constant, then the variables have a special relationship, known as a direct variation.

- If two sets of data are related, you may be able to use a line to estimate or predict values.

- One form of a linear equation, called Standard Form, allows you to find intercepts quickly.

- You can determine the relationship between two lines by comparing their slopes and y-intercepts.

- You can quickly graph absolute value equations by shifting the graph of y = abs(x)

- You can use ratios to show relationship between changing quantities, such as vertical and horizontal change.

- You can use slope and y-intercept of a line to write and graph an equation of the line.

- You can use the intercepts to draw the graph.

- You can use the slope of a line and any point on the line to write and graph an equation of the line.

Essential Questions

- Can two equations that look different by equivalent?

- How can you make predictions using a line?

- What does the slope of a line indicate about the line?

- What information does the equation of a line give you?

Standards/Indicators

MA.A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.

MA.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
MA.N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
MA.F-IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
MA.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.
MA.F-IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
MA.F-IF.C.7b	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
MA.F-IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
MA.F-BF.A.1	Write a function that describes a relationship between two quantities.
MA.F-BF.A.1a	Determine an explicit expression, a recursive process, or steps for calculation from a context.
MA.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.
MA.F-BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.
MA.F-BF.B.4	Find inverse functions.
MA.F-BF.B.4a	Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse.
MA.F-LE.A.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.
MA.F-LE.A.1b	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
MA.F-LE.A.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
MA.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).
MA.F-TF.B.5	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

Student Learning Objectives (SLOs)

- To determine whether lines are parallel, perpendicular, or neither
- To find rates of change from tables
- To find slope
- To graph an absolute value function
- To graph linear equations in slope-intercept form

- To graph linear equations using intercepts
- To translate the graph of an absolute value function
- To write an equation of a trend line and of a line of best fit
- To write and graph an equation of a direct variation
- To write and graph linear equations in point-slope form
- To write equations of parallel lines and perpendicular lines
- To write linear equations in standard form
- To write linear equations using slope-intercept form

Lesson Titles

- Direct Variation
- Graphing Absolute Value Functions
- Parallel and Perpendicular Lines
- Point-Slope Form
- Rate of Change and Slope
- Scatter Plots and Trend Lines
- Slope-Intercept Form
- Standard Form

Career Readiness, Life Literacies & Key Skills

TECH.9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
TECH.9.4.2.CI.2	Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
TECH.9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
TECH.9.4.2.CT.3	Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
TECH.9.4.2.DC.1	Explain differences between ownership and sharing of information.
TECH.9.4.2.DC.2	Explain the importance of respecting digital content of others.
TECH.9.4.2.TL.2	Create a document using a word processing application.
TECH.9.4.2.TL.3	Enter information into a spreadsheet and sort the information.

Inter-Disciplinary Connections

LA.RL.11-12.4	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (e.g., Shakespeare as well as other authors.)
LA.RST.9-10.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.W.9-10.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and

	information clearly and accurately through the effective selection, organization, and analysis of content.
LA.W.9-10.2.A	Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
LA.WHST.9-10.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LA.W.9-10.6	Use technology, including the Internet, to produce, share, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
9-12.HS-ETS1-4.5	Using Mathematics and Computational Thinking
9-12.HS-PS1-7.5	Mathematical and computational thinking at the 9–12 level builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK

- #1- Blooms Knowledge - Remember previously learned information

- #2 - Blooms Comprehension - Demonstrate an understanding of facts

- #3 - Blooms Application - Apply Knowledge to actual situations

- #4 - Blooms Analysis - Break down objects or ideas into simpler parts and find evidence to support generalizations

- #5 - Blooms Synthesis - Compile component ideas into a new whole or propose alternative solutions

- #6 - Blooms Evaluation - Make and defend judgments based on internal evidence or external criteria

- Discussion on vocabulary including slope and rate of change, y-intercept, vertical, horizontal, parallel, perpendicular

- Introduction, notes, and examples on finding the slope given a graph

- Introduction, notes, and examples on finding the slope given a table

- Introduction, notes, and examples on finding the slope given an equation

- Introduction, notes, and examples on finding the slope given two points

- Introduction, notes, and examples on graphing equations by using the slope and y-intercept

- Introduction, notes, and examples on graphing inequalities

- Introduction, notes, and examples on parallel and perpendicular lines

- Introduction, notes, and examples on translating an equation to put it in slope intercept form

