Califon Public School
Curriculum

Subject: Math	Grade: 8th	Unit #: 1	Pacing: 5 weeks

Unit Title: Real Numbers and Scientific Notation

OVERVIEW OF UNIT:

This unit starts out by explaining to students how to express a rational number as a decimal, approximate the value of an irrational number, describe the relationship between sets of real numbers, and order a set of real numbers arising from mathematical and real-world contexts. The unit then focuses on how to apply properties of integer exponents to evaluate expressions, convert between large numbers in standard decimal notation and scientific notation, convert between small numbers in standard decimal notation and scientific notation, and apply all four basic operations to numbers written in scientific notation.

Big Ideas

- Determine whether a number is rational or irrational.
- Write rational numbers as decimals or fractions.
- Evaluate square roots and cube roots and solve equations.
- Identify decimal estimates of square roots and cube roots.
- Compare numerical expressions involving roots.
- Order a list of real numbers including rational and irrational numbers.
- Develop the properties of integer exponents.
- Use the properties of integer exponents to simplify expressions and solve problems.
- Translate between standard notation and scientific notation or vice versa.
- Compare and compute numbers using scientific notation.

Essential Questions

- How can you determine whether a number is rational or irrational?
- How do you convert rational numbers into decimals and fractions?
- How can you evaluate and solve equations involving square roots and cube roots?
- What strategies can be used to identify decimal estimates of square and cube roots?
- In what ways can you compare numerical expressions involving roots?
- How can you order a list of real numbers including rational and irrational numbers?
- What are the properties of integer exponents?How are the properties of integer exponents used to simplify expressions and solve problems?
- What are the rules for translating between standard notation and scientific notation and vice versa?
- How can you compare and compute numbers using scientific notation?

Objectives

- Students will be able to determine if a number is rational or irrational.

- Students will be able to evaluate square and cube roots.
- Students will be able to order a list of real numbers consisting of both rational and irrational numbers.
- Students will be able to develop and use the properties of integer exponents.
- Students will be able to express numbers using scientific notation.
- Students will be able to compute with numbers written in scientific notation.

Assessment

Formative Assessment:

- Homework Assignments
- Classwork
- Quizzes
- Skill Worksheets
- Class Discussions

Summative Assessment:

- Module Test
- Unit Test
- Performance Task

Benchmark:

- Link It Benchmark Assessment

Alternative:

- Performance Task
- Modified Tests (independently developed by teacher)
- Projects

Key Vocabulary

- Irrational number
- Pi
- Repeating decimal
- Terminating decimal
- Circumference
- Diameter
- Greatest common factor
- Numerator
- Power
- Rational number
- Cubes
- Cube root
- Perfect cube
- Perfect square
- Principal square root
- Radical symbol
- Square root
- Number line
- Real numbers
- Base
- Exponent
- Properties of exponents
- Scientific notation
- Standard (or decimal) form

Resources & Materials

- Textbook (Into Math Gr. 8)
- Maneuvering the Middle Gr. 8
- Promethean Board
- Calculator
- Teacher-Made Materials
- Guided Notes
- Edpuzzle (www.edpuzzle.com)
- Online Games
- IXL (www.ixl.com/math)

- Khan Academy (www.khanacademy.org)
- HMH Online (https://www.hmhco.com/ui/#/dashboard)
- Desmos (www.desmos.com)
- Online Manipulatives (https://illuminations.nctm.org/)
- www.prometheanworld.com
- www.explorelearning.com
- http://nlvm.usu.edu/

Technology Infusion

Teacher Technology:

- Chromebook
- Promethean Board
- Edpuzzle
- Google Apps for Education
- Google Classroom

Student Technology:

- Google Classroom
- Chromebook
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- Edpuzzle

Activities:

- Students will use their Chromebooks to access Google Classroom and Edpuzzle to watch videos about math topics and write out explanations for how practice problems were solved or how the math connects to real-life situations.
- Students will use their Chromebooks to access websites like IXL, Khan Academy, Quizzizz, Blooket, Kahoot, etc. to practice and review the skills learned throughout the unit. They will also track their data to demonstrate progress and growth within specified topics.

Standard	Standard Description
8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.

