Unit 3 Analyzing Linear Equations

Content Area: **Math**
Course(s): **Algebra 1**
Time Period:
Length: **24 days**
Status: **Published**

Algebra 1

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Algebra 1, Grade 8

Unit 3 Analyzing Linear Equations

Belleville Board of Education

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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.

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?

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.

New Jersey Student Learning Standards (NJSLS)

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
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.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.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.
MA.K-12.6	Attend to precision.
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.S-ID.B.6c	Fit a linear function for a scatter plot that suggests a linear association.
MA.F-IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
MA.F-BF.A	Build a function that models a relationship between two quantities
MA.F-BF.A.1	Write a function that describes a relationship between two quantities.
MA.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.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).

Interdisciplinary Connections

Economics, Business, Financing, Geometry, Literacy, and Science

LA.SL.8.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
LA.SL.8.1.B	Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.

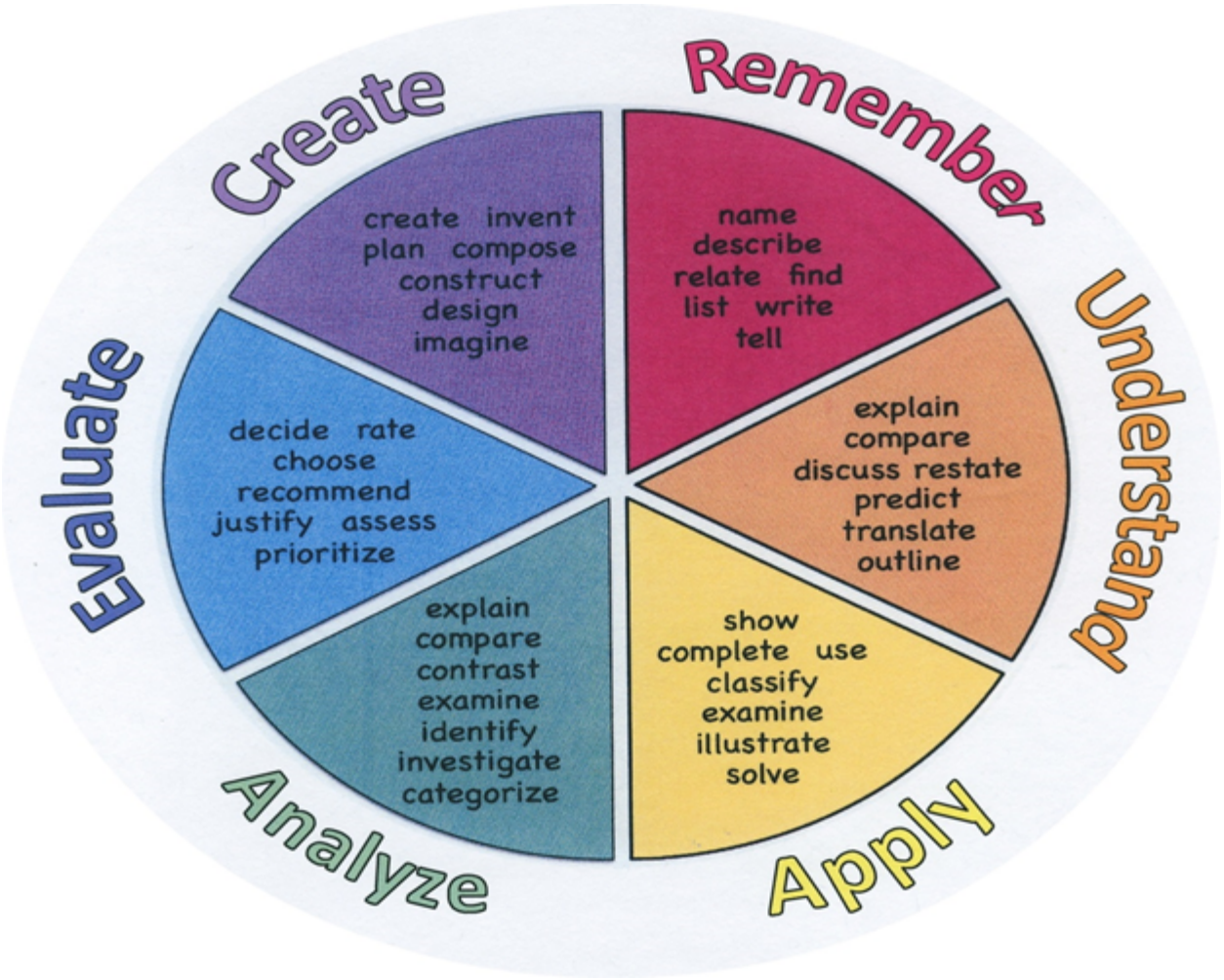
LA.SL.8.1.C	Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.
LA.SL.8.1.D	Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.

