Readington Township Public Schools

Grade 8 Mathematics

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Eighth Grade Mathematics

Overview

This Pre-Algebra course is directly aligned with the New Jersey Student Learning Standards (NJSLS) for grade 8. Through their work in this course, students will understand and apply their knowledge in real world applications. Focus will be on the content as specified in the NJSLS, as well as the NJSLS Practice Standards. The Practice Standards focus on the development of competencies used by mathematicians in all grades and throughout life.

Students in this course will understand slope of a linear relationship and relate linear equations to lines in the coordinate plane. They will write and solve linear equations, including pairs of linear equations. Students will understand that functions are rules that assign a unique output number to each input number. They will then use linear functions to model relationships. Students will analyze statistical relationships and use lines of best-fit to determine future outcomes in real-life situations. Students will work with positive and negative exponents, square root and cube root symbols, and scientific notation. They will understand the congruence and similarity of geometric figures.

STUDENT OUTCOMES

(Linked to New Jersey Student Learning Standards for Mathematics 2023)

THE NUMBER SYSTEM (8.NS)

A. Know that there are numbers that are not rational and approximate them by rational numbers

1. Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually and convert a decimal expansion which repeats eventually into a rational number.
2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). For example, by truncating the decimal expansion of $\sqrt{2}$, show that 2 is between 1 and $\sqrt{2}$, then between 1.4 and 1.5, and explain how to continue on to get better approximations.
3. Understand that the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

EXPRESSIONS AND EQUATIONS (8.EE)

A. Work with radicals and integer exponents

1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.
2. Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$ where p is a positive rational number.
    a. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
    b. Simplify numerical radicals, limiting to square roots (i.e. nonperfect squares).
3. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9 and determine that the world population is more than 20 times larger.

4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

B. Understand the connections between proportional relationships, lines, and linear equations

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.

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.

C. Analyze and solve linear equations and pairs of simultaneous linear equations

7 Solve linear equations in one variable.

a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

8 Analyze and solve pairs of simultaneous linear equations.

a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

b. Solve systems of two linear equations in two variables using the substitution method and estimate solutions by graphing the equations. Solve simple cases by inspection. For example: by inspection, conclude that 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6. Solve 3x + y = 30 and y = 2x using the substitution method; Solve y = 3x + 1 and y = -2x + 7 using the substitution method.

c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.

FUNCTIONS (8.F)

A. Define, evaluate and compare functions

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. (Clarification: Function notation is not required in Grade 8)
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.

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. 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.

B. Use functions to model relationships between quantities

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.

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.

GEOMETRY (8.G)

A. Understand congruence and similarity using physical models, transparencies, or geometry software

1. Verify experimentally the properties of rotations, reflections, and translations:
   a. Lines are transformed to lines, and line segments to line segments of the same length.
   b. Angles are transformed to angles of the same measure.
   c. Parallel lines are transformed to parallel lines.
2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.

B. Understand and apply the Pythagorean Theorem

6 Explain a proof of the Pythagorean Theorem and its converse.

7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

C. Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres

9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

STATISTICS AND PROBABILITY (8.SP)

A. Investigate patterns of association in bivariate data

1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
2. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit (e.g. line of best fit) by judging the closeness of the data points to the line.
3. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.
4. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning 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.

Strategies

- Teacher presentation
- Teacher read-aloud
- Group discussion
- Small Group instruction
- Group presentations
- Interactive Smartboard Lessons
- Partner work
- Museum walks
- Math talk (students explain their thinking)
- Small Group Work

Accommodations

Accommodations and Modification Addendum

Assessments

Formative	Summative
● Independent student work ● Ready Classroom Lesson Quizzes ● Teacher Observations	● Mid-Unit Test ● Unit Test

• Class Participation • Class Discussions • Class Assignments • Homework Assignments • Notebooks • Anecdotal Records	
Benchmark	**Alternative**
• I-Ready Diagnostic • Performance Assessments	• Live Online Assessment Tools (Kahoot, Brainpop) • Student Projects • Student Presentations • Self-Assessments
Resources	
Required/Primary	**Supplemental**
• *Big Ideas Math 8* textbook (Ron Larson and Laurie Boswell; published by Big Ideas Learning) • Associated *Big Ideas Record and Practice Journal*	• Brain Pop • IXL • Reflex Math • Online Tutorials (Learnzillion, Khan Academy, Math Antics) • Online Math Games (Math is Fun, Funbrain, Cool Math Games, Math Playground) • Illustrative Mathematics (www.illustratviemathematics.org) • Explore Learning Gizmos • Estimation 180
Essential Questions And Content	

The Number System

Numbers that are not rational are irrational; every number has a decimal expansion.