Interdisciplinary Integration

Activities:

- Students will practice using the unit vocabulary as they talk and write about the problems they are solving. Understanding the vocabulary will aid their understanding of the concepts covered in this unit.

Resources:

- Quizlet
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Standard	Standard Description
NJSLS-ELA 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.

21st Century Life Skills Standards

Activities:

- Students will work in groups to collaborate, at times taking leadership roles, to communicate project ideas to the whole class.

Standard	Student Learning Objectives
9.4.8.TL.6	Collaborate to develop and publish work that provides perspectives on a real-world problem.

Careers

Activities:

- Students will discuss and then write detailed explanations utilizing appropriate mathematical vocabulary to explain their thought process for obtaining solutions to specific problems

Practice	Description
Use technology to enhance productivity increase collaboration and communicate effectively.	Students find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
Work productively in teams while using cultural/global competence.	Students positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.
Utilize critical thinking to make sense of problems and persevere in solving them.	Students readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of the problem and carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through this when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. Their own actions or the actions of others.

Standards for Mathematical Practice

MP #	Practice
1	Make sense of problems and persevere in solving them.

2	Reason abstractly and quantitatively.
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.

Standards	
Standard #	**Standard Description**
8.NS.A	Know that there are numbers that are not rational and approximate them by rational numbers
8.NS.A.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.
8.NS.A.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 $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.
8.NS.A.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.
8.EE.A	Work with radicals and integer exponents
8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$.
8.EE.A.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.
8.EE.A.2a	Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
8.EE.A.2b	Simplify numerical radicals, limiting to square roots (i.e. nonperfect squares). For example, simplify $\sqrt{8}$ to $2\sqrt{2}$.
8.EE.A.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 x 10^8 and the population of the world as 7 x 10^9 and determine that the world population is more than 20 times larger.
8.EE.A.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.

Differentiation
Students with 504 plans
• Preferential seating • Guided notes • Extra time • Teacher check-ins • Use graphic organizers • Redirect attention • Prioritize tasks • Small group testing • Provide modifications & accommodations per individual student's 504 plan
Special Education
• Provide modifications & accommodations as listed in the student's IEP • Position the student near a helping peer or have quick access to the teacher • Modify or reduce assignments/tasks • Reduce the length of the assignment for different modes of delivery • Increase one-to-one time • Prioritize tasks • Use graphic organizers • Use online resources for skill-building • Provide teacher notes • Use collaborative grouping strategies, such as small groups • NJDOE resources - http://www.state.nj.us/education/specialed/
Response to Intervention (RTI)
• Tiered interventions following the RTI framework • Effective RTI strategies for teachers - http://www.specialeducationguide.com/pre-k-12/response-to-intervention/effective-rti-strategies-for-teachers/ • Intervention Central - http://www.interventioncentral.org/
English Language Learners (ELL)
• Provide text-to-speech • Use of a translation dictionary or software • Provide graphic organizers • NJDOE resources - http://www.state.nj.us/education/aps/cccs/ELL.htm • Adapt a Strategy – Adjusting strategies for ESL students - http://www.teachersfirst.com/content/esl/adaptstrat.cfm
Enrichment
• Process should be modified: higher order thinking skills, open-ended thinking, discovery • Utilize project-based learning for greater depth of knowledge • Utilize exploratory connections to higher-grade concepts

- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
- NJDOE resources

Califon Public School
Curriculum

Subject: Math	Grade: 8th	Unit #: 2	Pacing: 6 weeks

Unit Title: Linear Equations & Systems of Equations

OVERVIEW OF UNIT:

In the first part of this unit, students will learn about how to solve equations with the variable on both sides and with rational number coefficients and constants. Then during the second part of this unit, students will learn how to sole systems of two linear equations in two variables using graphing, elimination, and substitution; analyze special systems that have no solution or an infinite number of solutions; and represent real-world situations using systems of equations.

Big Ideas

- Use graphing to determine the approximate solution to a system
- Solve systems of linear equations by graphing, substitution, and elimination
- Recognize and interpret graphic and algebraic results of solving a system with no solution or infinitely many solutions
- Use systems of two linear equations to represent real-world problems

Essential Questions

- How can algebraic properties be used to solve one-variable linear equations?
- How do you determine the number of solutions when solving linear equations?
- How can you solve and apply linear equations in one-variable?
- How can graphing be used to determine approximate solutions to a system?
- What are the steps to follow when solving a system of two linear equations by graphing?
- What steps are followed when using substitution to solve a system of two linear equations?
- What are the steps to follow when using elimination to solve a system of two linear equations?
- How can you recognize and interpret systems of two linear equations that have no solution or infinitely many solutions?
- How can systems of two linear equations be used to solve real-world problems?

