


Marking Period	Unit Title	Recommended Instructional Days
1 (Modules 3 & 4) and 2 (Modules 5 & 6)	Proportional and Nonproportional Relationships and Functions	40 - 45
Domain		
<p><i>Strand:</i></p> <p>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. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.</p> <p>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.</p> <p>8.F.A.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.</p> <p>8.F.A.2 Compare properties (e.g. rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.</p> <p>8.F.A.3 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. <i>For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points $(1,1)$, $(2,4)$ and $(3,9)$, which are not on a straight line.</i></p> <p>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.</p>		

 **8.F.B.5** Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Key:

 **Major Cluster**



Supporting Cluster



Additional Cluster

Progress Indicator: ◊ Tests ◊ Homework / Classwork ◊ Projects ◊ Formative assessments ◊ Summative assessments

Mathematical Practices:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reason of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSLs-CLKS within Unit

Essential Questions:

Module 3:

How can you use tables, graphs, and equations to represent proportional relationships?

How do you find a rate of change or a slope?

What does the slope tell you about the line?

How do you interpret the unit rate as slope?

How can the rate of change be found from tables? Ordered pairs? Graphs?

Module 4:

How can you use tables, graphs, and equations to represent linear and nonproportional situations?

How can you determine the slope and the y-intercept of a line?

How can you graph a line using the slope and y-intercept?

How can you distinguish between proportional and nonproportional situations?
What makes a situation proportional or non-proportional?

Module 5:

What pieces of information are needed to write an equation for a linear relationship?
How do you write an equation to model a linear relationship given a graph or a description?
How do you write an equation to model a linear relationship given a table?
How can you contrast linear and nonlinear sets of bivariate data?

Module 6:

How can you identify and represent functions?
How can you determine if a table, graph or equation represents a functional relationship?
What are some characteristics that you can use to describe functions?
What distinguishes a linear relationship from a non-linear relationship?
How can you use tables, graphs, and equations to compare functions?
How can you describe a relationship given a graph and sketch given a description?
How can you analyze a graph that compares an object's distance with the time?

Essential Understandings:

Module 3:

Slope of linear relationships can be found from graphs, tables and ordered pairs.
The slope of a linear graph is the same between any two points on the line.

Module 4:

Linear relationships can be classified as either proportional or non-proportional based on certain characteristics.

Module 5:

The rate of change and initial value of linear relationships can be found and expressed in multiple representations (graphs, tables, descriptions).

Module 6:

A relationship is a function if every input has exactly one output.
Functions are either linear or non-linear based on certain characteristics.
Functions can be described and analyzed by using equations, tables and graphs.

Vocabulary:

- proportional relationship
- constant of proportionality
- rate of change

- slope
- unit rate
- linear equation
- y-intercept
- slope-intercept form of an equation
- bivariate data
- nonlinear relationship
- function
- input
- output
- linear equation
- linear function

**Encourage students to practice using the unit vocabulary as they talk and write about mathematics. Understanding vocabulary will aid their understanding of the concepts.*

Suggested Activity Descriptions:

- Have students draw the side view of a steep ramp and the side view of a ramp that isn't very steep. Allow students to discuss what makes one ramp steeper than the other and emphasize the differences in the vertical change over the horizontal change.
- Search "Linear Equations" on the Flocabulary website for a related video.
- Search "Graphing Lines" on BrainPOP for an interactive tool where students can manipulate the slope and the y-intercept of an equation to see how it will affect the graph of the equation.
- Visit the Buzzmath website and search "Comparing Functions". Click on the Common Core 8th Grade button, and you'll find an activity where students can compare functions and check their answers as they go. (Students can complete the activity as a "guest" and therefore do not have to have an account.)
- Display a list of equations (linear and non-linear), and have students predict which they think are linear functions. Then, have them compare their predictions at the end of the lesson. If time allows, have groups create a table and a graph for each equation to demonstrate whether it is linear or not.
- GoMATH Going Further 3.2 Using Right Triangles to Explore Slope (GoMATH TB pages 82A - 82B)
- GoMATH Going Further 6.2 Creating Nonlinear Functions (GoMATH pages 166A - 166B)
- GoMATH Activity 6.2 How Many Squares? (GoMATH TB pages 166C - 166D)
- GoMATH Going Further 6.3 Rate of Change and Initial Value (GoMATH pages 172A - 172B)
- GoMATH Unit 2 Review Project: MAPPING SAN DIEGO

◇ **Suggested Sample Tasks:**

Activity Description: School Fundraiser

Interdisciplinary Connections: 9.1 Personal Financial Literacy

Content: Civic Financial Responsibility

Sarah, Gene, and Paul are proposing plans for a class fundraiser. Each presents his or her proposal for the amount of money raised, y , for x number of hours worked, in different ways.



