

Unit 3: Analyzing Linear Equations

Content Area: **Math**
Course(s): **Algebra 1**
Time Period: **DecJan**
Length: **4-5 weeks**
Status: **Published**

Title Section

Department of Curriculum and Instruction



Belleville Public Schools

Curriculum Guide

Algebra 1 A

Unit 3: Analyzing Linear Equations

Belleville Board of Education

102 Passaic Avenue

Belleville, NJ 07109

Dr. Richard Tomko, Ph.D., M.J., Superintendent of Schools
Dr. Giovanni Cusmano, Director of Elementary Education K - 8
Mr. George Droste, Director of Secondary Education

Board Approved: August 27th, 2018

Unit Overview

- This unit is about graphing linear equations and writing equations of line.
- The students will identify linear equations, intercepts, and zeros, write and graph equations of line.

NJSLS

| | |
|-------------------|---|
| MA.9-12.S-ID.B.6c | Fit a linear function for a scatter plot that suggests a linear association. |
| MA.9-12.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.9-12.F-BF.A.1 | Write a function that describes a relationship between two quantities. |
| MA.9-12.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.9-12.F-LE.A.1a | Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. |
| MA.9-12.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.9-12.F-IF.C.7a | Graph linear and quadratic functions and show intercepts, maxima, and minima. |
| MA.9-12.S-ID.B.6a | Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. |

Exit Skills

By the end of Unit 3 Students Should be able to:

- Find rates of change from tables.
- Find the slope of a line.

- Find the y-intercept of a line.
- Graph equations in slope-intercept form.
- Write equations in slope-intercept form and standard form.
- Graph linear equations using intercepts.
- Analyze scatter plots and lines of best fit.
- Use a trend line and a line of best fit to make predictions.
- Use regression techniques to describe approximately linear relationships between quantities.
- Use graphical representations and knowledge of context to make judgments about the appropriateness of linear models.
- Model contextual problems by using linear equations.

Enduring Understanding

- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and express regularity in repeated reasoning.

Essential Questions

- What does the slope of a line indicate about the line?
- How do the values of m and b affect the graph $y=mx+b$?
- What are different ways of finding the slope of a line?
- What information does the equation of a line give you?
- How can you make predictions based on a scatter plot?
- What are characteristics of real-life situations that can be modeled using linear relationships?
- How can you use a graphing calculator to perform linear regression on a set of a paired numerical data?

Learning Objectives

Students will be able to:

- Find and use rates of change to solve problems.
- Differentiate between correlations of a scatter plot by using the lines of best fit.

- Find the slope of a line algebraically and graphically.
- Find the y-intercept of a line by using a graph or formula.
- Graph equations of a line by using x/y intercepts and slope/intercept.
- Write equations of a line in slope-intercept form and standard form.
- Analyze scatter plots and lines of best fit by using correlation and line of regression.
- Use a trend line and a line of best fit to make predictions.
- Determine whether lines are parallel, perpendicular, or neither by analyzing the slope.
- Write equations of parallel and perpendicular lines by finding the slope and they-intercept.
- Model and create contextual problems by using linear equations.
- Manipulate with a graphing calculator to perform analysis on a set of paired numerical data.

Interdisciplinary Connections

Economics, business, financing, geometry, literacy, science.

| | |
|-----------------|--|
| CRP.K-12.CRP2 | Apply appropriate academic and technical skills. |
| CRP.K-12.CRP4 | Communicate clearly and effectively and with reason. |
| CRP.K-12.CRP11 | Use technology to enhance productivity. |
| CRP.K-12.CRP8 | Utilize critical thinking to make sense of problems and persevere in solving them. |
| CRP.K-12.CRP7 | Employ valid and reliable research strategies. |
| TECH.8.1.12.A.3 | Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue. |
| TECH.8.1.12.F.1 | Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs. |

Alignment to 21st Century Skills & Technology

Key SUBJECTS AND 21st CENTURY THEMES

Mastery of key subjects and 21st century themes is essential for all students in the 21st century.

Key subjects include:

- English, reading or language arts
- World languages
- Arts
- Mathematics
- Economics
- Science
- Geography
- History

- Government and Civics

21st Century/Interdisciplinary Themes

- Financial, Economic, Business and Entrepreneurial Literacy
- Global Awareness

21st Century Skills

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy
- Information Literacy
- Life and Career Skills
- Media Literacy

Suggested Activities & Best Practices

Explore Steepness:

<https://teacher.desmos.com/activitybuilder/custom/56b8d8ec6fb01b1648653477>

Slope Intercept Game:

<https://www.scribd.com/presentation/110006988/Slope-Intercept-Gameboard>

Equations of lines/slope int form:

<https://teacher.desmos.com/activitybuilder/custom/582b81f4bf3030840aacf265>

Linear Models

<https://teacher.desmos.com/activitybuilder/custom/563a59893f80f2fd0b7c77f0>

Graph real-world problems:

<http://www.graphingstories.com/>

Slope:

https://www.youtube.com/watch?v=u3spOO-m_Gg

Rate of Change:

<http://algebrasfriend.blogspot.com/2012/10/slope-as-rate-of-change.html>

Meaning of slope and y intercept

<http://untilnextstop.blogspot.com/2010/10/activities-to-help-kids-understand.html>

Scatterplot:

<https://www.mathsisfun.com/data/scatter-xy-plots.html>

Textbook, eAssessment, supplemental materials:

<https://my.mheducation.com/login>

AI Assessment and Learning System:

<https://www.aleks.com/>

Algebra Tools - Functions:

<https://www.state.nj.us/education/aps/cccs/math/NJISTFunctions.pdf>

Algebra Tools - Algebra:

<https://www.state.nj.us/education/aps/cccs/math/NJISTAAlgebra.pdf>

Misc Mathematics materials:

<http://www.mathnstuff.com/>

Graph Paper:

<https://www.mathworksheets4kids.com/grid/30by30-all-noscale1.pdf>

<http://www.printfreegraphpaper.com/>

Technology Infusion

- Youtube
- Khan academy
- MS Excel
- Office 365
- MS Word
- PodCasts
- MS Powerpoint
- Wikipedia

- Skype
- Twitter
- Ted Talks
- QR Barcode Generator
- Calculator/Graphing calculator

Differentiation

- Cooperative groups
- Board work
- Team work
- Classroom discussions
- Questions and Answers
- Study guide
- Tests/quizzes reviews
- Notes taking/transparencies
- Organizer
- Calculator/graphing calculator
- Posters display
- Extra time

Special Education

- printed copy of board work/notes provided
- additional time for skill mastery
- assistive technology
- behavior management plan
- Center-Based Instruction
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- modified test content
- modified test format
- modified test length
- multiple test sessions

- multi-sensory presentation
- preferential seating
- preview of content, concepts, and vocabulary
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

ELL

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarify
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
- allowing students to correct errors (looking for understanding)
- decreasing the amount of work presented or required
- having peers take notes or providing a copy of the teacher's notes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using computer word processing spell check and grammar check features
- using true/false, matching, or fill in the blank tests in lieu of essay tests

Intervention Strategies

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic. Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.
- decreasing the amount of work presented or required

- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify

Evidence of Student Learning-CFU's

Please list ways educators may effectively check for understanding in this section.

- Admit Tickets
- Anticipation Guide
- Common benchmarks
- Compare & Contrast
- Create a Multimedia Poster
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Illustration
- KWL Chart
- Outline
- Quickwrite
- Quizzes
- Self- assessments
- Study Guide
- Teacher Observation Checklist
- Think, Pair, Share
- Unit tests

Primary Resources

Glencoe McGraw-Hill Algebra1 2014

Glencoe McGraw-Hill Algebra1 2010

Practice Glencoe Algebra1

Study Guide Glencoe Algebra1

Ancillary Resources

Houghton Mifflin Harcourt On core Mathematics Algebra1

Glencoe McGraw-Hill Science and Mathematics Lab Manual