- How can decimal expansions of rational and irrational numbers be compared?
- How can a rational number be represented with its decimal expansion, showing that it eventually repeats?
- How can a decimal expansion (which eventually repeats) be converted into a rational number?

Rational approximation of irrational numbers.

- How can irrational numbers be compared using their rational approximations?
- How are rational approximations located on a number line?
- How are the values of expressions containing irrational numbers estimated?

EXPRESSIONS AND EQUATIONS (8.EE)

Exponents as simplified representations of repeated multiplication.

- What are the properties of exponents?
- How are the properties of exponents applied to numerical expressions?
- How can equivalent numerical expressions be generated using positive and negative integer exponents?

Square roots, cube roots, perfect squares and perfect cubes; Inverse relationship between powers and square roots.

- What are the values of square roots of small perfect squares?
- What are the solutions to equations of the form $x^2 = p$, where p is a positive rational number?

- How can the square root symbol be used to represent solutions to equations of the form $x^2 = p$?
- What are the values of cube roots of small perfect cubes?
- What are the solutions to equations of the form $x^3 = p$, where p is a positive rational number?
- How can the cube root symbol be used to represent solutions to equations of the form $x^3 = p$?
- Why is the $\sqrt{2}$ an irrational number?

Very large and very small quantities can be approximated with numbers expressed in the form of a single digit times an integer power of 10.

- How can very large or very small quantities be estimated with numbers expressed in the form of a single digit times an integer power of 10?
- How can numbers written in the form of a single digit times an integer power of 10 be compared and how can it be expressed how many times as much one is than the other?

Operations with scientific notation

- How can numbers expressed in scientific notation be multiplied and divided?
- How can numbers expressed in scientific notation be added and subtracted?
- How can scientific notation and units of appropriate size be used to represent measurements of very large or very small quantities?
- How is scientific notation generated by technology interpreted?

Quantitative relationships can be represented in different ways.

- How are proportional relationships graphed?
- How is the unit rate interpreted as the slope of a graph?
- How can two different proportional relationships that are represented in different ways (table of values, equation, graph, verbal description) be compared?

Slope and similar triangles; Slope-intercept form of an equation.

- How can it be proved using similar triangles that the slope m, is the same between any two distinct points on a non-vertical line?
- How can the equation $y = mx$ be derived from two points for a line that passes through the origin?
- How can the equation $y = mx + b$ be derived from two points for a line that intercepts the vertical axis at b?

Linear equations may have a single solution, no solution or infinite solutions.

- What are some examples of linear equations in one variable with one solution ($x = a$), infinitely many solutions ($a = a$), or no solutions ($a = b$)?
- How can a given equation be transformed using the properties of equality into simpler forms?
- How can a given equation be transformed into an equivalent equation of the form $x = a$, $a = a$ or $a = b$ (a *and* b *are different numbers*)?
- How is a linear equation solved that has fractional coefficients? (including equations that require the use of the distributive property and combining like terms)

Simultaneous linear equations may have a single solution, no solution or infinite solutions; Solutions to a system of two linear equations in two variables correspond to the intersection point of their graphs.

- How is a system of linear equations in two variables solved algebraically?
- How is the solution of a linear system of two equations estimated by graphing?
- How are simple cases of linear systems of two equations solved by inspection?
- How are real-world and mathematical problems leading to two linear equations in two variables solved?

FUNCTIONS (8.F)

A function is a rule in which each input has exactly one output.

- What is function language and how is it used?
- How can a function be described as a single output for each input?
- How can it be determined whether a non-numerical relationship is a function?
- How can a function be described as a set of ordered pairs?
- How can inputs and outputs be read from a graph?
- How can an ordered pair be described as containing an input and the corresponding output?

Functions (quantitative relationships) can be represented in different ways; Functions/linear functions have properties.

- How can functions be analyzed when represented algebraically, as a table of values, and as a graph?
- How can functions be interpreted when represented by a verbal description?
- How are the properties of two functions compared when each are represented differently?

A linear function is defined by the equation $y = mx + b$; the graph of a linear function is a straight line.

- How can the analysis of tables of values, graphs, and equations be used to classify a function as linear or nonlinear?
- How can it be determined if equations presented in forms other than $y = mx + b$ (for example $3y - 2x = 7$) define a linear function?
- What are examples of equations that are nonlinear functions?
- How can it be shown that a function is not linear using a pair of points?