Objectives

- Students will be able to use algebraic properties to solve one-variable linear equations.
- Students will be able to recognize and interpret linear equations that have no solution or infinitely many solutions.
- Students will be able to solve and apply linear equations with one variable.
- Students will be able to interpret the graphical representation of two linear equations.
- Students will be able to solve a system of linear equations by graphing.
- Students will be able to use substitution to solve a system of two linear equations.

- Students will be able to use elimination to solve a system of two linear equations.
- Students will be able to recognize and interpret systems of two linear equations that have no solution or infinitely many solutions.
- Students will be able to use systems of two linear equations to solve real-world problems.

Assessment

Formative Assessment:

- Homework Assignments
- Classwork
- Quizzes
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- Class Discussions

Summative Assessment:

- Module Test
- Unit Test
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Benchmark:

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Alternative:

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- Projects

Key Vocabulary

- Coefficient
- Distributive Property
- Isolate the variable
- Least common denominator
- Like terms
- Substitute
- Infinitely many solutions
- No solution
- Expression
- System of equations
- Solution of a system of equations
- Substitute
- Elimination

Resources & Materials

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21st Century Life Skills Standards	
Activities: ● Students will work in groups to collaborate, at times taking leadership roles, to communicate project ideas to the whole class.	
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Careers	
Activities: ● Students will discuss and then write detailed explanations utilizing appropriate mathematical vocabulary to explain their thought process for obtaining solutions to specific problems	
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Standards for Mathematical Practice	
MP #	Practice
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.
6	Attend to precision.
7	Look for and make use of structure.

Standards	
Standard #	**Standard Description**
8.EE.C	Analyze and solve linear equations and pairs of simultaneous linear equations
8.EE.C.7	Solve linear equations in one variable.
8.EE.C.7a	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).
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.
8.EE.C.8	Analyze and solve pairs of simultaneous linear equations.
8.EE.C.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.C.8b	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.
8.EE.C.8c	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.

Differentiation
Students with 504 plans
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Special Education
• Provide modifications & accommodations as listed in the student's IEP • Position the student near a helping peer or have quick access to the teacher • Modify or reduce assignments/tasks • Reduce the length of the assignment for different modes of delivery

- Increase one-to-one time
- Prioritize tasks
- Use graphic organizers
- Use online resources for skill-building
- Provide teacher notes
- Use collaborative grouping strategies, such as small groups
- NJDOE resources - http://www.state.nj.us/education/specialed/

Response to Intervention (RTI)

- Tiered interventions following the RTI framework
- Effective RTI strategies for teachers - http://www.specialeducationguide.com/pre-k-12/response-to-intervention/effective-rti-strategies-for-teachers/
- Intervention Central - http://www.interventioncentral.org/

English Language Learners (ELL)

- Provide text-to-speech
- Use of a translation dictionary or software
- Provide graphic organizers
- NJDOE resources - http://www.state.nj.us/education/aps/cccs/ELL.htm
- Adapt a Strategy – Adjusting strategies for ESL students - http://www.teachersfirst.com/content/esl/adaptstrat.cfm

Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
- Utilize project-based learning for greater depth of knowledge
- Utilize exploratory connections to higher-grade concepts
- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
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Califon Public School
Curriculum

Subject: Math	Grade: 8th	Unit #: 3	Pacing: 6 weeks

Unit Title: Relationships & Functions

OVERVIEW OF UNIT:

This unit starts out with the students representing and solving problems involving proportional relationships using tables, graphs, and equations. The students will learn how to determine the rate of change or slope and y-intercept using the information provided in the tables, graphs, or equations for each situation. Then the students will shift to representing linear nonproportional relationships with tables, graphs, and equations in the form y = mx + b when b is not equal to 0. Additionally, students will begin to write equations in the form y = mx + b to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations. They will begin to contrast bivariate sets of data that suggest a linear relationship with bivariate sets of data that do not suggest a linear relationship from a graphical representation. Finally, students will identify functions using sets of ordered pairs, tables, mappings, and graphs; identify examples of proportional and nonproportional functions; distinguish between proportional and nonproportional situations using tables, graphs, and equations; and analyze and interpret graphs.

