Summit Public Schools
Summit, New Jersey
Grade Level: 8th / Content Area: Pre-Algebra

Overview: This one-year course has been designed to offer a rigorous and comprehensive scope and sequence that addresses New Jersey Student Learning Standards for Mathematics adopted in 2016. It will also provide students the opportunity to truly master middle school mathematics and basic algebraic skills.

Students will create and use numerical, algebraic, graphical, and verbal representations and analyze sophisticated patterns, relations, and functions. They will represent linear functions numerically, algebraically, graphically and verbally and work with and interpret these representations.

Students will develop insight and understanding of the algebraic properties that govern the manipulation of symbols in expressions, equations, and inequalities.

They will develop an understanding of relations and functions and build a repertoire of approaches in working with them.

They will explore transformational geometry and gain an understanding of how the four basic types of transformations may be used individually as well as in conjunction with one another.

Students will also learn the appropriate use of technology, such as graphing calculators and software models that will assist them examine a wide range of mathematical relationships.

Texts and Resources:
Big Ideas Math Blue © 2017, 2014

Standards:
New Jersey Student Learning Standards for Mathematics (2016)
https://www.state.nj.us/education/standards/math/Docs/2016NJSLS-M_Grade8.pdf

Developed by:
Tiffany Bennett
2023

Scope & Sequence for Pre-Algebra 8

Quarter 1:

Unit 1 - Solving Equations

Topic	Time Frame
Solving One-Step Equations (1.1)	2
Solving Multi-Step Equations (1.2)	2
Review/Quiz 1.1 - 1.2	3
Solving Equations with Variables on Both Sides (1.3)	3
Rewriting Equations and Formulas (1.4)	2
Review/Test	3
Total	15 days

Unit 2 - Transformations

Topic	Time Frame
Identify Congruent Polygons (2.1)	1
Translate Polygons in the Coordinate Plane (2.2)	2
Reflect Polygons in the Coordinate Plane (2.3)	2
Rotate Polygons in the Coordinate Plane (2.4)	3
Review/Quiz 2.1 - 2.4	3
Identify Similar Polygons (2.5)	2
Apply Dilations to Polygons in the Coordinate Plane (2.7)	2
Review/Test	3
Total	18 days

Quarterly Review - 2 days
Quarterly - 1 day

iReady Diagnostic - 2 to 3 days

Quarter 2:

Unit 3 - Angles and Triangles

Topic	Time Frame
Special Angle Pairs (Review)	1
Parallel Lines and Transversals (3.1)	2
Angles of Triangles (3.2)	2
Review/Quiz 3.1-3.2	3
Using Similar Triangles (3.4)	2
Review/Test	3
Total	13 days

Unit 4 - Graphing and Writing Linear Equations

Topic	Time Frame
Graphing Linear Equations (4.1)	3
Finding the Slope of a Line (4.2) + extension	4
Review/Quiz 4.1 - 4.2	3
Graphing Equations in Slope-Intercept Form (4.4)	2
Graphing Equations in Standard Form (4.5)	2
Writing Equations in Slope-Intercept Form (4.6)	2
Review/Test	3
Total	19 days

Quarterly Review - 2 days
Quarterly Quiz - 1 day

iReady Mid Year - 2 to 3 days

Quarter 3:

Unit 5 - Systems of Linear Equations (mini-unit)

Topic	Time Frame
Solving Systems of Linear Equations by Graphing (5.1)	2
Solving Systems of Linear Equations by Substitution (5.2)	3
Review/Quiz 5.1-5.2	3
Total	8 days

Unit 6 - Functions

Topic	Time Frame
Relations and Functions (6.1)	1
Representations of Functions (6.2)	2
Linear Functions (6.3)	3
Review/Quiz 6.1 - 6.3	3
Comparing Linear and Nonlinear Functions (6.4)	2
Analyzing and Sketching Graphs (6.5)	2
Review/Test	3
Total	16 days

Unit 7 - Exponents and Scientific Notation

Topic	Time Frame
Exponents (10.1)	1
Products of Powers Property (10.2)	2
Quotient of Powers Property (10.3)	2
Zero/Negative Exponents (10.4)	1
Review/Quiz 10.1-10.4	3
Reading Scientific Notation (10.5)	1
Writing Scientific Notation (10.6)	1
Operations with Scientific Notation (10.7)	3
Review/Quiz SN 10.5-10.7	3
Total	17 days

Quarterly Review - 2 days
Quarterly - 1 day

Quarter 4:

Unit 8 - Real Numbers and the Pythagorean Theorem

Topic	Time Frame
Finding Square Roots (7.1)	1
Finding Cube Roots (7.2)	1
The Pythagorean Theorem (7.3)	3
Review/Quiz 7.1-7.3	3
Real Number System/Approximating Square Roots (7.4)	3
Using the Pythagorean Theorem (7.5)	2
Review/Test	3
Total	16 days

Unit 9 - Volume and Similar Solids

Topic	Time Frame
Volumes of Cylinders (8.1)	1
Volumes of Cones (8.2)	1
Volume of Spheres (8.3)	1
Review/Quiz 8.1-8.3	3
Volumes of Similar Solids (8.4)	2
Review/Test	3
Total	11 days

Unit 10 - Data Analysis and Displays

Topic	Time Frame
Scatter Plots (9.1)	2
Lines of Fit (9.2)	2
Review/Quiz 9.1-9.2	2
Two-Way Tables (9.3)	1
Choosing a Data Display (9.4)	2
Review/Test	3
Total	12 days

Quarterly Review - 2 days
Quarterly Quiz - 1 day

iReady EOY - 2 to 3 days

Unit 1: Solving Equations

Students will be able to solve linear equations in one variable.

