Curriculum Map: Math 8 22-23

Course: 8TH MATH Sub-topic: General

Grade(s): 8

Course Description:	This course provides a comprehensive approach to basic fundamental skills in mathematics and algebra with preparation for PSSA testing. Instructional time is focused on 1) formulating and reasoning about expressions and equations, 2) grasping the concept of a function, and: 3) analyzing two and three dimensional space. Mathematical thinking skills, problem solving, and applications in other disciplines are used.
Course Textbooks, Workbooks, Materials Citations:	EnVision Mathematics Common Core 2021 Savvas Learning Company LLC

Unit: Real Numbers

Unit Description:	Students will work with radicals and integer exponents. Students will know that there are numbers that are not rational and students will approximate them by rational numbers.
Unit Essential Questions:	What are real numbers? How are real numbers used to solve problems?
Unit Big Ideas:	Rational and Irrational Numbers Square Roots and Cube Roots Integer Exponents and Scientific Notation
Unit Key Terminology & Definitions :	irrational number perfect square square root cube root perfect cube Power of Products Property Product of Powers Property Quotient of Powers Property Negative Exponent Property Zero Exponent Property scientific notation

STANDARDS:

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.NS.A.1 (Advanced)	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.
MA.8.NS.A.2 (Advanced)	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., pi^2).
MA.8.EE.A.1 (Advanced)	Know and apply the properties of integer exponents to generate equivalent numerical expressions.
MA.8.EE.A.2	Use square root and cube root symbols to represent

(Advanced) solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that the square root of 2 is irrational.

(* standards consolidated from Topic level)

Topic: Rational Numbers as Decimals

Minutes for Topic: 120

Core Lesson Description: Students will write repeating decimals as fractions, write repeating decimals with non-repeating digits as fractions, and write decimals with multiple repeating digits as fractions.

Core Lesson Student Learning Objectives: Students will be able to write repeating decimals as fractions.

Core Lesson Essential Questions: How can you write repeating decimals as fractions?

Core Lesson Big Ideas: Repeating decimals can be represented as an equivalent rational number in fraction form.

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.NS.A.1 (Advanced) 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.

Topic: Understand Irrational Numbers

Minutes for Topic: 120

Core Lesson Description: Students will identify irrational numbers, identify square roots as irrational numbers, and classify numbers as rational or irrational.

Core Lesson Student Learning Objectives: Students will be able to identify an irrational number.

Core Lesson Essential Questions: How is an irrational number different from a rational number?

Core Lesson Big Ideas: Any number that is not rational is irrational. Irrational numbers are non-repeating, non-terminating decimals.

Core Lesson Key Terminology & Definitions: irrational number

square root

perfect square

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.NS.A.1 (Advanced) 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.

Topic: Compare and Order Real Numbers

Minutes for Topic: 120

Core Lesson Description: Students will approximate an irrational number, compare irrational numbers, and compare and order rational and irrational numbers.

Core Lesson Student Learning Objectives: Students will be able to compare and order rational and irrational numbers.

Core Lesson Essential Questions: How can you compare and order rational and irrational numbers?

Core Lesson Big Ideas: Most square roots are irrational numbers. Strategies such as using perfect squares or decimal expansion are used to compare and order rational and irrational numbers.

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.NS.A.2 (Advanced) 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., pi^2).

Topic: Evaluate Square Roots and Cube Roots

Minutes for Topic: 120

Core Lesson Description: Students will evaluate cube roots to solve problems, evaluate perfect squares and perfect cubes, and evaluate square roots to solve problems.

Core Lesson Student Learning Objectives: Students will be able to find square roots and cube roots of rational numbers.

Core Lesson Essential Questions: How do you evaluate cube roots and square roots?

Core Lesson Big Ideas: Finding the square root is the inverse operation of squaring a number. Finding the cube root is the inverse operation of cubing, which is raising a number to the third power.

Core Lesson Key Terminology & Definitions: cube root

perfect cube

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.EE.A.2 (Advanced) 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. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that the square root of 2 is irrational.