Big Ideas

- Derive the equation $y = mx$
- Write an equation of a proportional relationship
- Graph proportional relationships
- Identify and use unit rates
- Determine whether a graph should be discrete or continuous
- Compare proportional relationships presented in different representations
- Learn to identify functions and give examples of functions that are not linear
- Use functions to solve real-world problems
- Derive and interpret $y = mx + b$
- Interpret the meaning of the slope and y-intercept in a context
- Construct a function
- Compare functions
- Sketch, analyze, and describe a graph that exhibits the qualitative features of a function

Essential Questions

- How can you derive the equation $y = mx$?
- What information is needed to write an equation of a proportional relationship?
- How do you graph proportional relationships?
- How can you identify and use unit rates?
- How do you determine whether a graph should be discrete or continuous?

- How can you compare proportional relationships presented in different representations?
- How do you identify functions?
- What are examples of functions that are not linear?
- How can functions be used to solve real-world problems?
- How can you derive and interpret $y = mx + b$?
- How do you construct a function?
- How do you compare functions?
- How can you sketch, analyze, and describe a graph that exhibits the qualitative features of a function?

Objectives

- Students will be able to relate right triangles to the coordinates of a line going through the origin.
- Students will be able to compare persistent features of the triangles to persistent features of the line.
- Students will be able to write the equation of a proportional relationship.
- Students will be able to graph proportional relationships.
- Students will be able to interpret the unit rate as the slope of the graph of a proportional relationship.
- Students will be able to demonstrate and interpret proportional relationships between quantities.
- Students will be able to visually display a relationship between two variables.
- Students will be able to write the equation of a linear function.
- Students will be able to interpret the slope and y-intercept of a line.
- Students will be able to construct a function to model a linear relationship.
- Students will be able to use tables, graphs, and equations to compare functions.
- Students will be able to ketch and analyze a graph that exhibits the qualitative features of a function.

Assessment

Formative Assessment:

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Key Vocabulary

- Hypotenuse
- Legs
- Rise
- Run
- Slope
- Unit rate
- Output
- Domain
- Function
- Range
- Relation
- Vertical line test

- Linear equation
- Continuous graph
- Discrete graph
- Input
- Linear function
- Nonlinear function
- Slope-intercept form
- Y-intercept

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8	Look for and express regularity in repeated reasoning.

Standards	
Standard #	**Standard Description**
8.EE.B	Understand the connections between proportional relationships, lines, and linear equations
8.EE.B.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
8.EE.B.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y=mx for a line through the origin and the equation y=mx+b for a line intercepting the vertical axis at b.
8.F.A	Define, evaluate and compare functions
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. (Clarification: Function notation is not required in Grade 8)
8.F.A.2	Compare properties (e.g. rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented

	by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.
8.F.A.3	Interpret the equation y=mx+b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. 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.
8.F.B	Use functions to model relationships between quantities
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.
8.SP.A	Investigate patterns of association in bivariate data
8.SP.A.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.
8.SP.A.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.
8.SP.A.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.

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Special Education

- Provide modifications & accommodations as listed in the student's IEP
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Response to Intervention (RTI)

- Tiered interventions following the RTI framework
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- Intervention Central - http://www.interventioncentral.org/

English Language Learners (ELL)

- Provide text-to-speech
- Use of a translation dictionary or software
- Provide graphic organizers
- NJDOE resources - http://www.state.nj.us/education/aps/cccs/ELL.htm
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Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
- Utilize project-based learning for greater depth of knowledge
- Utilize exploratory connections to higher-grade concepts
- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
- NJDOE resources

Califon Public School
Curriculum

Subject: Math	Grade: 8th	Unit #: 4	Pacing: 6 weeks

Unit Title: Transformational Geometry

OVERVIEW OF UNIT:

Students will start out using transformation geometry to represent properties of orientation and congruence of translations, reflections, and rotations in a coordinate plane. They will also use transformation geometry to represent the effect of translations, reflections, and rotations in a coordinate plane using an algebraic representation. Also, the students will use transformational geometry to compare the attributes of a shape and its dilation(s) on a coordinate plane, represent algebraically the effect of a scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation, and explore how transformations can be used to obtain similar figures.

