05 - Linear Relationships and Slope

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **3 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

Pre-Algebra 7A units were created and organized in line with the areas of focus as identified by the New Jersey Student Learning Standards. Each unit consists of standards that are considered major content along with standards that are supporting and/or additional content. The expectation is that students will have many opportunities to develop fluency with rational number arithmetic and solving multi-step problems (including those involving positive and negative rational numbers and word problems leading to one variable equations) throughout the school year. This course prepares students to take Algebra 1 in Grade 8 by addressing a combination of Grade 7 and Grade 8 standards in one school year.

In this unit, students will draw on their knowledge of proportional relationships to develop understanding of linear relationships and the concept of slope. They use this understanding to build fluency with finding the slope of a line, and writing and graphing linear equations. They apply their fluency to solve multi-step real-world problems.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives:

Linear Relationships:

- Recognize problem situations in which two variables have a linear relationship
- Identify and describe the patterns of change between the independent and dependent variables for linear relationships represented by tables, graphs, equations, or contextual settings
- Construct tables, graphs, and symbolic equations that represent linear relationships
- Identify the rate of change between two variables and the x- and y-intercepts from graphs, tables, and equations that represent linear relationships
- Translate information about linear relationships given in a contextual setting, a table, a graph, or an equation to one of the other forms
- Write equations that represent linear relationships given specific pieces of information, and describe what information the variables and numbers represent
- Make a connection between slope as a ratio of vertical distance to horizontal distance between two points on a line and the rate of change between two variables that have a linear relationship

- Recognize that y = mx represents a proportional relationship
- Solve problems and make decisions about linear relationships using information given in tables, graphs, and equations
- Recognize when a linear relationship is parallel or perpendicular

Equivalence:

- Recognize that the equation y = mx + b represents a linear relationship and means that mx + b is an expression equivalent to y
- Recognize that linear equations in one unknown, k = mx + b or y = m(t) + b, where k, t, m, and b are constant numbers, are special cases of the equation y = mx + b
- Recognize that finding the missing value of one of the variables in a linear relationship, y = mx + b, is the same as finding a missing coordinate of a point (x, y) that lies on the graph of the relationship
- Solve linear equations in one variable using symbolic methods, tables, and graphs

Essential Questions:

- How are linear relationships related to proportional relationships?
- What real-world problems could be represented by equations?

Enduring Understanding:

- Two variables are in a linear relationship if one variable is changing by a constant amount when the other variable changes by increments of 1 unit.
- The rate of change in a linear relationship is represented by the slope of the line representing the relationship.
- The equation y = mx is a particular kind of linear relationship where x and y are proportional to each other.
- Solutions for linear equations of the form y = mx + b are pairs of values (x, y) which make the equation true. Graphically, solution pairs are points on the graph of the line.

CONTENT AREA STANDARDS

7.EE

A. Use properties of operations to generate equivalent expressions

B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations

7.SP

A. Use random sampling to draw inferences about a population

B. Draw informal comparative inferences about two populations

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.8.EE.B	Understand the connections between proportional relationships, lines, and linear equations.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.8.EE.B.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
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.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

9.1.8.PB.3: Explain how to create budget that aligns with financial goals

LA.RST.9-10.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
LA.RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.7	Plan education and career paths aligned to personal goals.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will:

- Understand that the unit rate in a proportional relationship is the slope of the line.
- Understand the difference between non-proportional and proportional relationships.

- Understand the difference between proportional and linear relationships.

Procedural Knowledge

Students will be able to:

- Graph and write equations to represent linear relationships.
- Find the slope of a line from a graph, table, and using the formula.
- Relate the slope of a line to similar triangles.
- Derive the equation $y = mx$ from graphs, tables, and verbal descriptions of proportional relationships.
- Write non proportional linear relationships in the form $y = mx + b$
- Graph lines in slope-intercept form, vertical lines, and horizontal lines.
- Recognize when lines are parallel or perpendicular

EVIDENCE OF LEARNING

Benchmark Assessments

- BOY Diagnostic Snapshot Assessment
- MP1 Quarterly Assessment
- MP2 Quarterly Assessment
- MP3 Quarterly Assessment
- MP4 Quarterly Assessment
- EOY Diagnostic Snapshot Assessment

Alternate Assessments

- Portfolios
- Verbal Assessment (instead of written)
- Multiple choice
- Modified Rubrics

- Performance Based Assessments

Formative Assessments

- Delta Math Assignments
- Linear Relationships & Slope Proficiency Scale
- Do Now Check ins
- Formative Assessments - exit tickets, student-friendly proficiency scales, skill checklists (Google Drive Folder)

Summative Assessments

- Summative Assessment Google Drive Folder
- OnCourse Assessments
- Teacher created assessments (both test generator and teacher generated questions)
- Delta Math - Teacher generated assessments

RESOURCES (Instructional, Supplemental, Intervention Materials)

Instructional Materials:

- Reveal Math Accelerated - Linear Relationships & Slope (Module 8) (Online link - teacher and student resources)
- Resources for Unit 5 Google Drive Folder

Supplemental/Intervention Materials:

- Desmos - Marbleslides: Lines, Put the Point on the Line, Land the Plane
- Delta Math
- Khan Academy
- NCTM Illuminations
- Illustrative Math
- Illustrative Math Tasks

INTERDISCIPLINARY CONNECTIONS

- Computations

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.