Topic: Solve Equations Using Square Roots and Cube Roots

Minutes for Topic: 120

Core Lesson Description: Students will solve equations involving perfect squares, perfect cubes, and imperfect squares and cubes.

Core Lesson Student Learning Objectives: Students will be able to solve equations and problems in real-world contexts involving square roots and cube roots.

Core Lesson Essential Questions: How can you solve equations with squares and cubes?

Core Lesson Big Ideas: The square root of a positive squared number is that number. The cube root of a cubed number is that number.

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.EE.A.2 (Advanced) 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. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that the square root of 2 is irrational.

Topic: Use Properties of Integer Exponents

Minutes for Topic: 120

Core Lesson Description:	Students will multiply exponential expression with the same base and different base, find the power of a power, and divide exponential expressions with the same base.
Core Lesson Student Learning Objectives:	Students will be able to understand the properties of exponents. Students will be able to generate equivalent expressions with exponents.
Core Lesson Essential Questions:	How do properties of integer exponents help you write equivalent expressions?
Core Lesson Big Ideas:	Expressions with integer exponents can be simplified using the properties of exponents. The simplified expression will always be equivalent to the original expression.
Core Lesson Key Terminology & Definitions:	Product of Powers Property Power of Products Property Power of Powers Property Quotient of Powers Property

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.EE.A.1 (Advanced)	Know and apply the properties of integer exponents to generate equivalent numerical expressions.

Topic: More Properties of Integer Exponents

Minutes for Topic: 120

Core Lesson Description:	Students will use the zero exponent property and the negative exponent property and rewrite expressions with negative exponents as expressions with positive exponents.
Core Lesson Student Learning Objectives:	Students will be able to simplify and evaluate expressions with negative and zero exponents.
Core Lesson Essential Questions:	What do the Zero Exponent and Negative Exponent Properties mean?
Core Lesson Big Ideas:	A number with a negative exponent indicates multiplication by the reciprocal of that number. A number with an exponent of zero is equal to 1.
Core Lesson Key Terminology & Definitions:	Zero Exponent Property Negative Exponent Property

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.EE.A.1 (Advanced)	Know and apply the properties of integer exponents to generate equivalent numerical expressions.

Topic: Use Powers of 10 to Estimate Quantities

Minutes for Topic: 120

Topic: Understand Scientific Notation

Minutes for Topic: 120

Topic: 3-Act Mathematical Modeling: Hard-Working Organs
Minutes for Topic: 80

Topic: Operations with Numbers in Scientific Notation
Minutes for Topic: 120

Topic: Topic 1 Assessment
Minutes for Topic: 40

Unit: Analyze and Solve Linear Equations

Unit Description: Students will understand the connections between proportional relationships, lines, and linear equations. Students will analyze and solve linear equations and pairs of simultaneous linear equations.

Unit Essential Questions: How can we analyze connections between linear equations and use them to solve problems?

Unit Big Ideas: Solve Linear Equations

Proportional Relationships

Represent Linear Equations

Unit Key Terminology & Definitions : slope

y-intercept

slope-intercept form

STANDARDS:

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.EE.B.5 (Advanced)	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
MA.8.EE.B.6 (Advanced)	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.
MA.8.EE.C.7.A (Advanced)	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).
MA.8.EE.C.7.B (Advanced)	Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Topic: Combine Like Terms to Solve Equations
Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to combine like terms. Students will be able to solve equations with like terms on one side of the equation. Students will be able to make sense of scenarios and represent them with equations.

Core Lesson Big Ideas: Combining like terms that are on one side of an equation makes it easier to solve for the variable by using inverse operations.

Topic: Solve Equations with Variables on Both Sides
Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to solve equations with like terms on both sides of the equation. Students will be able to make sense of scenarios and represent them with equations.

Core Lesson Big Ideas: To solve a linear equation that has variable terms on both sides of the equation, first use inverse operations to move all variable terms to one side of the equation and constant terms to the other, then isolate the variable.

Topic: Solve Multistep Equations

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to plan multiple solution pathways and choose one to find the solution.

Core Lesson Big Ideas: The Distributive Property is an important tool for simplifying expressions and combining like terms.

Topic: Equations with No Solutions or Infinitely Many Solutions

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to determine the number of solutions to an equation.

Core Lesson Big Ideas: Equations with one variable can have zero, one, or infinitely many solutions.

Topic: 3-Act Mathematical Modeling: Powering Down

Minutes for Topic: 80

Topic: Compare Proportional Relationships

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to analyze equations, linear graphs, and tables to find unit rates and compare proportional relationships.

Core Lesson Big Ideas: Proportional relationships can be represented using different models including graphs, tables, and equations.

Topic: Connect Proportional Relationships and Slope

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to find the slope of a line using different strategies. Students will be able to interpret a slope in context and relate it to steepness on a graph.

Core Lesson Big Ideas: Slope is a measure of the steepness of a line and is equal to the rate of change between quantities. In a proportional relationship, slope is the same as the unit rate and the constant of proportionality.

Core Lesson Key Terminology & Definitions: slope

Topic: Analyze Linear Equations: y = mx

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to understand how the constant of proportionality and the slope relate in a linear equation. Students will be able to write a linear equation in the form y = mx when the slope is given. Students will be able to graph a linear equation in the form y = mx.

Core Lesson Big Ideas: The slope, constant of proportionality, and unit rate are equal for proportional relationships.

Topic: Understand the y-intercept of a Line

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to interpret and extend the table or graph of a linear relationship to find its y-intercept. Students will be able to analyze graphs in context to determine and explain the meaning of the y-intercept.

Core Lesson Big The y-intercept of a line is the y-coordinate of the point where the graph of the line crosses the y-axis. Its

Ideas:	meaning depends on the context of the graph.
Core Lesson Key Terminology & Definitions:	y-intercept

Topic: Analyze Linear Equations: y = mx + b

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to graph a line from an equation in the form y = mx + b. Students will be able to write an equation that represents the given graph of a line.
Core Lesson Big Ideas:	The slope-intercept form for a linear equation, y = mx + b, gives information to sketch a graph of the line. It indicates that the point (0, b) is on the graph of the line and shows that the slope of the line is m.
Core Lesson Key Terminology & Definitions:	slope-intercept form

Topic: Topic 2 Assessment

Minutes for Topic: 40

Unit: Use Functions to Model Relationships

Unit Description:	Students will define, evaluate, and compare functions. Students will use functions to model relationships between quantities.
Unit Essential Questions:	How can you use functions to model linear relationships?
Unit Big Ideas:	Relations and Functions Compare Properties of Functions Construct Functions to Model Linear Relationships Describe Behaviors of Functions Qualitatively
Unit Key Terminology & Definitions :	relation function constant rate of change initial value linear function nonlinear function interval

STANDARDS:

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.F.A.1 (Advanced)	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. Function notation is not required in Grade 8.
MA.8.F.A.2 (Advanced)	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
MA.8.F.A.3 (Advanced)	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.
MA.8.F.B.4	Construct a function to model a linear relationship between

(Advanced)	two quantities. 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.
MA.8.F.B.5 (Advanced)	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.

Topic: Understand Relations and Functions

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to identify whether a relation is a function. Students will be able to interpret a function.
Core Lesson Big Ideas:	A relation is a set of ordered pairs. A function is a relation in which each input, or x-value, has exactly one output, or y-value. Arrow diagrams and tables can be used to determine whether a relation is a function.
Core Lesson Key Terminology & Definitions:	relation function

Topic: Connect Representations of Functions

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to identify functions in different representations including equations, tables, and graphs. Students will be able to identify linear and nonlinear functions in different representations.
Core Lesson Big Ideas:	Different representations such as equations, tables, and graphs can represent a function. The graph of a linear function is a straight line. The graph of a nonlinear function is not a straight line.
Core Lesson Key Terminology & Definitions:	constant rate of change initial value linear function nonlinear function

Topic: Compare Linear and Nonlinear Functions

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to compare properties of linear and nonlinear functions in different representations.
Core Lesson Big Ideas:	Two functions presented in different representations can be compared by looking at their initial value and constant rate of change.