Big Ideas: *Course Objectives / Content Statement(s)*

- Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions.
- Show which of the above 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).

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• How can we choose and implement procedures to solve linear equations in one variable? • How can we use linear equations to describe the association between two quantities? • What do we need to do differently to solve an equation with variables on both sides? • How can technology be used to investigate properties of linear functions and their graphs?	Students will understand that… • The use of the properties of equality and the concept of logical equivalence maintain the solutions of the original equation. • Real world problems can be modeled and solved by using algebraic equations. • The goal of solving a linear equation in one variable is to isolate the variable on one side of the equation and the resultant number on the other.
Areas of Focus: Proficiencies (New Jersey Student Learning Standards)	**Lessons**
Students will: 8.EE.C.7a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. 8.EE.C.7b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **Career-Ready Practices** **CRP1**: Act as a responsible and contributing citizen and employee. **CRP2**: Apply appropriate academic and technical skills. **CRP3**: Attend to personal health and financial well-being. **CRP4**: Communicate clearly and effectively and with reason. **CRP5**: Consider the environmental, social and economic impacts of decisions. **CRP6**: Demonstrate creativity and innovation.	• Solving One-Step Equations (1.1) • Solving Multi-Step Equations (1.2) • Solving Equations with Variables on Both Sides (1.3) • Rewriting Equations and Formulas (1.4)

CRP7: Employ valid and reliable research strategies.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9: Model integrity, ethical leadership and effective management.
CRP10: Plan education and career paths aligned to personal goals.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

Differentiation

Instructional Strategies:

- Modeling and solving one- and two-step equations using algebra tiles.
- Use of direct instruction with guided notes, when possible.
- Flipped classroom model using Edpuzzle videos

Instructional Strategies:

- Modeling and solving one- and two-step equations using algebra tiles.
- Use of direct instruction with guided notes, when possible.

Interdisciplinary Connections

- To convert from Celsius to Fahrenheit, you can get an estimate by using this rule: multiply the Celsius temperature by 2, and then add 30. Use this strategy to convert 4°C, 15°C, and 50°C.

Technology Integration

- Use a Google sheet to show weekly salary accumulation given an equation (e.g. y = 15x + 100 represents your $15 hourly rate plus the $100 you had in your account to start. Use a graph to determine your earnings after 8 weeks. Use the equation to determine your earnings after 24 weeks).

Media Literacy Integration

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Assessments

Sample Assessments:

- 1 unit quiz
- 1 unit test

SCR: Write an equation to find three consecutive integers with a sum of 267.

ECR: Compare and contrast the procedures for solving equations with a variable on one side and an equation with variables on both sides.
$7 = 2x + 1$ $5x - 3 = 3x + 7$

Performance Assessment Task: Suppose you are shopping for a calling plan. You expect to use 10 long-distance minutes per month. Use the table below and the total-cost equation to find out how much you will pay for the first month of each calling plan. Which plan would you choose and why?

Calling Plan	A	B	C	D
Monthly Fee	$19.99	$34.99	$19.99	$29.99
Long-Distance Rate	$.15	$.15	$.00	$.20
Activation Fee	$36.00	$24.00	$30.00	$35.00

Global Perspectives

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Supports for English Language Learners		
Sensory Supports	**Graphic Supports**	**Interactive Supports**
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations
Repeat/confirm directions	Increase task structure (e.g.	Differentiated materials

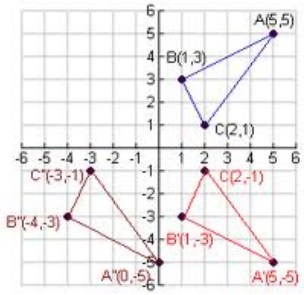
	directions, checks for understanding, feedback	
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading

Unit 2: Geometric Transformations

<table>
<tr><td colspan="2">Students will understand congruence and similarity through physical and/or computer modeling.</td></tr>
<tr><td colspan="2">Big Ideas: Course Objectives / Content Statement(s)
● Explore properties of rotations, reflections and translations.
● Draw conclusions regarding 2-dimensional congruent figures through sequences of rotations, reflections, and translations.
● Explore dilations and the impact it has on similar polygons.</td></tr>
<tr><td>Essential Questions
What provocative questions will foster inquiry, understanding, and transfer of learning?</td><td>Enduring Understandings
What will students understand about the big ideas?</td></tr>
<tr><td>● How is the coordinate system used to analyze transformations?
● How are congruence and similarity related to transformations?
● How does the dilation of a 2-dimensional polygon affect the lengths of corresponding sides?</td><td>Students will understand that…
● When a polygon is transformed systematically using rules and patterns, the transformed image is congruent to the original polygon
● Corresponding sides of similar polygons form proportions that can be represented by dilation.</td></tr>
<tr><td>Areas of Focus: Proficiencies
(New Jersey Student Learning Standards)</td><td>Lessons</td></tr>
<tr><td>Students will:
8.G.A.1(a-c) Verify experimentally the properties of rotations, reflections, and translations.
8.G.A.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.
8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
8.G.A.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.