Two (x, y) values can be used to construct a function.

- How can the rate of change and initial value of a function from a description of a relationship be determined?
- How can the rate of change and initial value of a function from two (x, y) values by reading from a table of values be determined?
- How can the rate of change and initial value of a function from two (x, y) values by reading these from a graph be determined?
- How can a function be constructed to model a linear relationship?
- How can the rate of change and initial value of a linear function in context be interpreted?

Graphs of functional relationships.

- How can the graph of a functional relationship be analyzed?
- What are qualitative descriptions of graphs? (e.g. where increasing or decreasing, linear or nonlinear)
- How can the graph of a function be sketched given a verbal description based on qualitative features?

GEOMETRY (8.G)

Two-dimensional objects under rigid motion transformations (rotation, reflection, and translation) remain unchanged.

- Do performing rotations, reflections, and translations on lines result in a line?
- Do performing rotations, reflections, and translations on line segments result in line segments with un-altered lengths?
- Do performing rotations, reflections, and translations on angles result in angles with un-altered measures?
- Does performing rotations, reflections, and translations on parallel lines result in parallel lines?
- Does the measure of a two-dimensional object remain unchanged when under a rigid motion transformation (rotation, reflection, and translation)?

Two-dimensional figures are congruent if the second can be obtained from the first by a sequence of rotations, reflections, and translations.

- How can two figures be identified as congruent using a sequence of transformations?

The effects of transformations on two-dimensional figures using coordinates.

- What results after applying dilations with a scale factor greater than, less than, and equal to 1 on the coordinates of a two-dimensional figure?
- What results after applying translations, rotations, and reflections to the coordinates of a two-dimensional figure?

Two-dimensional figures are similar if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; congruent figures are also similar.

- What transformation or sequence of transformations can be performed to describe the similarity between two given similar two-dimensional figures?

Angle sum and exterior angles of triangles; Parallel lines cut by a transversal.

- How can the interior angle sum of a triangle be justified?
- What are the facts about the exterior angles of a triangle?
- What are the facts about the angles created when parallel lines are cut by a transversal?
- How can the angle-angle criterion for the similarity of triangles be established?

Pythagorean Theorem; the converse of the Pythagorean Theorem

- How can a proof of the Pythagorean Theorem be explained?
- How can a proof of the converse of the Pythagorean Theorem be explained?

Apply the Pythagorean Theorem.

- How can the side lengths of two-dimensional right triangles in real-world and mathematical problems be determined using the Pythagorean Theorem?
- How can the side lengths of three-dimensional right triangles in real-world and mathematical problems be determined using the Pythagorean Theorem?

Find the distance between two coordinate points.

- How can the distance between two points in a coordinate plane be determined using the Pythagorean Theorem?

Volume of cones, cylinders, and spheres.

- How can the volumes of cones, cylinders, and spheres be used to solve real-world problems?
- How can a single unknown dimension of cones, cylinders, and spheres be found using volume formulas in real-world problems?

STATISTICS AND PROBABILITY (8.SP)

Association in bivariate measurement data

- How is a scatter plot constructed and interpreted?
- How are patterns of association between two quantities represented by a scatter plot analyzed?
- How are the terms clustering, outliers, positive or negative association, linear or nonlinear association used when describing patterns of association in a scatter plot?

Approximately linear relationships between quantitative variables are modeled using straight lines.

- How can a line of best fit be used on a scatter plot to suggest a linear association?
- How can the model's fit be assessed by judging the closeness of the data points to the line of best fit?

Use the equation of a linear model with bivariate data.

- How can the slope and intercept be interpreted when given the equation for a linear model (line of best fit)?
- How can problems in the context of measurement data be solved when given the equation for a linear model?

Analyzing categorical data using two-way tables.

- How is a two-way frequency table containing data on two categorical variables constructed and interpreted?
- How is a two-way relative frequency table containing data on two categorical variables constructed and interpreted?
- How can any association between two categorical variables using relative frequencies calculated for rows or columns be described?

Pacing and Interdisciplinary Connections

The Number System

- Understanding Rational and Irrational Numbers (10 days)

Interdisciplinary Connections:

- **W.IW.8.2.A** Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information, using text structures (e.g. definition, classification, comparison/contrast, cause/effect, etc.) and text features when useful to aid in comprehension.
  Activity: Students will determine whether the statement is *always, sometime*s, or *never* true, explain reasoning, and provide examples.