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.

Remember	Understand	Apply	Analyze	Evaluate	Create
Choose	Classify	Choose	Categorize	Appraise	Combine
Describe	Defend	Dramatize	Classify	Judge	Compose
Define	Demonstrate	Explain	Compare	Criticize	Construct
Label	Distinguish	Generalize	Differentiate	Defend	Design
List	Explain	Judge	Distinguish	Compare	Develop
Locate	Express	Organize	Identify	Assess	Formulate
Match	Extend	Paint	Infer	Conclude	Hypothesize
Memorize	Give Examples	Prepare	Point out	Contrast	Invent
Name	Illustrate	Produce	Select	Critique	Make
Omit	Indicate	Select	Subdivide	Determine	Originate
Recite	Interrelate	Show	Survey	Grade	Organize
Select	Interpret	Sketch	Arrange	Justify	Plan
State	Infer	Solve	Breakdown	Measure	Produce
Count	Match	Use	Combine	Rank	Role Play
Draw	Paraphrase	Add	Detect	Rate	Drive
Outline	Represent	Calculate	Diagram	Support	Devise
Point	Restate	Change	Discriminate	Test	Generate
Quote	Rewrite	Classify	Illustrate		Integrate
Recall	Select	Complete	Outline		Prescribe
Recognize	Show	Compute	Point out		Propose
Repeat	Summarize	Discover	Separate		Reconstruct
Reproduce	Tell	Divide			Revise
	Translate	Examine			Rewrite
	Associate	Graph			Transform
	Compute	Interpolate			
	Convert	Manipulate			
	Discuss	Modify			
	Estimate	Operate			
	Extrapolate	Subtract			
	Generalize				
	Predict				



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://betterlesson.com/lesson/530380/introduction-to-scatter-plots-line-of-best-fit-and-the-prediction-equation?from=search

https://mathbits.com/MathBits/TISection/Statistics1/LineFit.htm

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/NJISTAlgebra.pdf

Misc Mathematics materials:

http://www.mathnstuff.com/

Graph Paper:

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

http://www.printfreegraphpaper.com/

Assessment Evidence - Checking for Understanding (CFU)

- kahoot Slope Intercept Form https://create.kahoot.it/details/bb9d0a93-8033-4262-bf34-aae8d0eca35e (formative assessment)
- Benchmark #2 (summative assessment)
- Self - assessment and reflection (formative assessment)
- Surveys (formative assessment)
- Group lessons to the class (alternative assessments)
- Quizzes (summative assessments)

- Admit Tickets
- Anticipation Guide
- Common Benchmarks
- Compare & Contrast
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Fist- to-Five or Thumb-Ometer

- Illustration
- KWL Chart
- Learning Center Activities
- Multimedia Reports
- Quizzes
- Red Light, Green Light
- Self- assessments
- Study Guide
- Surveys
- Teacher Observation Checklist
- Think, Pair, Share
- Unit review/Test prep
- Unit tests

