Unit # 3: Graphs of Linear Equations in Two Variables

Content Area: **Mathematics**
Course(s): **College Prep Math 2**
Time Period: **February**
Length: **14 days**
Status: **Published**

Unit Overview

This unit introduces the basic tools for solving linear equations in two variables. Solution sets of linear equations are represented graphically using the coordinate plane. The slope of a line is defined, and the standard and slope-intecept forms of a line's equation are examined. Lines are graphed from given equations, and equations are determined from given facts about a line.

Enduring Understandings

- A variety of families of functions can be used to model and solve real world situations
- Functional relationships can be expressed in real contexts, graphs, algebraic equations, tables, and words; each representation of a given function is simply a different way of expressing the same idea.

Essential Questions

- How can slope functions be used as tools to best describe and help explain real-life situations ?
- How can you graph the solutions of a linear equation on a line ?
- How does a line on a coordinate graph represent solutions to a linear equation ?
- What is slope and how do you compute it ?
- Why is it useful to represent real-life situations algebraically?

Standards / Indicators / Student Learning Objectives (SLOs) :

- SWBAT complete a table of values for a given equation.
- SWBAT determine whether a given ordered pair is a solution of a given equation.
- SWBAT find an equation of a line that fits a data set.
- SWBAT find the missing coordinate of an ordered pair for a given equation.
- SWBAT find the slope from the equation of a line.
- SWBAT find the slope of line given two points.
- SWBAT find x and y- intercepts for the graph of an equation.
- SWBAT graph a line given its slope and a point on the line.
- SWBAT graph linear equations of the form Ax + By = C
- SWBAT graph linear equations of the form y = k or x = k.
- SWBAT interpret graphs

- SWBAT plot ordered pairs on a coordinate graph.
- SWBAT to graph a linear equation by plotting the appropriate ordered pairs.
- SWBAT use slope to determine whether to lines are parallel, perpendicular, or neither.
- SWBAT uses a linear equation to model data.
- SWBAT write a solution as an odered pair.
- SWBAT write an equation of line given its slope and y-intercept.
- SWBAT write an equation of a line given its slope and any point on the line.
- SWBAT write an equation of a line given two points on a line.

MA.K-12.1	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MA.K-12.4	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
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.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.
MA.A-REI.D	Represent and solve equations and inequalities graphically
MA.A-REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

MA.A-REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
MA.G-GPE.B.5	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

Lesson Titles

- Equations of Lines
- Graphing Linear Equations in Two Variables
- Reading Graphs; Linear Equations in Two Variables
- Slope of a Line

Career Readiness, Life Literacies & Key Skills

WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.

Inter-Disciplinary Connections

LA.RH.11-12.4	Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines faction in Federalist No. 10).
LA.WHST.11-12.2.E	Provide a concluding paragraph or section that supports the argument presented.
SCI.HS-PS4-1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

Instructional Strategies, Learning Activities, and Blooms/DOK:

- Explanation , examples, and practice finding the slope of a line.
- Explanation , examples, and practice graphing linear equations in two variables.
- Explanation , examples, and practice reading graphs
- Explanation , examples, and practice with writing an equation of line given its slope and any point on the line.
- Explanation , examples, and practice writing an equation of a line given the slope and y - intercept.
- Explantion, examples, and practice writing an equation of a line given two points on the line.
- Tutoring during Delsea One

Modifications

ELL Modifications

- Alternate assessment options….physical demonstration
- Assess ELL students continuously using formative assessment methods
- Use manipulatives where possible
- Use manipulatives where possible B.) Use real objects when possible

IEP & 504 Modifications

- Allowing student to correct mistakes or answer wrong questions correctly for additional credit if failed the first test (another way to re-teach material)
- Less questions per page (so not visually overwhelming)
- Math tests could have formula's available on the test and/or sample problems
- Modeling and showing lots of examples

G & T Modifications

- Graph analysis / interpretation
- Peer leadership or mentoring.
- Provide additional rigorous challenge problems for advanced students. .
- Specific career they are interested in? How would this apply to their interest?)

At Risk Modifications

- Review, restate, reword directions
- Additional help during tutoring/Delsea One/Academic Enrichment
- Guided notes
- Hands-on Instruction
- Modeling and showing lots of examples
- Study guides
- Tutoring during Delsea One
- Visuals

Formative Assessment

- Accuplacer practice problem
- Begin the homework assignment and periodically check answers together
- Class discussions
- Graded classwork
- Graded homework
- Guided practice
- Individual practice
- Oral questioning
- Oral response
- Teacher observation
- Warm up problems - completing a table of values for a given equation
- Warm up problems - deciding whether a given ordered pair is a solution of a given equation
- Warm up problems - finding a equation of a line that fits a data set
- Warm up problems - finding intercepts
- Warm up problems - finding the slope from the equation of a line
- Warm up problems - finding the slope of a line given 2 points
- Warm up problems - graph a line given its slope and a point on the line
- Warm up problems - graphing linear equations
- Warm up problems - interpreting graphs
- Warm up problems - plotting ordered pairs
- Warm up problems - using slope to determine whether 2 lines are parallel, perpendicular, or neither.
- Warm up problems - writin the equation of a line given its slope and y-intercept
- Warm up problems - writing an equation of a line given 2 points on the line
- Written work

Summative Assessment

- Accuplacer Practice Test
- Accuplacer Test
- Quiz on reading graphs, graphing linear equations in 2 variables, and slope of a line - (sections 3.1 - 3.3
)
- Unit Test on Graphs of Linear Equations in Two Variables

Resources & Materials

- Computer Generated Warm Ups (see formative assessment section for specific topics)
- Internet worksheets (see formative assessment section for specific topics)

- Teacher made worksheets (see formative assessment section for specific topics)
- Text: Introductory Algebra (2010) (Ninth Edition)
- Warm up problems (see formative assessment section)

Technology

- Internet Sources: http://accuplacer.collegeboard.org/students
- Math XL
- Smart board
- Smart Board

TECH.8.1.12.C	Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
TECH.8.1.12.D.CS2	Demonstrate personal responsibility for lifelong learning.