Unit 5: Writing Linear Equations

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 19**
Length: **5 Weeks**
Status: **Published**

Unit Overview

In this unit, students will write equations of lines in slope-intercept form given three situations: the slope and y-intercept; the slope and a point; or two points. They also write equations using a graph of the line or using real-world data. Students will write equations of lines in standard form, and they will use their equations to solve real-world problems. They will also write equations of lines parallel or perpendicular to a given line and use function notation. In addition, students will make scatter plots of data and use a line of fit to model and interpret the data. They will perform linear regression to find the best-fitting line for data and make predictions using the graph and the equation.

Standards

MA.F-IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
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.

Essential Questions

- How can mathematical models be used to clarify mathematical relationships?
- How can mathematical models be used to describe physical relationships?
- How can knowing the equation of a line help in decision-making?

Application of Knowledge and Skills...

Students will know that...

- 1) slope-intercept form of a line is y = mx + b
- 2) point-slope form of a line is y - y1 = m(x - x1)

- 3) standard form of a line is Ax + By = C
- 4) parallel lines have the same slope and perpendicular lines have negative reciprocal slopes
- 5) the symbol f(x) is another name for y and is read as 'the value of f at x'
- 6) a line of fit is used to model the trend in data that shows a positive or negative correlation
- 7) a best-fitting line is a line that most closely follows a trend in data

Students will be able to...

- a) Write linear equations in slope-intercept form
- b) Write linear equations in point-slope form
- c) Write linear equations in standard form
- d) Write equations of parallel and perpendicular lines
- e) Write linear functions using function notation
- f) Solve for values of x or f(x) using function notation
- g) Create scatter plots and write equations to model data
- h) Make predictions using best-fitting lines

Assessments

- Communicator Practice Diagnostic: Other written assessments Students will solve practice problems on communicators to receive immediate feedback
- Daily Do Now Problems Diagnostic: Other written assessments Students will complete daily Do Now problems to assess readiness
- Homework Formative: Other written assessments Students will complete daily homework assignments to reinforce concepts and skills used in class
- Tickets to Leave Formative: Other written assessments One or two problems will be used to determine whether students mastered material taught during the lesson
- Writing Equations Quiz Formative: Written Test Students will take a quiz on writing equations in slope-intercept form given the slope and y-intercept, a graph, a table, a real-world situation, the slope and a point, and two points; writing equations in point-slope form given the slope and a point, and two points; word problems
- Writing Equations Test Summative: Written Test Topics will include: writing equations in slope-intercept form, point-slope form, and standard form; parallel and perpendicular lines; function notation; creating scatter plots and equations of lines of best fit

Activities

Point-Slope Activity

Students will work with equations in point-slope form to discover that the line passes through (x_1, y_1) and has a slope of m.

Graphs of Equations in Standard Form Activity

Students will discover how to identify equivalent equations from standard form.

Writing Linear Equations Tic-Tac-Toe

Students play a game of tic-tac-toe in pairs by correctly solving problems that practice writing linear equations.

Linear Equation Bull's Eye Worksheet

Students will complete a worksheet that reviews and makes connections between slope-intercept form, standard form, and x-intercepts.

Food Preference Correlation Activity

Students will compare favorite foods in partners to create and analyze a scatter plot.

Cell Phone Scatter Plot Activity

Students will use a scatter plot to create an equation and make predictions.

Fuel Consumption Scatter Plot Class Activity

The class will predict future fuel consumption from given data using a table and compare their prediction with that of a linear model.

Communicator Practice

Students will solve differentiated practice problems on SmartPal response boards.

- Point-Slope Activity
- Standard Form Activity
- Tic Tac Toe Boards
- Bull's Eye Worksheet

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
  - Position student near helping peer or have quick access to teacher
  - Break tests down in smaller increments

- **Content specific modifications may include:**
  - Provide personal handout for integer rules
  - Provide graphic organizer for remembering angle relationships
  - Provide completed examples for practice work and homework.
  - Provide calculator to assist with calculations.
  - Provide students with a formula sheet with one type of problem for each formula worked out for them already.

Differentiation for ELL's:

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

- **Content specific vocabulary important for ELL students to understand include:** slope-intercept form, line, point-slope form, standard form, parallel, perpendicular, reciprocal, slope, f(x), line of fit, best-fitting line, negative correlation, positive correlation, linear equation, function

Differentiation to extend learning for gifted students may include:

- Challenge and enrichment homework, worksheets, and activity
- Optional weekly challenge problems
- Appropriately leveled problems for students to solve when participating in communicator practice will be provided.
- Tic Tac Toe game consists of tiered levels.

Integrated/Cross-Disciplinary Instruction

Technology - An excel spreadsheet will be utilized and projected on the Smart Board to complete the Fuel Consumption Activity.

Resources

McDougal Littell Algebra 1 textbook and resource materials

Kuta software

SmartExchange resources

- McDougal Littell Algebra 1
- SMART Exchange

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.