Expressions and Equations

- Radical and Integer Exponents (25 days)
  - Properties of integer exponents
  - Square roots and cube roots
  - Scientific notation
  - Operations and Scientific notation

Interdisciplinary Connections:

- **MS-LS4-1-**Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.
  Activity: Students will compare three geologic periods using scientific notation, make a timeline of the eras, make inferences about geologic time, and use the Internet to assess their inferences.
- **RL.CR.8.1** Cite a range of textual evidence and make clear and relevant connections to strongly support an analysis of multiple aspects of what a literary text says explicitly as well as inferences drawn from the text.
  Activity: Students will read a nursery rhyme from 1730, determine the information given as well as what they are trying to find, and write the number of items in the poem as a power.

Functions

- Understanding Functions (15 days)
  - Define and identify functions
  - Compare functions
  - Identify and interpret linear functions
- Functions to Model Relationships (10 days)
  - Analyze functions
  - Graphing functional relationships

Interdisciplinary Connections:

- **W..AW.8.1** Write arguments on discipline-specific content (e.g. social studies, science, technical subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
  Activity: Students will graph data and use the graphs to test the truth of each statement. Students will then write arguments to support their claims about the truth of the statements.

- **MS-ESS2-6-**Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
  Activity: Students will watch the Big Ideas STEM video on Apparent Temperature and explore the Heat Index and its role in climate through the construction of a table, identification of variables, and writing linear functions.

Expressions and Equations

- Proportional Relationships and Linear Equations (15 days)
  - Representing proportional relationships
  - Slope-intercept equation of a line
- Solving Linear Equations and Pairs of Simultaneous Linear Equations (25 days)
  - Solving linear equations with rational coefficients
  - Solutions of linear equations
  - Understanding systems of equations
  - Solving systems of equations algebraically
  - Solve real-world problems using systems of equations

Interdisciplinary Connections:

- **MS-ESS2-5-**Collect data to provide evidence for how the motions and complex interactions of air masses results in changing weather conditions.
  Activity: Students will watch a STEM video on hurricanes and graph linear equations of wind speed of storms in the Gulf of Mexico and determine when storms become tropical storms or hurricanes.

Geometry

- Congruence and Similarity (20 days)
  - Properties of transformations
  - Transformations and congruence
  - Transformations and similarity
  - Angle relationships
  - Angle relationships in triangles
- Pythagorean Theorem (15 days)
  - Understanding the Pythagorean Theorem
  - Solving problems using the Pythagorean Theorem
  - Distance in the coordinate plane
- Volume of Cylinders, Cones, and Spheres (10 days)
  - Understand the volume of cylinders, cones, and spheres
  - Solve real-world problems with cylinders, cones, and spheres.

Interdisciplinary Connections:

- **SL.PE.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.
  Activity: Students will analyze the converse of statements, provide examples and counterexamples, and explore the converse of the Pythagorean Theorem with a partner or small group.

- **MS-ESS3-5-**Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Activity: Students will research camouflage packaging and explore the environmental effects in terms of resources, production, and shipping. Students will calculate packaging waste on selected products and design alternative packaging.

Statistics and Probability

- Bivariate Data (15 days)
  - Scatter plots
  - Scatter plots and linear models
  - Solving problems with linear models of scatter plots
  - Categorical data in frequency tables

Interdisciplinary Connections:

- **MS-ESS3-3-**Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
  Activity: Students will analyze, interpret, and choose the best method to display roadkill data and then come up with ways to reduce the number of animals killed by vehicles.

- **W.WR.8.5** Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related focused questions that allow for multiple avenues of exploration.
  Activity: Students will use the internet to write a report about an animal species that is endangered and include graphical displays of the data.

Career, Computer Science, and Key Skills

The Number System

- **Career Ready Practices**
  Utilize critical thinking to make sense of problems and persevere in solving them.
  Activity: Students will utilize the Standards for Mathematical Practices to explore the rates at which objects fall and apply the given formula. Students will then conduct an experiment to see if basketballs fall at the rate they calculated.

- **9.2 Career Awareness, Exploration, and Preparation**
  9.2.8.CAP.11: Analyze potential career opportunities by considering different types of resources, including occupation databases, and state and national labor market statistics.
  Activity: Students will research several different careers that use irrational numbers and explore how those occupations use irrational numbers.

- **9.4 Life Literacies and Key Skills**
  9.4.8.IML.4: Ask insightful questions to organize different types of data and create meaningful visualizations.
  9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem.
  Activity: Students will discover how periscopes are used in the military and will calculate the visibility distances in nautical miles based on various periscope heights.