Career-Ready Practices
CRP1: Act as a responsible and contributing</td><td>● Identify Congruent Polygons (2.1)
● Translate Polygons in the Coordinate Plane (2.2)
● Reflect Polygons in the Coordinate Plane (2.3)
● Rotate Polygons in the Coordinate Plane (2.4)
● Identify Similar Polygons (2.5)
● Apply Dilations to Polygons in the Coordinate Plane (2.7)</td></tr>
</table>

citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP3: Attend to personal health and financial well-being.
CRP4: Communicate clearly and effectively and with reason.
CRP5: Consider the environmental, social and economic impacts of decisions.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9: Model integrity, ethical leadership and effective management.
CRP10: Plan education and career paths aligned to personal goals.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

Differentiation	Assessments
Global Perspectives/ Interdisciplinary Connections: ● Transformational Geometry is an important element in the art world. Artwork involving tessellations serve as one example:  ● Transformations are relevant in photography - an image showing a reflection in a body of water is aesthetically pleasing and often sold for home decor	**Sample Assessments:** ● 1 unit quiz ● 1 unit test **SCR:** Write a rule to describe the following transformation of a point from: G (-3, 5) to G' (2, 1). **ECR:**  Given three congruent shapes (different quadrants) on the coordinate plane,

- Transformations are the primitive beginnings to animation - repeated congruent figures in different places in a stack of pages makes a flip book and has the appearance of movement

Technology Integration

- Use Geogebra.com to give students an interactive visual of each type of transformation; try the Geometry Town Project

Media Literacy Integration

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Supports for English Language Learners		
Sensory Supports	**Graphic Supports**	**Interactive Supports**
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

identify a series of transformations to one shape such that it ends up in the exact position of one of the other shapes.

Project: Transformations Project. Students choose a preimage and follow a series of transformations to create 3 new images on graph paper. Students may choose to complete the project electronically.

Performance Assessment Task:
Work with a partner. Consider the frieze pattern shown.



Is the frieze pattern a reflection of itself? Explain.

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations
Repeat/confirm directions	Increase task structure (e.g. directions, checks for understanding, feedback	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading

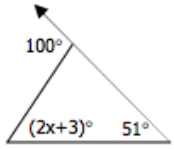
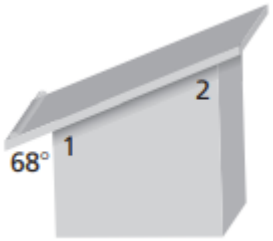
Unit 3: Angles and Triangles

Students will understand special angle relationships formed from parallel lines cut by a transversal. Students will understand the relationship between interior and exterior angles of triangles.

Big Ideas: ***Course Objectives / Content Statement(s)***

- Define, evaluate, and compare angles formed by a transversal passing through a pair of parallel lines in the same plane
- Determine missing measures of interior or exterior angles of a triangle using the triangle angle sum theorem, as well as prior knowledge of linear pairs.

Essential Questions ***What provocative questions will foster inquiry, understanding, and transfer of learning?***	**Enduring Understandings** ***What will students understand about the big ideas?***
• What observations and inferences can be made about the angles formed when a transversal cuts across a pair of parallel lines? • How can we determine missing angles of a triangle? • How can we connect exterior angles of a triangle to the interior angles, and how does this relate to angles formed by parallel lines cut by a transversal?	**Students will understand that…** • Angles resulting from this unique model form pairs of congruent and supplementary angles. • Three angles of a triangle have a sum of 180 degrees; this can be used to determine missing angles. • The sum of two remote-interior angles of a triangle is equal to the exterior angle • The exterior angle of a triangle is supplementary to its adjacent interior angle
Areas of Focus: Proficiencies (New Jersey Student Learning Standards)	**Lessons**
Students will: 8.G.A.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. **Career-Ready Practices** **CRP1**: Act as a responsible and contributing citizen and employee. **CRP2**: Apply appropriate academic and technical skills. **CRP3**: Attend to personal health and financial well-being. **CRP4**: Communicate clearly and effectively and with reason. **CRP5**: Consider the environmental, social	• Special Angle Pairs (Review lesson) • Parallel Lines and Transversals (3.1) • Angles of Triangles (3.2) • Using Similar Triangles (3.4)

and economic impacts of decisions. **CRP6**: Demonstrate creativity and innovation. **CRP7**: Employ valid and reliable research strategies. **CRP8**: Utilize critical thinking to make sense of problems and persevere in solving them. **CRP9**: Model integrity, ethical leadership and effective management. **CRP10**: Plan education and career paths aligned to personal goals. **CRP11**: Use technology to enhance productivity. **CRP12**: Work productively in teams while using cultural global competence.	
Differentiation	**Assessments**
Interdisciplinary Connections Look around the animal kingdom. What shapes do you see? Do you see polygons in a giraffe's fur pattern? What polygons might you find on a sea turtle's shell? Turtles and tortoises have upper and lower shells that have geometric patterns. How are these patterns related to math? A carapace is the upper shell of a turtle or tortoise. It is made of the bones of ribs and vertebrae. The carapace is covered by layers of scutes that consist of a substance called keratin, much like the substance in your hair and nails, or in the horns and hooves of animals. These layers, or scutes, protect the shell. They form geometrical patterns on the carapace, such as pentagons and hexagons. (Students will examine the image of a turtle shell and compare to a polygon, analyzing similarities in the interior angle measures.) **Technology Integration:** ● Have students use the sum of the interior angles of a triangle and knowledge of supplementary angles to complete a table of missing values in a Google Sheet. Then through a series of questions about the information in the table, they observe the pattern shown in the table between an exterior angle of a triangle and the two	● **1 unit quiz** ● **1 unit test** **Sample Assessment Items:** ● Find the value of x in the given diagram:  ● A lectern has four vertical sides and a slanted top. Find the measures of ∠1 and ∠2. Explain your reasoning. 

remote interior angles.

Media Literacy Integration

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Global Perspectives:



- If you were building the house in the photograph, how can you use angles formed by parallel lines and a transversal to ensure the studs are parallel?