Primary Resources & Materials

Glencoe McGraw-Hill Algebra1 2014

Glencoe McGraw-Hill Algebra1 2010

Practice Glencoe Algebra1

Study Guide Glencoe Algebra1

Ancillary Resources

Glencoe Algebra 1 Tutor: Personal Tutor and Spanish Tutor

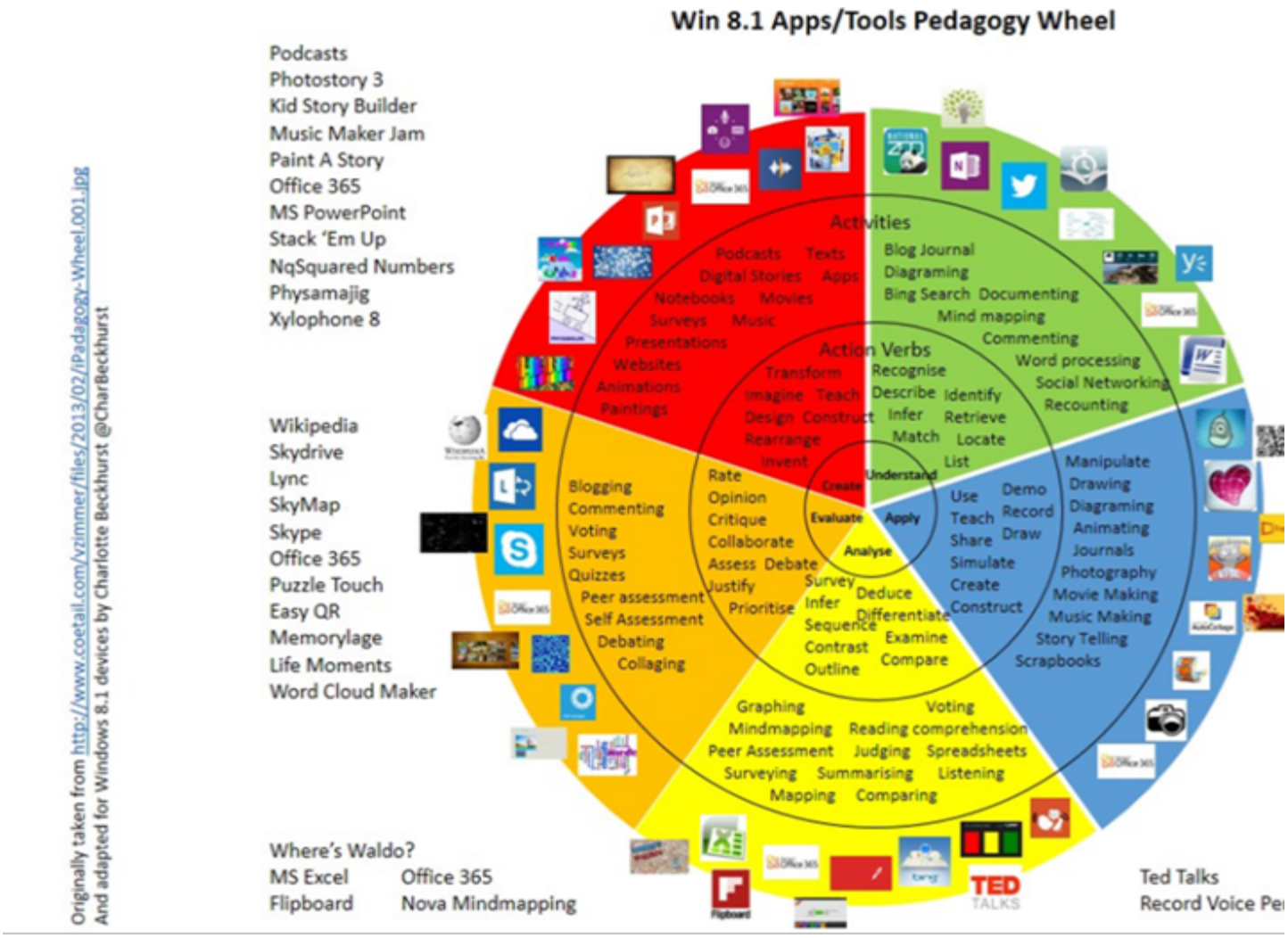
Glencore Algebra 1 Geometer's Sketchpad

Glencoe Algebra 1 Glencoe Mathematics Secondary Series

ALEKS

Technology Infusion

- Better Lesson Scatterplots and Patterns https://betterlesson.com/lesson/594109/fast-hands?from=cc_lesson
- Youtube
- Khan academy
- Edulastic
- Google Sheets
- Google Classroom
- Office 365
- Google Docs
- PodCasts
- Google Slides
- Wikipedia
- Skype
- Twitter
- Ted Talks
- QR Barcode Generator
- Calculator/Graphing calculator



Alignment to 21st Century Skills & Technology

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

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.CRP7.1	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
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.
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
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.

21st Century Skills/Interdisciplinary Themes

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

21st Century Skills

- Civic Literacy
- Environmental Literacy
- Financial, Economic, Business and Entrepreneurial Literacy
- Global Awareness
- Health Literacy

Differentiation

- Use of Larger version of coordinate plane
- Color coding Equations based on their slope
- Use of piece of spaghetti to show the line of best fit and determine the correlation
- Cooperative groups
- Pairing oral instruction with visuals
- Team work
- Center based instruction
- Repeat directions as needed
- Study guide
- Tets/quizzes reviews
- Notes taking/transparencies
- Organizer
- Calculator/graphing calculator
- Extra time
- Students work with assigned partner
- Choice boards

- Stations/Learning centers

Special Education Learning (IEP's & 504's)

- Use of Larger version of coordinate plane
- Color coding Equations based on their slope
- Use of piece of spaghetti to show the line of best fit and determine the correlation

- printed copy of board work/notes provided
- additional time for skill mastery
- assistive technology
- 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
- preferential seating
- Provide modifications as dictated in the student's IEP/504 plan