- **Computer Science**
  8.1.8.DA.1- Organize and transform data collected using computational tools to make it usable for a specific purpose.
  Activity: Students will approximate irrational numbers by reviewing fractions and decimals and will present this data in a spreadsheet.

Expressions and Equations

- **Career Ready Practices**
  Work productively in teams while using cultural/global competence.
  Utilize critical thinking to make sense of problems and persevere in solving them.
  Activity: Students will utilize the Standards for Mathematical Practices to graph linear equations in standard form through real-life situations and will communicate and explain their reasoning.

- **9.2 Career Awareness, Exploration, and Preparation**
  9.2.8.CAP.20- Identify the items to consider when estimating the cost of funding a business.
  Activity: Students will write and graph
  linear equations to calculate when an online business will become profitable through ad clicks.

- **9.4 Life Literacies and Key Skills**
  9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option.
  Activity: Students will use a protractor to measure the angles of multiple triangles and use inductive reasoning to write and test rules. Students will analyze conjectures and apply their knowledge to write and solve equations.

- **Computer Science**
  8.1.8.DA.1- Organize and transform data collected using computational tools to make it usable for a specific purpose.
  Activity: Students will use graphing calculators to write and graph linear equations in real-world situations.

Functions

- **Career Ready Practices**
  Utilize critical thinking to make sense of problems and persevere in solving them.
  Activity: Students will utilize the Standards for Mathematical Practices to analyze graphs of real-life situations and will communicate and explain their reasoning.

- **9.2 Career Awareness, Exploration, and Preparation**
  9.2.8.CAP.19: Relate academic achievement, as represented by high school diplomas, college degrees, and industry credentials, to employability and to potential level
  Activity: Students will write and graph linear functions comparing salaries of different types of employees as well as the impact of education levels on earning.

- **9.4 Life Literacies and Key Skills**
  9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option.
  9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.
  9.4.8.IML.4: Ask insightful questions to organize different types of data and create meaningful visualize.
  Activity: Students will analyze the relationship between two quantities using graphs and will sketch graphs to represent the relationship between two quantities. Students will then discuss how those graphs can be used in everyday life.

- **Computer Science**

8.1.8.DA.1- Organize and transform data collected using computational tools to make it usable for a specific purpose.
Activity: Students will make a mapping diagram and graph of scuba diving depths and pressures. Students will then use search engines to research common depths of experienced versus novice divers, as well as popular locations and associated costs.

Geometry

- **Career Ready Practices**
  Utilize critical thinking to make sense of problems and persevere in solving them.
  Activity: Students will work with a partner to use geoboards to explore congruent triangles.

- **9.2 Career Awareness, Exploration, and Preparation**
  9.2.8.CAP.2: Develop a plan that includes information about career areas of interest.
  Activity: Students will work with a partner and make a table of the relationship between an original figure and its image under four types of transformations. Students will explore how enlarging/reducing figures in a technical drawing is important in a career such as drafting.

- **9.4 Life Literacies and Key Skills**
  9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem
  9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem.
  Activity: Students will work collaboratively with a partner/small group to use geometry software, protractors, and indirect measurement to determine whether triangles are similar.

- **Computer Science**
  8.1.8.DA.5: Test, analyze, and refine computational models.
  Activity: Students will use geometry software to draw parallel lines intersected by a transversal to explore angle measures and will use that knowledge to solve problems involving the construction of buildings.

Statistics and Probability

- **Career Ready Practices**
  Utilize critical thinking to make sense of problems and persevere in solving them.
  Activity: Students will work with a partner/small group to read, make, and interpret two-way tables and use data from the tables to make purchasing decisions.

- **9.2 Career Awareness, Exploration, and Preparation**
  9.2.8.CAP.19: Relate academic achievement, as represented by high school diplomas, college degrees, and industry credentials, to employability and to potential level
  Activity: Students will use data in a table to describe the relationship between absenteeism and grades. Students will make predictions based on this data.

- **9.4 Life Literacies and Key Skills**
  9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem
  9.4.8.TL.6: Collaborate to develop and publish work that provides perspectives on a real-world problem

9**.4.8.IML.12**: Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.
Activity: Students will work with a partner/small group to find lines of best fit and use lines of fit to solve problems about biologists studying wildlife populations.

- **Computer Science**
  8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.
  Activity: Students will review data relating to absences and final grades in courses. Students will collect data digitally and then discuss solutions and reasons why attendance may or may not relate to final grades.