Gene's Proposal

Hours Worked	Money Raised
5	42
10	77
15	112
20	147

Paul's Proposal
 $y = 10x + 7$

Part A:

Are each of the proposals represented by linear functions? Explain.

Part B:

Does the class have any money in the account now? How can you tell?

Part C:

Which fundraising proposal raises money at the fastest rate?

Part D:

If Sarah and her classmates are hoping to raise \$200, which proposal do you recommend that Sarah and her classmates choose? Explain why you recommend that proposal.

KEY:

Part A:

Yes, a straight line represents Sarah's proposal, so it is a linear function. Gene's proposal has a constant of rate of change, so it is a linear function. An equation in the form $y = mx + b$ represents Paul's proposal, so it is a linear function.

Part B:

Yes; the initial value of each function represents the amount of money the class already has or has earned. Each proposal shows that the class starts with \$7.

Part C:

Sarah's proposal; Sample answer: The slope represents the amount of money earned per hour. Sarah's proposal earns \$15 per hour, Gene's proposal earns \$7 per hour, and Paul's proposal earns \$10 per hour.

Part D:

Sample answer: Assuming that Sarah's proposal is as easy as the others, the students should choose Sarah's proposal because they can earn the money in the fewest number of hours.

Interdisciplinary Connections:

Science:

1. GoMATH Textbook page 178 #14-16

Social Studies:

1. A train from Portland, Oregon, to Los Angeles, California, travels at an average speed of 60 miles per hour and covers a distance of 963 miles. Susanna is taking the train from Portland to Los Angeles to see her aunt. She needs to arrive at her aunt's house by 8pm. It takes 30 minutes to get from the train to her aunt's house.
 - a. By what time does the train need to leave Portland for Susanna to arrive by 8pm? Explain how you got your answer. As part of your explanation, write a function that you used in your work.
 - b. Susanna does not leave Portland later than 10pm or earlier than 6 am. Does the train in part A meet her requirements? If not, give a new

departure time that would allow her to still get to her aunt’s house on time, and find the arrival time of that train?

Language Arts:

1. Vocabulary Preview Activity, GoMATH pg. 66
2. Reading Startup Activities on GoMATH pages 69, 93, 125, and 151.

***Grade 8 Math/Science Connection**

Marking Period: 2 Science

Module: K & L Math Module(s): 5

Topics that Overlaps: Forces & Motion/ Energy and Slope

Roller Coaster Performance Task

Science Aspects: “Take it further” Roller Coaster Restraint Activity (Unit 1 Lesson 1 page 19) Determine how the speed of the roller coaster can determine the type of safety restraint used.

Skills: Momentum, kinetic and potential energy, gravitational force, recording data, graphing, Newton’s Laws of Motion.

Math Aspects: Create a scale drawing of your roller coaster from science class on graph paper. Include an x- and y-axis in the middle of your drawing. Find the approximate slope of each hill of your coaster using two points on each segment on your graph. Then, list the slopes in order of steepness. Last, use the slope-intercept equation to find the y-intercept of each line segment and write its linear equation.

Skills: Scale, finding slope from two points, comparing slopes, using the slope-intercept equation to find y-intercepts, writing the equation of a line.

Spot Light On: Dr. Stephon Alexander

Social and Emotional Learning: Competencies	Social and Emotional Learning: Sub-Competencies
<p>SEL Competencies:</p> <ul style="list-style-type: none"> • Self-Awareness • Social Awareness • Self-Management • Relationship Skills • Responsible Decision-Making 	<ul style="list-style-type: none"> • Recognizing the importance of self-confidence in handling daily tasks and challenges. • Demonstrate an awareness of the expectations for social interactions in a variety of ways. • Demonstrate an understanding of the need for mutual respect when viewpoints differ. • Identify and apply ways to persevere through alternative methods to achieve goals. • Utilize positive communication and social skills to interact effectively with others. • Develop, implement, and model effective problem solving and critical thinking skills.