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- Use open book, study guides, test prototypes

English Language Learning (ELL)

- Use of Larger version of coordinate plane
- Color coding Equations based on their slope
- Use of piece of spaghetti to show the line of best fit and determine the correlation

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarif
- 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)
- allowing the use of note cards or open-book during testing
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- providing study guides
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using computer word processing spell check and grammar check features

At Risk

- Use of Larger version of coordinate plane
- Color coding Equations based on their slope
- Use of piece of spaghetti to show the line of best fit and determine the correlation

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic. Eliminate nonessential information
- allowing the use of note cards or open-book during testing
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- modifying tests to reflect selected objectives
- providing study guides
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using videos, illustrations, pictures, and drawings to explain or clarify

Talented and Gifted Learning (T&G)

- Investigating Slope-Intercept Form graphing technology lab(McGraw Hill Algebra 1 textbook page

- Advanced problem-solving
- Allow students to work at a faster pace
- Complete activities aligned with above grade level text using Benchmark results
- Create a plan to solve an issue presented in the class or in a text
- Debate issues with research to support arguments
- Flexible skill grouping within a class or across grade level for rigor
- Higher order, critical & creative thinking skills, and discovery
- Multi-disciplinary unit and/or project
- Teacher-selected instructional strategies that are focused to provide challenge, engagement, and growth opportunities
- Utilize exploratory connections to higher-grade concepts

Sample Lesson

Using the template below, please develop a **Sample Lesson** for the first unit only.

Unit Name:

NJSLS:

Interdisciplinary Connection:

Statement of Objective:

Anticipatory Set/Do Now:

Learning Activity:

Student Assessment/CFU's:

Materials:

21st Century Themes and Skills:

Differentiation/Modifications:

Integration of Technology: