Unit 5: Writing Equations for Linear Relationships

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 20**
Length: **3 weeks**
Status: **Published**

Unit Overview

This unit will build upon the previous unit "Linear Relationships" and focus on writing equations in slope-intercept form. Students will begin this unit by discussing how to write equations for linear relationships when given the slope and the coordinate of the y-intercept. Then, they will learn how to write equations when given the slope and a coordinate point on the line that is not the y-intercept. Students will apply this knowledge as well their skill of finding slope in order to write linear equations when only given two coordinate points on the line. This will include when students are given a table and have more than two coordinate points to choose from. Finally, students will be able to write a linear equation when given a real-world scenario. Then, they will be able to calculate a value when given either an independent or dependent variable.

Standards

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.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.
MA.8.F.B.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Essential Questions

- How can the equation of a linear relationship be used to describe and explain real-world situations?
- How can knowing the equation of a line help in decision-making?

Application of Knowledge: Students will know that...

- a coordinate point is on a line when it can be plugged into the equation and produce a true statement.
- for y = mx + b, "m" stands for slope and "b" stands for the y-intercept of the equation.
- rates refer to the slope and one-time fees refer to the y-intercept when writing linear equations to represent real-world situations.

- to write a linear equation, one needs either the slope and one coordinate point or two coordinate points.

Application of Skills: Students will be able to...

- determine whether a coordinate point is on a line algebraically.
- write a linear equation that represents a real-world situation.
- write a linear equation when given a table.
- write a linear equation when given the slope and a coordinate point on the line.
- write a linear equation when given two coordinate points.

Assessments

- Do-Nows: These daily assessments will be used to check for prior knowledge and to determine mastery of particular topics. If needed, remediation will be completed on an as needed basis.
- Communicator practice: This will be used as a quick whole-class assessment tool to check for complete comprehension.
- Exit Tickets: These will be used to measure student understanding of the lesson and assist in determining whether remediation is needed for the topic.
- "Math Lib" Gallery Walk: This may be used as a formative assessment (see description below).
- Practice using IXL
- Mid-Unit Quiz
- Unit Test
- Information from this unit will be included on a locally developed, mid-year or end of year benchmark assessment that may take the form of a test, performance based project, or other summative assessment.

Suggested Activities

- Grade 8 Digits Topics 7 and 8 Launches
- Student-centered SMART Board lessons: including interactive coordinate graphs for writing linear equations from graphs and reveals for scaffolded instruction for writing linear equations when given two coordinate points.
- Review games using Communicators
- Determining if a Coordinate Point is On a Line Investigation: Students will be given a graph and equation of a line. Then, they will be given coordinate points to plug into the equation. If plugging in the point produces a true statement, students will mark a "Y" on that point on the graph. If plugging in the point produces a false statement, they will mark a "N" on that point on the graph. This will lead to students finding that all of the points that produce true statements when plugged in are on the line.
- "Math Lib" Gallery Walk: Students will complete problems posted around the room that review all of the types of problems studied in this unit on writing linear equations. Each problem is multiple choice and also has a word or phrase written next to each answer choice. Once students have completed a problem, they will put the corresponding phrase in the labeled space on a "math lib" (similar to "mad

lib"). Once students have completed all of the problems, they will be left with a funny story.

Activities to Differentiate Instruction

Differentiation for special education:

- General modifications may include:
  - Modifications & accommodations as listed in the student's IEP
  - Assign a peer to help keep student on task
  - Modified or reduced assignments
  - Reduce length of assignment for different mode of delivery
  - Increase one-to-one time
  - Working contract between you and student at risk
  - Prioritize tasks
  - Think in concrete terms and provide hands-on-tasks
  - Position student near helping peer or have quick access to teacher
  - Anticipate where needs will be
  - Break tests down in smaller increments

- Content specific modifications may include:
  - Provide personal handout for integer rules
  - Provide personal handout with steps for writing linear equations when given two points
  - Provide completed problems for practice work and homework

Differentiation for ELL's:

- General modifications may include:
  - Strategy groups
  - Teacher conferences
  - Graphic organizers
  - Modification plan
  - Collaboration with ELL Teacher

- Content specific vocabulary important for ELL students to understand include: linear, unit rate, vertical, horizontal, intercept, initial value, slope, plug in, coordinate plane/graph

Differentiation to extend learning for gifted students may include:

- Investigate equations of vertical and horizontal lines
- Provide problems in which the y-intercept is a fraction
- Investigate point-slope and standard forms of linear equations

Technology Integration

- iPads or Chromebooks as appropriate to the activity.
- Online learning components including use of the Digits digital textbook and resources.
- Teacher integration of the SMART board to facilitate active student engagement throughout the course of the lesson.
- Software or online programs that teachers may use to create students materials or generate problems such as Kuta software.
- Additional practice provided through the use of IXL.

Integrated/Cross-Disciplinary Instruction

- **ELA:** Practice formulating complete and grammatically correct responses to open-ended questions.
- **Science:** Model linear equations that relate to science topics, such as population growth.
- **Economics:** Model linear equations that relate to businesses in which the y-intercept is the initial cost and the slope is the unit rate for the product. Students can identify the initial cost and unit rate of the product and then write the linear equation representing profit for the business.

Resources

- Digits student access and support: www.MyMathUniverse.com
- Digits teacher materials and support: www.pearsonrealize.com
- IXL: www.ixl.com
- SMART Exchange: http://exchange.smarttech.com/index.html#tab=0
- SMART Board lessons
- Coordinate graph worksheets
- Punchline/Pizzazz worksheets (self-correcting)
- Kuta software generated worksheets

21st Century Skills

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.