Grade 8 Mathematics
Unit 2: Proportional and Nonproportional Relationships and Functions

September
2022

Assessments (Formative) <i>To show evidence of meeting the standard/s, students will successfully engage within:</i>		Assessments (Summative) <i>To show evidence of meeting the standard/s, students will successfully complete:</i>	
Formative Assessments: • Teacher Observations • Exit Tickets • Quizzes • Self Assessments • Math Journals • Homework/Classwork • Teacher created assessments		Benchmarks & Summative Assessments: • Chapter/Unit Assessments • Standardized Tests • District Assessments • Project-based Assessments	
Differentiated Student Access to Content: Teaching and Learning <i>Resources/Materials</i>			
Core Resources	Alternate Core Resources <i>IEP/504/At-Risk/ESL</i>	ELL Core Resources	Gifted & Talented Core Resources
Go Math Workbook, IXL, Personal Math Trainer, Math on the Spot Videos, My HRW, Khan Academy, Illustrative Mathematics, Learn360, TeacherTube, BrainPOP, Freckle, LearnZillion, MobyMax, 60 minutes of weekly ST Math, Edulastic, Achieve the Core, Desmos	Reteaching worksheets, Skill building workbook, Math manipulatives, Leveled practice worksheets	Dictionary for native language, Video tutorial in native language, Success for English Learners worksheets, GoMATH Leveled Strategies for English Learners, GoMATH Linguistic Support	ST Math Challenge Objectives, G&T tasks, Enrichment worksheets, Art of Problem Solving, Leveled assessments, GoMATH Teaching for Depth, GoMATH Extend-the-Math Activity, Math Olympiad
Supplemental Resources			
Technology: • Chromebooks • Scientific/Graphing Calculators (upper grades only) • Online math manipulatives Other: • Google Classroom, Google Meets, Schoology, Interactive Workbooks • Illustrative Mathematics • insidemathematics.org • National Library of Virtual Manipulatives			

Differentiated Student Access to Content: Recommended <i>Strategies & Techniques</i>			
Core Resources	Alternate Core Resources <i>IEP/504/At-Risk/ESL</i>	ELL Core Resources	Gifted & Talented Core
Deliver instruction utilizing varied learning styles including audio, visual, and tactile/kinesthetic, provide individual instruction as needed, modify assessments and/or rubrics.	Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of skills by varying the method (repetition, simple explanations, additional examples, modeling, etc.), modify test content and/or format, allow students to retake test for additional credit, provide additional times and preferential seating as needed, review, restate and repeat directions, provide study guides, and/or break assignments into segments of shorter tasks.	Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, oral/visual directions/prompts when necessary, supplemental materials including use of an online bilingual dictionary, and modified assessment and/or rubric.	Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based extension activities, and connect student to related content.

NJSLS CAREER READINESS, LIFE LITERACIES & KEY SKILLS	Disciplinary Concept(s): Civic Financial Responsibility		
	Core Ideas:	Philanthropic and charitable organizations play important roles in supporting the interests of individuals and local and global communities and the issues that affect them.	
	Performance Expectation/s:	9.1.8.CR.1: Compare and contrast the role of philanthropy, volunteer service, and charities in community development and the quality of life in a variety of cultures.	
	Career Readiness, Life Literacies, & Key Skills Practices		
	Act as a responsible and contributing community member and employee. Attend to financial well-being. Consider the environmental, social and economic impacts of decisions. Demonstrate creativity and innovation.		

Grade 8 Mathematics
Unit 2: Proportional and Nonproportional Relationships and Functions

September
2022

	<p>Utilize critical thinking to make sense of problems and persevere in solving them. Model integrity, ethical leadership and effective management. Plan education and career paths aligned to personal goals. Use technology to enhance productivity, increase collaboration and communicate effectively. Work productively in teams while using cultural/global competence.</p>
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New Jersey Legislative Statutes and Administrative Code (place an "X" before each law/statute if/when present within the curriculum map)									
X	Amistad Law: <i>N.J.S.A. 18A 52:16A-88</i>		Holocaust Law: <i>N.J.S.A. 18A:35-28</i>		LGBT and Disabilities Law: <i>N.J.S.A. 18A:35-4.35</i>	X	Diversity & Inclusion: <i>N.J.S.A. 18A:35-4.36a</i>		Standards in Action: <i>Climate Change</i>