Big Ideas

- Explore and verify the properties of lines and angles in transformations.
- Use coordinates to describe the effect of translations, reflections, and rotations.
- Execute a sequence of transformations on a figure in the coordinate plane that results in a congruent figure.
- Learn to describe the effects of dilations.
- Understand that dilations produce similar figures and the difference between similarity and congruence.
- Describe a sequence of transformations that exhibits the similarity between two given figures.
- Decide whether two given figures are similar.

Essential Questions

- How do you verify the properties of lines and angles in transformations?
- How can coordinates be used to describe the effect of translations, reflections, and rotations?
- Can a congruent figure be created by executing a sequence of transformations on a figure in the coordinate plane?
- How would you describe the effect of dilations on a figure?
- Will dilations produce similar figures?
- What is the difference between similarity and congruence?
- How can a sequence of transformations be used to exhibit the similarity between two given figures?
- How do you determine whether two given figures are similar?

Objectives

- Students will be able to explore and observe the effects of rigid motions on a figure.
- Students will be able to describe translations and their effects on a figure.

- Students will be able to describe reflections and their effects on a figure.
- Students will be able to recognize and perform rotations.
- Students will be able to describe rotations algebraically.
- Students will be able to understand that rotating a figure produces an image that is congruent to the preimage.
- Students will be able to perform and describe sequences of transformations on figures.
- Students will be able to perform enlargements and reductions.
- Students will be able to understand that the result of enlarging or reducing a preimage is not congruent to the preimage.
- Students will be able to describe and apply the properties of dilations.
- Students will be able to calculate the scale factor and center of dilation, both on and off the coordinate plane.
- Students will be able to recognize and make similar figures using dilations.

Assessment

Formative Assessment:

- Homework Assignments
- Classwork
- Quizzes
- Skill Worksheets
- Class Discussions

Summative Assessment:

- Module Test
- Unit Test
- Performance Task

Benchmark:

- Link It Benchmark Assessment

Alternative:

- Performance Task
- Modified Tests (independently developed by teacher)
- Projects

Key Vocabulary

- Transformation
- Image
- Mapping Notation
- Preimage
- Prime Notation
- Translate
- Reflection
- Center of Rotation
- Rotation
- Congruent
- Center of Dilation
- Dilation
- Scale Factor
- Similar
- Reduction
- Enlargement

Resources & Materials

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- Maneuvering the Middle Gr. 8
- Promethean Board
- Calculator
- Teacher-Made Materials

- Guided Notes
- Edpuzzle (www.edpuzzle.com)
- Online Games
- IXL (www.ixl.com/math)
- Khan Academy (www.khanacademy.org)
- HMH Online (https://www.hmhco.com/ui/#/dashboard)
- Desmos (www.desmos.com)
- Online Manipulatives (https://illuminations.nctm.org/)
- www.prometheanworld.com
- www.explorelearning.com
- http://nlvm.usu.edu/

Technology Infusion

Teacher Technology:

- Chromebook
- Promethean Board
- Edpuzzle
- Google Apps for Education
- Google Classroom

Student Technology:

- Google Classroom
- Chromebook
- IXL/Quizzizz/Blooket/Kahoot
- Edpuzzle

Activities:

- Students will use their Chromebooks to access Google Classroom and Edpuzzle to watch videos about math topics and write out explanations for how practice problems were solved or how the math connects to real-life situations.
- Students will use their Chromebooks to access websites like IXL, Khan Academy, Quizzizz, Blooket, Kahoot, etc. to practice and review the skills learned throughout the unit. They will also track their data to demonstrate progress and growth within specified topics.

Standard	Standard Description
8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.

Interdisciplinary Integration

Activities:

- Students will practice using the unit vocabulary as they talk and write about the problems they are solving. Understanding the vocabulary will aid their understanding of the concepts covered in this unit.