Supports for English Language Learners		
Sensory Supports	**Graphic Supports**	**Interactive Supports**
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language

Broadcasts		With mentors
Models & Figures		

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations
Repeat/confirm directions	Increase task structure (e.g. directions, checks for understanding, feedback	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading

Unit 4: Linear Equations

<table>
<tr><th colspan="2">Students will understand the connection between proportional relationships, lines, and linear equations ; define, evaluate, and compare functions.</th></tr>
<tr><td colspan="2">Big Ideas: Course Objectives / Content Statement(s)
Graph proportional relationships, interpreting the unit rate as the slope of the graph.
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 an equation between two points in slope-intercept form.</td></tr>
<tr><th>Essential Questions
What provocative questions will foster inquiry, understanding, and transfer of learning?</th><th>Enduring Understandings
What will students understand about the big ideas?</th></tr>
<tr><td>How can we compare two different proportional relationships represented in different ways?
How can we write an equation in slope-intercept form between two distinct points?</td><td>Students will understand that…
In graphing proportional relationships, the unit rate is the slope of the graph.
The slope between any two distinct points on a non-vertical line in the coordinate plane is identical.
Linear equations can be represented in different ways (algebraically, graphically, numerically in tables, or by verbal descriptions).</td></tr>
<tr><th>Areas of Focus: Proficiencies
(New Jersey Student Learning Standards)</th><th>Lessons</th></tr>
<tr><td>Students will:
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.

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.

Career-Ready Practices
CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP3: Attend to personal health and financial well-being.
CRP4: Communicate clearly and effectively and with reason.</td><td>Graphing Linear Equations (4.1)
Finding the Slope of a Line (4.2) (including Lesson 4.2 extension)
Graphing Equations in Slope-Intercept Form (4.4)
Graphing Equations in Standard Form (4.5)
Writing Equations in Slope-Intercept Form (4.6)</td></tr>
</table>

CRP5: Consider the environmental, social and economic impacts of decisions.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9: Model integrity, ethical leadership and effective management.
CRP10: Plan education and career paths aligned to personal goals.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

Differentiation	Assessments

Instructional Strategies:

- Check for understanding frequently.
- Provide environment for discovery/inquiry-based learning.
- Present linear equations in different representations (graphs, tables, equations) and show patterns in each so students can adeptly switch between forms.

Interdisciplinary Connections

- The force of gravity is less on Mars than it is on Earth. As a result, the weight of an object on Mars m is 40% of its weight on Earth w. Find the weight on Mars of a space probe that weighs 15 lb on Earth.

Technology Integration

- Using a graphing calculator, input the data from the table below. Then follow the steps to create a line of best fit.

Years Employed	Salary
3	29,000
4	30,000
5	33,000

Sample Assessments:

- 2 unit quizzes
- 1 unit test

SCR: Determine the slope of the line that passes through the points (0, 3) and (-2, 7).

ECR: Which is steeper, a slide that rises 3 feet for every 2 feet of run, or a sliding pole that rises 5 feet for every 3 feet of run? Explain.

5	32,000
7	34,000
9	37,000
10	38,000
12	44,000

Media Literacy Integration

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Global Perspectives

How can you use linear equations to model important characteristics of hurricanes? How accurate are these models in predicting a hurricane's behavior? Researchers collect data from a storm as it grows in strength and becomes a hurricane. By analyzing the data, researchers discover that they can model the speed of the wind from the storm with the equation y=x+21.

1. What is the maximum wind speed of the storm after 36 hours of monitoring?
2. A tropical storm is classified as a hurricane when there are maximum sustained winds of 74 miles per hour or greater. How much time does it take for this storm to become a hurricane?

Supports for English Language Learners		
Sensory Supports	**Graphic Supports**	**Interactive Supports**
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group

Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations
Repeat/confirm directions	Increase task structure (e.g. directions, checks for understanding, feedback	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading

Unit 5: Systems of Linear Equations (mini-unit)

<table>
<tr><th colspan="2">Students will analyze and solve pairs of simultaneous linear equations</th></tr>
<tr><td colspan="2">Big Ideas: Course Objectives / Content Statement(s)
Analyze and solve pairs of simultaneous linear equations both graphically and algebraically.</td></tr>
<tr><td>Essential Questions
What provocative questions will foster inquiry, understanding, and transfer of learning?</td><td>Enduring Understandings
What will students understand about the big ideas?</td></tr>
<tr><td>How can graphing two linear equations on the same coordinate plane lead to an estimate of the solution of the system?
How can systems of equations be used to represent situations and solve problems?</td><td>Students will understand that…
The solution to a system of two linear equations in two variables corresponds to the point of intersection of their graphs.
The solution to a system of two linear equations is the point which makes both equations true.</td></tr>
<tr><td>Areas of Focus: Proficiencies
(New Jersey Student Learning Standards)</td><td>Lessons</td></tr>
<tr><td>Students will:

8.EE.8a 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..

8.EE.8b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.

8.EE.8c Solve real-world and mathematical problems leading to two linear equations in two variables.

Career-Ready Practices
CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP3: Attend to personal health and financial well-being.
CRP4: Communicate clearly and effectively and with reason.
CRP5: Consider the environmental, social and</td><td>Solving Systems of Linear Equations by Graphing (5.1) - graph each line from slope-intercept form to find the point of intersection
Solving Systems of Linear Equations by Substitution (5.2) over 3 days:
substitute the expression “y =” or “x =” for x or y in the other equation
solve the equation for x or y, then substitute the expression into the other equation
practice with substitution/ understanding that vertical lines (x = 4) and horizontal lines (y = 3) intersect at (4,3)</td></tr>
</table>

economic impacts of decisions.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9: Model integrity, ethical leadership and effective management.
CRP10: Plan education and career paths aligned to personal goals.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

Differentiation	Assessments
Instructional Strategies: ● Show multiple representations of linear systems and how to find a solution (visual models and algebraic models). ● Explore the meaning behind a solution to a system of linear equations through the use of the various representations discussed. **Interdisciplinary Connections** ● A chemist has 70 mL of a 50% methane solution. How much of a 80% solution must she add so the final solution is 60% methane? **Technology Integration** ● A cable company offers a "pay-per-view" club. Let c = the annual cost and n = the number of movies you watch in a year. Using a graphing calculator, input the system of equations then decide whether to join the club. **Media Literacy Integration** ● **Global Perspectives** What happens if a mixture of fruits is made incorrectly? You can separate the fruits and start again. But what happens if	**Sample Assessments:** ● 1 unit quiz **SCR:** Solve the system by graphing. $y = -x + 4$ $y = 2x + 1$ **ECR:** Suppose you and your friends form a band, and you want to record a demo tape. Studio A rents for $100 plus $50 per hour. Studio B rents for $50 plus $75 per hour. Solve the system and explain what the solution means in terms of your band renting a studio. **Performance Assessment Task:** Suppose you are a member of the student council and must plan a dance. You want to keep the ticket prices as low as possible to encourage students to attend. Band A charges $600 to play for the evening. Band B charges $350 plus $1.25 for each ticket sold. Write a linear equation for the cost of each band. Graph each equation and find the number of tickets for which the cost of the two bands will be equal. Assume that 200 people will attend the dance. Write a report listing which band you would choose and the cost per ticket that you need to charge to cover expenses.

you melt two metals together to form an alloy? If the resulting mixture does not have the composition you want, it is not so easy to back up and start again. Imagine that a jeweler needs an alloy that is precisely 75% gold. He has gold alloys in his store, but none are 75% gold. How can he combine these to get the mixture that he wants?

Supports for English Language Learners		
Sensory Supports	**Graphic Supports**	**Interactive Supports**
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**

Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations	
Repeat/confirm directions	Increase task structure (e.g. directions, checks for understanding, feedback	Differentiated materials	
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need	
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading	

Unit 6: Functions

Students will identify, analyze, and graph functions.	
Big Ideas: ***Course Objectives / Content Statement(s)*** ● Define and identify functions ● Graph linear functions from a variety of equation forms ● Interpret slope and y-intercept ● Identify linear and nonlinear functions	
Essential Questions ***What provocative questions will foster inquiry, understanding, and transfer of learning?***	**Enduring Understandings** ***What will students understand about the big ideas?***
● What characteristics of a relation makes it a function? ● How can you identify a function when given a table, graph, or equation? ● What does the slope of the line represent? ● What does the y-intercept represent in a given situation? ● How can you determine whether a function is linear or nonlinear given a table, graph, or equation?	**Students will understand that** ● Functions have specific characteristics, that each element of the domain has one matching element of the range. ● Functions can be represented as equations, tables, or graphs. ● The slope of the line represents a constant rate of change. ● Linear equations can be used to model a variety of real life situations. ● Tables must have a constant rate of change, graphs must be a continuous straight line, and equations must be able to be written in the form y=mx+b to show a linear relationship
Areas of Focus: Proficiencies **(New Jersey Student Learning Standards)**	**Lessons**
Students will: ● 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.1 ● 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). ● 8.F.A.3 Interpret the equation y = mx + b as defining a linear function, whose	● Relations and Functions (6.1) ● Representations of Functions (6.2) ● Linear Functions (6.3) ● Comparing Linear and Nonlinear Functions (6.4) ● Analyzing and Sketching Graphs (6.5)

graph is a straight line; give examples of functions that are not linear. ● 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 ● 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. **Career-Ready Practices** **CRP1**: Act as a responsible and contributing citizen and employee. **CRP2**: Apply appropriate academic and technical skills. **CRP3**: Attend to personal health and financial well-being. **CRP4**: Communicate clearly and effectively and with reason. **CRP5**: Consider the environmental, social and economic impacts of decisions. **CRP6**: Demonstrate creativity and innovation. **CRP7**: Employ valid and reliable research strategies. **CRP8**: Utilize critical thinking to make sense of problems and persevere in solving them. **CRP9**: Model integrity, ethical leadership and effective management. **CRP10**: Plan education and career paths aligned to personal goals. **CRP11**: Use technology to enhance productivity. **CRP12**: Work productively in teams while using cultural global competence.	

Differentiation	Assessments
Interdisciplinary Connections ● Make a model of the relationship between Celsius and Fahrenheit temperatures. Represent the relationship as an equation, and check the equation against two known data points – 0 degrees C = 32 degrees F and 100 degrees C = 212 degrees F. Use the equation to convert between Celsius and Fahrenheit temperatures. **Technology Integration** ● Using spreadsheet software, examine variables as a set of objects and find the image of a set of objects using a function to gain an output. For example, the corresponding values of $f(n) = 3n$ are examined by using a single number substituted for n in the function, next by using the set of natural numbers less than or equal to 50 under this function, and finally considering the variable n as the set of real numbers. Students identify a real world situation where a continuous function using the set of real numbers versus a single number may occur. **Media Literacy Integration** ● **Global Perspectives** ● Compare and contrast populations of various nations to determine % growth or decay. Students will determine other environmental or political factors that affect the population changes and determine if growth or decay is an example of a linear function. **Supports for English Language Learners**	**Sample Assessments:** 2 Unit quizzes, 1 Unit Test ● Determine whether the relation is a function. **Explain.** | Input, x | 9 | 7 | 5 | 3 | 1 | | --- | --- | --- | --- | --- | --- | | Output, y | 1 | 2 | 2 | 3 | 4 | ● The elevation h (in Feet) of a submersible is modeled by the function h(t)=550t - 11000, where t is the time (in minutes) since the submersible began to ascend. Identify and interpret the slope and y-intercept.

Sensory Supports	Graphic Supports	Interactive Supports
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations
Repeat/confirm directions	Increase task structure (e.g. directions, checks for understanding, feedback	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need

Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading	

Unit 7: Integer Exponents & Scientific Notation

Students will be able to apply the properties of integer exponents to generate equivalent numerical expressions. Students will use properties of exponents to perform operations with numbers in scientific notation.

Big Ideas: *Course Objectives / Content Statement(s)*

- Simplify expressions using the properties of exponents.
- Use scientific notation to estimate very large or very small quantities.
- Perform operations with numbers expressed in scientific notation.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• How can repetitive patterns be written using exponents? • How can computations involving very large or very small numbers be simplified?	**Students will understand that…** • The rules of exponents allow modeling of repeated multiplication. • The properties of integer exponents can generate equivalent numerical expressions. • Negative exponents indicate repeated division, generating the reciprocal of the expression • An expression to the power of zero, except zero itself, is equal to 1`5 • Numbers expressed in the form of a single digit times an integer power of 10 can be used to estimate very large or very small quantities and to express how many times as much one is than the other.

Areas of Focus: Proficiencies (New Jersey Student Learning Standards)	**Lessons**
Students will:	• Exponents (10.1) • Products of Powers Property (10.2) • Quotient of Powers Property (10.3) • Zero/Negative Exponents (10.4) • Reading Scientific Notation (10.5) • Writing Scientific Notation (10.6) • Operations with Scientific Notation (10.7)
8EE 1. Know and apply the properties of integer exponents to generate equivalent numerical expressions.	
8EE 3. Use scientific notation to estimate very large or very small quantities.	
8 EE 4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.	
Career-Ready Practices **CRP1**: Act as a responsible and contributing citizen and employee. **CRP2**: Apply appropriate academic and technical skills.	

CRP3: Attend to personal health and financial well-being.
CRP4: Communicate clearly and effectively and with reason.
CRP5: Consider the environmental, social and economic impacts of decisions.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
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CRP9: Model integrity, ethical leadership and effective management.
CRP10: Plan education and career paths aligned to personal goals.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

Differentiation

Interdisciplinary Connections

- Light travels through space at a constant speed of about
- $3x10^5$km/s. Earth is about $1.5x10^8$ km from the sun. How long does it take for light from the sun to reach the earth?

Technology Integration

- Graph the functions $y = x^2$ and $y = 2^x$ on the same set of axes on a graphing calculator.
  a. What happens to the graphs between x = 1 and x = 3?
  b. How do you think the graph of $y = 6^x$ would compare to the graphs of $y = x^2$ and $y = 2^x$?

Media Literacy Integration

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Global Perspectives

Have you ever wondered how many galaxies and how many stars are in the universe? Our solar system is a part of the Milky Way galaxy. It is estimated that there are 10^{11} stars in the Milky Way galaxy.

Assessments

Sample Assessments:

- 2 unit quizzes

  SCR: Simplify the expression: x^2/x^5

  ECR: Develop a method for multiplying numbers that are written in scientific notation. Use your method to find each product.
  a. $(3x10^4)(2x10^7)$
  b. $(6x10^2)(8x10^5)$

Performance Assessment Task: Fold a sheet of paper in half. Notice that the fold line divides the paper into two rectangles. Fold the paper in half again and determine the number of rectangles. Continue folding the paper in half until you cannot make another fold. Keep track of your results in the table below.

Number of Folds	Number of Rectangles
0	1
1	2
2	4
3	

1. If the stars in the Milky Way are categorized into 1000 different evenly distributed groups according to size, how many stars will be in each group?
2. If the stars are categorized by temperature so that there are 10^9 stars in each group, how many groups will be formed?

4	
5	

Suppose you could continue to fold the paper. Extend your table to include 10 folds. What pattern do you notice?

Supports for English Language Learners

Sensory Supports	Graphic Supports	Interactive Supports
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

Intervention Strategies

Accommodations	Interventions	Modifications
Allow for verbal	Multi-sensory	Modified

responses	techniques	tasks/expectations	
Repeat/confirm directions	Increase task structure (e.g. directions, checks for understanding, feedback	Differentiated materials	
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need	
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading	

Unit 8: Real Numbers and The Pythagorean Theorem

Students will be able to determine square and cube roots, understand and apply the Pythagorean Theorem, and classify rational and irrational numbers.

Big Ideas: *Course Objectives / Content Statement(s)*

- Classify numbers in the Real Number System.
- Use square root and cube root symbols to represent solutions to equations.
- Approximate irrational numbers by rational numbers.
- Understand and apply the Pythagorean Theorem.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• What are the inverse operations for raising a number to the second or third power? • What is the difference between a rational number and an irrational one and how can they be located on a number line? • How can a number written as a decimal expression be transformed into a rational number and vice versa? • What mathematical and real-world applications result from the principles associated with the Pythagorean Theorem?	**Students will understand that…** • If a number is the product of two identical factors, each factor is the *square root* of the number. Likewise, if a number is the product of three identical factors, each factor is the *cube root* of the number. • Right triangles reflect this unique property and that there are a multitude of theoretical and practical applications. • Every number has a rational expansion and a decimal expansion that repeats can be converted into a rational number. • Rational approximations of irrational numbers can be used to compare the size of irrational numbers.