- Introduction, notes, and examples on writing equations in slope intercept form given two points

- review homework if need - answers posted on Google Classroom

- review warm up

- students will work as a team and explain their work

- students will work individually

- tutoring during Delsea One

Modifications

This unit includes: rate of change and slope, direct variation, slope intercept form, parallel and perpendicular lines, point slope form,and standard form

ELL Modifications

- Acquire the help from the Foreign Language Department if possible
- Assess ELL students continuously using formative assessment methods
- Be flexible with time frames and deadlines
- During Delsea One - one on one with a student who speaks the same language
- Intentional scheduling/grouping with student/teacher who speaks the same language if possible
- Khan Academy offers lesson in several languages: https://es.khanacademy.org/
- Offer resources for specific topics in primary language (Youtube web resources)
- Repeat, reword, clarify
- The NEA Portal offers lessons in several languages: http://neaportal.k12.ar.us/index.php/algebra-1-en-espanol/
- tutoring during Delsea One
- Use google translator, especially for application problems
- Using technology, such as but not limited to: graphing calculator and desmos

IEP & 504 Modifications

- Allow re-takes only after a tutoring session
- Assessments will allow for calculator use and/or other math tools
- Give assessments on mathxl that are from the interactive algebra 1; however, the homework/classwork on mathxl will be from algebra 1 to expose them to the material
- Higher level reasoning questions would have less weight than other questions or provide as extra credit questions to provide exposure to these questions but not something that will be a determinant to the student's ability to share knowledge of content
- if not in a co-teaching setting allowing time in the schedule for a special education teacher to consult with general education teachers on what specifically can be modified or how to paraphrase things in a different way specific to that lesson
- Keep updated videos on google classroom for reinforcement outside of the classroom
- Less questions overall or possibly break the test into two parts

- Modeling and showing several examples

- Show solving an inequality that includes fractions an alternative way to solve instead of reciprocating the fraction

- speaking to students privately when redirecting behaviors

- tutoring during Delsea One

- Upload several youtubes on the concepts that are in this specific unit

- Use a colored highlighter to highlight the variable that needs to be isolated

G&T Modifications

- Allow to go ahead on concepts on mathxl

- Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning

- Employ differentiated curriculum to keep interest high

- Encourage students to make transformations- use a common task or item in a different way

- Flip the lessons to push further ahead

- Flip the lessons using videos of more in depth work

- Have students include transformations

- Include more in depth problems involving application

- Invite students to explore different points of view on a topic of study and compare the two

- Provide more rigorous problems; either off the NJ State website or from the Pearson Algebra 2 textbook (available on mathxl)

- tutoring during Delsea One

- Videos that offer extra practice and examples in all areas are posted on google classroom and taken from: mathispower4u

At Risk Modifications

- Refer students to Organizational Management

- Require Delsea One tutoring

- Stay in contact with parents/guardians and guidance counselors on student progress

- tutoring during Delsea One

Formative Assessment

- Connecting previous lessons

- Connecting vocabulary with root words

- Discussion including vocab review/recall

- Evaluate your understanding of the lesson

- Guided Review

- Homework/classwork
- Mathxlforschool
- NJSLA Math type of question
- Pass out of class
- SAT question of the day
- Skill needed to do lesson
- Teacher observation
- Think-pair-share
- Turn to your partner and discuss
- Use What You Know - type of question
- Video clip
- Warm up review
- White Boards

Alternate Assessment

Performance tasks

Project-based assignments

Problem-based assignments

Presentations

Benchmark Assessment

Skills Based assessment- math practice

Summative Assessment

- Benchmark Assessment
- Marking Period Assessment
- Quiz on Parallel & Perpendicular Lines
- Quiz on Slope and Rate of Change
- Quiz on Slope-Intercept Form

- Unit test on Linear Functions

Resources & Materials

- Colored pencils/highlighters
- Google Slides
- Mathispower4u video clip to introduce or demonstrate concepts
- Pearson 2015 Algebra 1 Textbook
- Teacher generated worksheets
- White board paddles

Technology

- Chromebooks
- Desmos
- Edpuzzle
- Equatio
- Google Classroom
- Google Forms
- Graphing Calculator
- Mathway
- Mathxlforschool
- PearDeck
- Remind
- Video Clips

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.