Resources:

- Quizlet
- Teacher Vision Cross-Curricular Theme Map - https://www.teachervision.com/teaching-methods/curriculum-planning/7167.html
- Engineering Go For It! - http://teachers.egfi-k12.org/
- US Department of Education STEM - http://www.ed.gov/stem
- What Every Educator Should Know About Using Google by Shell Education
- International Literacy Association Read Write Think - http://www.readwritethink.org/

Standard	Standard Description
NJSLS-ELA 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.

21st Century Life Skills Standards

Activities:

- Students will work in groups to collaborate, at times taking leadership roles, to communicate project ideas to the whole class.

Standard	Student Learning Objectives
9.4.8.TL.6	Collaborate to develop and publish work that provides perspectives on a real-world problem.

Careers

Activities:

- Students will discuss and then write detailed explanations utilizing appropriate mathematical vocabulary to explain their thought process for obtaining solutions to specific problems

Practice	Description
Use technology to enhance productivity increase collaboration and communicate effectively.	Students find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
Work productively in teams while using cultural/global competence.	Students positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.
Utilize critical thinking to make sense of problems and persevere in solving them.	Students readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of the problem and carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through this when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. Their own actions or the actions of others.

Standards for Mathematical Practice	
MP #	Practice
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.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.

Standards	
Standard #	**Standard Description**
8.G.A	Understand congruence and similarity using physical models, transparencies, or geometry software
8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations.
8.G.A.1a	Lines are transformed to lines, and line segments to line segments of the same length.
8.G.A.1b	Angles are transformed to angles of the same measure.
8.G.A.1c	Parallel lines are transformed to parallel lines.
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.

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Califon Public School
Curriculum

Subject: Math	Grade: 8th	Unit #: 5	Pacing: 8 weeks

Unit Title: Measurement Geometry

OVERVIEW OF UNIT:

Students will represent and determine angle relationships with angles formed by parallel lines that are cut by a transversal, the sum of the measures of the angles of a triangle, and the similarity of triangles. Then students will use models and diagrams to explain the Pythagorean Theorem, use the Pythagorean Theorem and its converse to solve problems, and determine the distance between two points on a coordinate plane using the Pythagorean Theorem. Finally, students will represent and solve for the volumes of three-dimensional curved figures. They will describe the volume formula of a cylinder in terms of its base area and height and model the relationship between the volume of a cylinder and a cone having both congruent bases and height and connect that relationship to their volume formulas. Also, they will solve problems involving the volume of cylinders, cones, and spheres.

Big Ideas

- Establish facts about the angle sum and exterior angle of triangles
- Use angle measures to determine whether two triangles are similar
- Show that corresponding angles, alternate exterior angles, and alternate interior angles are congruent, and that same-side interior or exterior angles are supplementary
- Apply the Pythagorean Theorem to determine the distance between two points on the coordinate plane
- Use the formulas for the volumes of cylinders, cones, and spheres
- Develop the formula for the volume of a cylinder
- Develop the formula for the volume of a cone
- Develop the formula for the volume of a sphere
- Use volume formulas to solve real-world problems
- Find missing angle measurements using angle relationship knowledge
- Prove the Pythagorean Theorem and its converse
- Solve basic problems using the Pythagorean Theorem
- Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions

Essential Questions

- What are some facts about the angle sum and exterior angle of triangles?
- How can you use angle measures to determine whether two triangles are similar?
- How can you show that corresponding angles, alternate exterior angels, and alternate interior angles are congruent?

- How can you show that same-side interior or exterior angles are supplementary?
- How can you use knowledge about angle relationships to find missing angle measurements?
- How can you prove the Pythagorean Theorem and its converse?
- How can you use the Pythagorean Theorem to solve problems?
- How can the Pythagorean Theorem be applied to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions?
- How can the Pythagorean Theorem be applied to determine the distance between two points on the coordinate plane?
- How are the formulas used for the volumes of cylinders, cones, and spheres?
- What is the formula for the volume of a cylinder and how can it be applied to real-world problems?
- What is the formula for the volume of a cone and how can it be applied to real-world problems?
- What is the formula for the volume of a sphere and how can it be applied to real-world problems?
- How can volume formulas be used to solve problems involving cylinders, cones, and spheres?

Objectives

- Students will be able to use angle relationships in triangles.
- Students will be able to identify whether two triangles are similar, given angle measures in the triangle.
- Students will be able to find missing angle measures when parallel lines are cut by a transversal.
- Students will be able to prove and use the Pythagorean Theorem.
- Students will be able to prove and apply the Pythagorean Theorem and its converse.
- Students will be able to use the Pythagorean Theorem to solve real-world problems involving right triangles.
- Students will be able to use the Pythagorean Theorem to determine distance between any two points in the coordinate plane.
- Students will be able to develop and use the formula for the volume of a cylinder.
- Students will be able to develop and use the formula for the volume of a cone.
- Students will be able to develop and use the formula for the volume of a sphere.
- Students will be able to use volume formulas to solve problems involving cylinders, cones, and spheres.

Assessment

Formative Assessment:

- Homework Assignments
- Classwork
- Quizzes
- Skill Worksheets
- Class Discussions

Summative Assessment:

- Module Test
- Unit Test
- Performance Task

Benchmark:

- Link It Benchmark Assessment

Alternative:

- Performance Task
- Modified Tests (independently developed by teacher)
- Projects

Key Vocabulary	
• Interior angle • Exterior angle • Exterior Angle Theorem • Remote interior angle • Triangle Sum Theorem • Angle-Angle Similarity Postulate • Alternate exterior angles • Alternate interior angles • Corresponding angles • Same-side exterior angles • Same-side interior angles	• Transversal • Pythagorean Theorem • Pythagorean triple • Converse • Height • Radius • Cylinder • Volume • Slant Height • Sphere

Resources & Materials

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Standard	Standard Description
8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.

Interdisciplinary Integration

Activities:

- Students will practice using the unit vocabulary as they talk and write about the problems they are solving. Understanding the vocabulary will aid their understanding of the concepts covered in this unit.

Resources:

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- Teacher Vision Cross-Curricular Theme Map - https://www.teachervision.com/teaching-methods/curriculum-planning/7167.html
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21st Century Life Skills Standards

Activities:

- Students will work in groups to collaborate, at times taking leadership roles, to communicate project ideas to the whole class.

Standard	Student Learning Objectives
9.4.8.TL.6	Collaborate to develop and publish work that provides perspectives on a real-world problem.

Careers	
Activities: ● Students will discuss and then write detailed explanations utilizing appropriate mathematical vocabulary to explain their thought process for obtaining solutions to specific problems	
Practice	**Description**
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Standards for Mathematical Practice	
MP #	Practice
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.
6	Attend to precision.
7	Look for and make use of structure.

Standards	
Standard #	**Standard Description**
8.EE.B.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y=mx for a line through the origin and the equation y=mx+b for a line intercepting the vertical axis at b.
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. 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.

8.G.B	Understand and apply the Pythagorean Theorem
8.G.B.6	Explain a proof of the Pythagorean Theorem and its converse.
8.G.B.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.G.B.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
8.G.C	Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres
8.G.C.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

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English Language Learners (ELL)
• Provide text-to-speech • Use of a translation dictionary or software

- Provide graphic organizers
- NJDOE resources - http://www.state.nj.us/education/aps/cccs/ELL.htm
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Califon Public School
Curriculum

Subject:	Grade:	Unit #:	Pacing:
Math	8th	6	5 weeks

Unit Title: Statistics & Probability

OVERVIEW OF UNIT:

Students will learn how to represent data in a scatter plot, describe associations in data in scatter plots, represent bivariate data in a scatter plot with a trend line, and make predictions from a scatter plot or trend line. In addition, students will learn how to create two-way frequency and relative frequency tables for categorical data, calculate joint, marginal, and conditional relative frequencies given a two-way relative frequency table, and analyze a two-way table to discover any association between the variables.

Big Ideas

- Recognize that lines can be used to model the pattern shown in a scatter plot
- Sketch a linear model for a data set displayed in a scatter plot
- Understand the influence of outliers on the trend line of a data set
- Compare linear models to determine which is the best fit for given data
- Interpret rate of change and initial value of a linear function
- Construct and interpret two-way frequency tables
- Determine whether there is an association between events
- Construct and interpret two-way relative frequency tables
- Calculate and interpret conditional relative frequencies

Essential Questions

- How are lines used to model the patterns shown in a scatter plot?
- How can you sketch a linear model for a data set displayed in a scatter plot?
- How do outliers influence the trend line of a data set?
- How can you determine which linear model is the best fit for given data?
- How do you interpret rate of change and initial value of a linear function?
- How do you construct and interpret two-way frequency tables?
- How can you determine whether there is an association between events?
- How do you construct and interpret two-way relative frequency tables?
- How can you calculate and interpret conditional relative frequencies?