Areas of Focus: Proficiencies (New Jersey Student Learning Standards)	**Lessons**
Students will:	• Finding Square Roots (7.1) • Finding Cube Roots (7.2) • The Pythagorean Theorem (7.3) • Real Number System/Approximating Square Roots (7.4) • Using the Pythagorean Theorem (7.5)
8.EE 2. Use square root and cube root symbols to represent solutions to appropriate equations. Evaluate square roots of small perfect squares and cube roots of small perfect squares.	
8.NS.1 & 2 Know that there are numbers that are not rational, and approximate them by rational numbers.	
8.G.6-8. Apply the Pythagorean Theorem in real-world and mathematical problems	

including the distance between points in the coordinate plane.	
Career-Ready Practices **CRP1**: Act as a responsible and contributing citizen and employee. **CRP2**: Apply appropriate academic and technical skills. **CRP3**: Attend to personal health and financial well-being. **CRP4**: Communicate clearly and effectively and with reason. **CRP5**: Consider the environmental, social and economic impacts of decisions. **CRP6**: Demonstrate creativity and innovation. **CRP7**: Employ valid and reliable research strategies. **CRP8**: Utilize critical thinking to make sense of problems and persevere in solving them. **CRP9**: Model integrity, ethical leadership and effective management. **CRP10**: Plan education and career paths aligned to personal goals. **CRP11**: Use technology to enhance productivity. **CRP12**: Work productively in teams while using cultural global competence.	
Differentiation	**Assessments**
Interdisciplinary Connections ● The distance (in nautical miles) you can see with a periscope is $1.17\sqrt{h}$, where h is the height of the periscope above the water. Can you see twice as far with a periscope that is 6 feet above the water than with a periscope that is 3 feet above the water? Explain. **Technology Integration** ● Use of scientific calculators and Desmos online graphing tools. **Media Literacy Integration** ●	**Sample Assessments:** ● 2 unit quizzes **SCR:** Approximate $\sqrt{39}$ to the nearest tenth. **ECR:** Explain the difference between rational and irrational numbers and give examples of each. **Project:** Pythagorean Spiral **Performance Assessment Task:** Students will find the period of a pendulum given the length using the

Global Perspectives

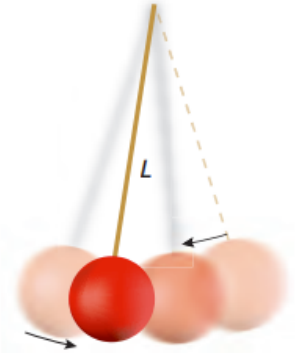
- You are playing capture the flag. You are 50 yards north and 20 yards east of your team's base. The other team's base is 80 yards north and 60 yards east of your base. How far are you from the other team's base?

Supports for English Language Learners		
Sensory Supports	**Graphic Supports**	**Interactive Supports**
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations

formula for three different lengths. Students will evaluate expressions involving square roots. Students will be given the calculations for two different periods of a pendulum that are incorrectly solved using the formula Students must do error analysis and describe and correct the errors.

The period of a pendulum is the time (in seconds) it takes the pendulum to swing back and forth and is given by the formula $T = 1.1\sqrt{L}$.



Repeat/confirm directions	Increase task structure (e.g. directions, checks for understanding, feedback	Differentiated materials	
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need	
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading	

Unit 9: Volume and Similar Solids

Students will understand Volume of Cylinders, Cones, and Spheres, and build on prior knowledge to determine similarity of such solids.

Big Ideas: ***Course Objectives / Content Statement(s)***

- Use Volume formulas to calculate volume and find missing dimensions of a solid
- Solve real world problems involving the volume of 3-dimensional shapes
- Similar solids have the same shape and proportional corresponding dimensions

Essential Questions ***What provocative questions will foster inquiry, understanding, and transfer of learning?***	**Enduring Understandings** ***What will students understand about the big ideas?***
• What dimensions does a cylinder have, and how can they be used to find volume? • What are the similarities between cylinders and cones? How is this observed in their volume formulas? • What are the real world applications of determining the volume 3-dimensional shapes? • If the volume of a figure is changed by a factor of *k*, how is volume affected?	**Students will understand that…** • Volume is a measure of capacity and relates to the product of base x area and height. • Cylinders and cones have similar formulas; both use area of a circle time the height, but cones are one–third the volume of a cylinder • Volume of various sized containers can impact production cost • When dimensions of a solid are increased or decreased, volume increases or decreases accordingly

<table>
<tr><th>Areas of Focus: Proficiencies
(New Jersey Student Learning Standards)</th><th>Lessons</th></tr>
<tr><td>Students will:
8.G.C.9 Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Career-Ready Practices
CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP3: Attend to personal health and financial well-being.
CRP4: Communicate clearly and effectively and with reason.
CRP5: Consider the environmental, social and economic impacts of decisions.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9: Model integrity, ethical leadership and effective
management.
CRP10: Plan education and career paths aligned to personal goals.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.</td><td>● Volumes of Cylinders (8.1)
● Volumes of Cones (8.2)
● Volume of Spheres (8.3)
● Volumes of Similar Solids (8.4)</td></tr>
<tr><th>Differentiation</th><th>Assessments</th></tr>
<tr><td>Interdisciplinary Connections
● The dimensions of the touch tank at an aquarium are doubled. What is the volume of the new touch tank?

