Unit 11: Linear Functions and Final Review

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 34**
Length: **4 Weeks**
Status: **Published**

Unit Overview

In this unit, students will be introduced to the concept of functions and will learn how to determine if a set represents a function by utilizing the vertical line test. Students will also learn how to determine the domain and range of a data set, how to determine if an ordered pair is a solution to an equation, how to create a table of values and how to write an equation in function form. Students also will learn how to find the x and y intercepts of an equation, which leads to the introduction of the concept of slope. Students will find slope by using a graph and by using the formula and will write equations in slope intercept form. With these skills, students will solve systems of equations and inequalities by graphing.

Standards

MA.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.
MA.8.EE.B.6	Use similar triangles to explain why the slope m is the same between any two distinct 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.
MA.8.EE.C.8	Analyze and solve pairs of simultaneous linear equations.
MA.8.EE.C.8a	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.
MA.8.F.A.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
MA.8.F.A.2	Compare properties (e.g. rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
MA.8.F.A.3	Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.

Essential Questions

- How is change represented mathematically?
- How are we building upon concepts from previous units and applying them to linear functions?
- When is it practical to use each of the three methods to graph an equation?

Application of Knowledge and Skills...

Students will know that...

- For a set of data to represent a function, there can be one and only one output for every input.
- Parallel lines have the same slope, but different y intercepts.
- Perpendicular lines have slopes that are negative reciprocals and a different y intercept.
- Slope can be calculated mathematically by using the formula (y2-y1)(x2-x1).
- Slope intercept form refers to an equation that is solved for y.
- The slope of a line refers to the relationship of the rise to the run of the line.
- The solution to a system of equations is the point at which the two lines intersect. (To check the answer, insert the ordered pair into the original equations).
- The term domain refers to the input, and is represented by the x value in an ordered pair.
- The term range refers to the output, and is represented by the y value in an ordered pair.
- The Vertical Line test is used to determine if a set of data is a function. If a ruler is held vertically over the coordinate plane, and the line intersects the ruler more than once at any given value of x, the graph is not a function.
- The word linear literally means line.
- The x/y intercepts of a graph refer to the points at which a line intersects the x and y axes.
- To find the x intercept of an equation, insert zero for the y value.
- To find the y intercept of an equation, insert zero for the x value.
- When a line is in slope intercept form (y=mx + b), m represents the slope and b represents the y intercept.
- When creating an x/y table to graph an equation, write the equation in slope intercept form.
- When graphing a line that is in slope intercept form, plot the y intercept first, then plot three other points based on the slope of the line.
- When graphing a system of inequalities, shade the region that results in a true response when inserting an ordered pair.

Students will be able to:

- Calculate the slope of a line by using the mathematical formula or by observing the rise and run of the line.
- Calculate the x and y intercepts of a linear equation and graph it.
- Classify the domain and range in a given set of data.
- Create an x/y table to graph a linear equation.
- Graph a line that is in slope intercept form by plotting the y intercept and using the slope to plot the remaining points.
- Identify the slope and y intercept of a line by correctly writing it in slope intercept form.
- Identify whether or not a set of data represents a function. (includes passing the vertical line test)

- Manipulate an equation so that it is written in slope intercept form.
- Solve a system of equations by graphing.
- Write equations of lines that are parallel or perpendicular to the original line.

Assessments

Digits Readiness Assessments:

The readiness assessment screens students on their understanding of the prerequisite content of a unit. Students are then assigned invidualized intervention lessons to address specific needs.

- Do Now Exercises Diagnostic: Instructional/Assessment Focus The purpose of these do now exercises is to review and remediate when necessary the concepts/skills learned throughout the unit.
- Linear Functions Unit Quiz Formative: Written Test This unit quiz will include: functions, x/y tables, and x/y intercepts.
- Linear Functions Unit Test Summative: Written Test This unit test will include all skills/knowledge associated with linear functions.
- Pre-Algebra Final Exam Summative: Benchmark Assessment The Final Exam will assess all of the skills/concepts/knowledge the students have learned throughout the Pre-Algebra course.
- Waterpark Activity Formative: Other written assessments In this assessment, students will apply their skills and knowledge relative to linear functions to solve a real- world problem

Activities

- **Slope Intercept Form Introductory:** in this activity taken from the activity-generator, students will apply their knowledge of creating x/y tables to discover a pattern with the y intercept and the slope. Students will determine that when an equation is in slope intercept form, the “m” represents the slope of the line while the “b” represents the y intercept.
- **Slope Buddy:** in this teacher-generated Smartboard presentation, students will learn about slope through graphing and the mathematical formula. Students will move "slope buddy" up or down a line to represent a positive or a negative slope. Students will utilize the Smartboard to draw triangles to represent the rise and the run of a line.
- **Systems of Inequalities:** in this teacher-generated activity, students follow a series of steps to discover how to solve and to graph a system of inequalities and will answer questions based on their discoveries.
- **Interactive Smartboard** presentations will show students how to write equations, graph a line, and solve a system of equations.
- **Smart pal** review games focus on graphing equations and placing equations in slope intercept form.
- Digits grade 8 cd

Launch Activity

Marching Bands r14: In this activity students will graph points in the coordinate plane. Students will write and graph linear equations in two variables.

Activities to Differentiate Instruction

- **Waterpark Activity:** in this teacher-generated activity, students decide which admission plan for a waterpark is the "best deal". Students work in groups to answer questions that will require students to graph a set of linear equations. Challenge questions will be introduced for advanced students.
- **Model Equations:** in this teacher-generated activity, students model various equations on a coordinate grid created with tape on the floor. Students move themselves to represent the slope of the given line. This activity can also be modified to include solving a pair of systems of equations.
- **Final Exam Review Stations:** students complete teacher-generated questions to review concepts/skills/knowledge learned throughout the year.
- Provide completed study guides as needed.
- Provide calculators to assist with calculations.

- **Digits Supported Materials:**

    - Math XL Printables
    - Leveled Homework G and K
    - Help Me Solve This: This function scaffolds math problems by asking prompting question at each individual step.
    - View An Example: This function provides a fully worked out step-by-step solution of a similar problem.
    - Readiness Assessment: After a student completes the readiness assessment intervention lessons are individually assigned to address prerequisite skills .
    - Tools: On line manipulatives

Integrated/Cross-Disciplinary Instruction

- **Science:** Model linear equations that relate to science topics, such as the growth of a pine tree. Students will solve to find how many years it will take to reach a certain height, how tall it would be after a given number of years, etc.
- **Physical Education:** have students create and graph a “human” equation.

Resources

Kuta software

Digits teacher materials and support: www.pearsonrealize.com

SMART Exchange - SMART Exchange

Digits student access and support: www.MyMathUniverse.com

Kuta generated worksheets dealing with graphing linear equations and solving a system of equations

Slope intercept form activity directions

Waterpark activity questions

Activity generator

Calculators

Football interception video clips to enhance the concept of x/y

21st Century Skills

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.