Objectives

- Students will be able to display and analyze data with two variables.
- Students will be able to use trend lines to describe a linear relationship between two variables.
- Students will be able to use scatter plots and trend lines to interpret linear data in context.
- Students will be able to interpret data by constructing two-way frequency tables.

- Students will be able to construct two-way relative frequency tables.
- Students will be able to interpret and analyze data using two-way relative frequency tables.

Assessment

Formative Assessment:

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Key Vocabulary

- Association
- Cluster
- Linear association
- Negative association
- No association
- Nonlinear association
- Outlier
- Positive association
- Scatter plot
- Trend line
- Two-way table
- Joint relative frequency
- Marginal relative frequency
- Relative frequency
- Two-way relative frequency table
- Conditional relative frequency

Resources & Materials

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Interdisciplinary Integration

Activities:

- Students will practice using the unit vocabulary as they talk and write about the problems they are solving. Understanding the vocabulary will aid their understanding of the concepts covered in this unit.

Resources:

- Quizlet
- Teacher Vision Cross-Curricular Theme Map - https://www.teachervision.com/teaching-methods/curriculum-planning/7167.html
- Engineering Go For It! - http://teachers.egfi-k12.org/
- US Department of Education STEM - http://www.ed.gov/stem
- What Every Educator Should Know About Using Google by Shell Education
- International Literacy Association Read Write Think - http://www.readwritethink.org/

Standard	Standard Description

NJSLS-ELA 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.

21st Century Life Skills Standards	
Activities: ● Students will work in groups to collaborate, at times taking leadership roles, to communicate project ideas to the whole class.	
Standard	**Student Learning Objectives**
9.4.8.TL.6	Collaborate to develop and publish work that provides perspectives on a real-world problem.

Careers	
Activities: ● Students will discuss and then write detailed explanations utilizing appropriate mathematical vocabulary to explain their thought process for obtaining solutions to specific problem	
Practice	**Description**
Use technology to enhance productivity increase collaboration and communicate effectively.	Students find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
Work productively in teams while using cultural/global competence.	Students positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.
Utilize critical thinking to make sense of problems and persevere in solving them.	Students readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of the problem and carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through this when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. Their own actions or the actions of others.

Standards for Mathematical Practice	
MP #	Practice
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.
6	Attend to precision.
7	Look for and make use of structure.

Standards	
Standard #	**Standard Description**
8.SP.A	Investigate patterns of association in bivariate data
8.SP.A.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.
8.SP.A.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.
8.SP.A.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.
8.SP.A.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?

Differentiation
Students with 504 plans
• Preferential seating • Guided notes • Extra time • Teacher check-ins • Use graphic organizers • Redirect attention • Prioritize tasks • Small group testing • Provide modifications & accommodations per individual student's 504 plan
Special Education
• Provide modifications & accommodations as listed in the student's IEP • Position the student near a helping peer or have quick access to the teacher • Modify or reduce assignments/tasks • Reduce the length of the assignment for different modes of delivery • Increase one-to-one time • Prioritize tasks

- Use graphic organizers
- Use online resources for skill-building
- Provide teacher notes
- Use collaborative grouping strategies, such as small groups
- NJDOE resources - http://www.state.nj.us/education/specialed/

Response to Intervention (RTI)

- Tiered interventions following the RTI framework
- Effective RTI strategies for teachers - http://www.specialeducationguide.com/pre-k-12/response-to-intervention/effective-rti-strategies-for-teachers/
- Intervention Central - http://www.interventioncentral.org/

English Language Learners (ELL)

- Provide text-to-speech
- Use of a translation dictionary or software
- Provide graphic organizers
- NJDOE resources - http://www.state.nj.us/education/aps/cccs/ELL.htm
- Adapt a Strategy – Adjusting strategies for ESL students - http://www.teachersfirst.com/content/esl/adaptstrat.cfm

Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
- Utilize project-based learning for greater depth of knowledge
- Utilize exploratory connections to higher-grade concepts
- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
- NJDOE resources