Technology Integration
●

Media Literacy Integration
●</td><td>Sample Assessments:
● 1 unit quiz
● 1 unit test

SCR: Find the volume of a cone with height 9.7cm and radius 4cm.

ECR: You and a friend make paper cones to collect beach glass. You cut out the largest possible three-fourths circle from each piece of paper.</td></tr>
</table>

Global Perspectives

- You are planning to make and sell three different sizes of cylindrical candles. You buy 1 cubic foot of candle wax for $20 to make 8 candles of each size. a. Design the candles. What are the dimensions of each size of candle? b. You want to make a profit of $100. Decide on a price for each size of candle. c. Did you set the prices so that they are proportional to the volume of each size of candle? Why or why not?

Media Literacy Integration

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Supports for English Language Learners		
Sensory Supports	**Graphic Supports**	**Interactive Supports**
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

a. Are the cones similar? Explain your reasoning.
b. Your friend says that because your sheet of paper is twice as large, your cone will hold exactly twice the volume of beach glass. Is this true? Explain your reasoning.

Performance Assessment Task: How can unused space be minimized when packaging an item? A company produces jars of salsa with the dimensions shown below. The company plans to ship the jars in boxes. Students will examine the empty space in each shipping box and calculate what size cylinder of packing peanuts will ensure the least amount leftover, thereby minimizing waste and maximizing efficiency.



Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations
Repeat/confirm directions	Increase task structure (e.g. directions, checks for understanding, feedback	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading

Unit 10: Data Analysis and Displays

<table>
<tr><td colspan="2">Students will construct and interpret data displays, describing patterns and observing relationships between data sets.</td></tr>
<tr><td colspan="2">Big Ideas: Course Objectives / Content Statement(s)
Use scatter plots to interpret bivariate measurement data.
Understand and interpret data and data models representing a variety of real-world situations.
Choose an appropriate data representation for a given situation.</td></tr>
<tr><td>Essential Questions
What provocative questions will foster inquiry, understanding, and transfer of learning?</td><td>Enduring Understandings
What will students understand about the big ideas?</td></tr>
<tr><td>How can we gather, organize, and display data to communicate and justify results in the real world?
How can we analyze data to make predictions?
Why does it make sense to examine more than one set of data to look for trends and associations?</td><td>Students will understand that…
Scatter plots can display patterns and trends, based on the data’s correlation, that can be interpreted using a linear model.
Different sets of data can be associated and visual representations can help determine that association.</td></tr>
<tr><td>Areas of Focus: Proficiencies
(New Jersey Student Learning Standards)</td><td>Lessons</td></tr>
<tr><td>Students will:

8.SP.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 correlation, linear association, and nonlinear association.

8.SP.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 by judging the closeness of the data points to the line.

8.SP.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

8.SP.4 Understand that patterns of association can also be seen in bivariate</td><td>Scatter Plots (9.1)
Lines of Fit (9.2)
Two-Way Tables (9.3)
Choosing a Data Display (9.4)</td></tr>
</table>

categorical data by displaying frequencies and relative frequencies in a two-way table.

Career-Ready Practices
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CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

Differentiation	Assessments
Instructional Strategies: ● Check for understanding frequently. ● Provide an environment for discovery/inquiry-based learning. **Interdisciplinary Connections** ● Using the relationship between distance traveled and time, create a scatter plot of the data in a table. Approximate the average speed over a 6-hour period. **Technology Integration** ● Using a graphing calculator, input the data from the table below. Then follow the steps to create a line of best fit.	**Sample Assessments:** ● 1 unit quiz ● 1 unit test **SCR:** Given the scatter plot, determine the number of calories in a sandwich with a given number of calories.

Years Employed	Salary
3	29,000
4	30,000
5	33,000
5	32,000
7	34,000
9	37,000
10	38,000
12	44,000

Media Literacy Integration

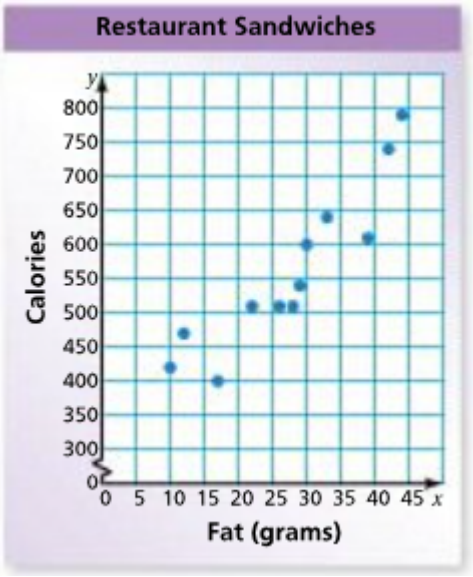
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Global Perspectives

Hybrid cars have a higher fuel economy but are more expensive than their equivalent nonhybrid counterparts. How much more do you pay in fuel costs per mile if you purchase a hybrid than if you purchase its nonhybrid equivalent? Students will create tables of values and make scatter plots to compare the data, then answer several questions, including:

Is there a fuel economy value where a hybrid car and a nonhybrid car cost the same? Explain your reasoning. Is this a realistic value? Explain. How could you have found this same value using your two equations of your lines of best fit?

Supports for English Language Learners		
Sensory Supports	**Graphic Supports**	**Interactive Supports**
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic	In triands or



ECR: Given the scatter plot, describe what tends to happen to the number of calories as the number of grams of fat increases?

	Organizers	small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations
Repeat/confirm directions	Increase task structure (e.g. directions, checks for understanding, feedback	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and	Modified assessment grading

	semantic mapping		

Texts and Resources:
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