Topic: 3-Act Mathematical Modeling: Every Drop Counts

Minutes for Topic: 80

Topic: Construct Functions to Model Linear Relationships

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to construct a linear function to model a relationship using an equation in the form $y = mx + b$.

Core Lesson Big Ideas: A function that represents a linear relationship between two quantities can be represented by an equation written in the form y = mx + b.

Topic: Intervals of Increase and Decrease

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to describe qualitatively the behavior of a function by analyzing its graph. Students will be able to describe the graph of a function at each interval.

Core Lesson Big Ideas: The relationship between two quantities can be represented in a qualitative graph that shows the behavior of the function in different intervals.

Core Lesson Key Terminology & Definitions: interval

Topic: Sketch Functions from Verbal Descriptions

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to draw a qualitative graph of a function based on a verbal description. Students will be able to analyze and interpret the sketch of a graph of a function.

Core Lesson Big Ideas: You can use what you know about the behavior of a function in different intervals to sketch a qualitative graph of a function.

Topic: Topic 3 Assessment

Minutes for Topic: 40

Unit: Investigate Bivariate Data

Unit Description: Students will investigate patterns of association in bivariate data.

Unit Essential Questions: How can you represent the relationship between paired data and use the representation to make predictions?

Unit Big Ideas: Paired Data

Linear Associations and Models

Two-Way Frequency Tables

Unit Key Terminology & Definitions : cluster

gap

measurement data

negative association

outlier

positive association

scatter plot

trend line

categorical data

relative frequency table

STANDARDS:

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.F.A.3 (Advanced)	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.

MA.8.F.B.4 (Advanced)	Construct a function to model a linear relationship between two quantities. 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.
MA.8.SP.A.1 (Advanced)	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.
MA.8.SP.A.2 (Advanced)	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.
MA.8.SP.A.3 (Advanced)	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.
MA.8.SP.A.4 (Advanced)	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.

Topic: Construct and Interpret Scatter Plots

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to construct a scatter plot graph to model paired data. Students will be able to utilize a scatter plot to identify and interpret the relationship between paired data.
Core Lesson Big Ideas:	A scatter plot is a graph on a coordinate plane that uses points to show the relationship between paired data. These points visually display any clusters, gaps, or outliers.
Core Lesson Key Terminology & Definitions:	cluster gap measurement data negative association outlier positive association scatter plot

Topic: Analyze Linear Associations

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to recognize whether the paired data has a linear association, a nonlinear association, or no association. Students will be able to draw a trend line to determine whether a linear association is positive or negative and strong or weak.
Core Lesson Big Ideas:	A trend line on a scatter plot approximates the linear association between the paired data. Scatter plots can show a linear or nonlinear association or no association.
Core Lesson Key Terminology & Definitions:	trend line

Topic: Use Linear Models to Make Predictions

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to use the slope and y-intercept of a trend line to make a prediction. Students will be able to make a prediction when no equation is given by drawing trend lines and writing the equation of the linear model.
Core Lesson Big Ideas:	Trend lines in linear models can help with making predictions about a set of data. By determining the equation of a linear model, predictions of an outcome can be made.

Topic: Interpret Two-Way Frequency Tables

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to organize paired categorical data into a two-way frequency table. Students will be able to compare and make conjectures about data displayed in a two-way frequency table.
Core Lesson Big Ideas:	Data can be displayed in a two-way frequency table making it easier to analyze. Individual data categories can be compared to all the data. Individual data can also be compared to sub-categories to make evidence-based conjectures.
Core Lesson Key Terminology & Definitions:	categorical data

Topic: Interpret Two-Way Relative Frequency Tables

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to construct two-way frequency tables and two-way relative frequency tables. Students will be able to compare and make conjectures about data displayed in a two-way relative frequency table.
Core Lesson Big Ideas:	Data can be organized in a two-way frequency table and then used to create a two-way relative frequency table. Relative frequency can be determined for the rows and the columns as well as for the whole table.
Core Lesson Key Terminology & Definitions:	relative frequency table

Topic: 3-Act Mathematical Modeling: Reach Out

Minutes for Topic: 80

Topic: Topic 4 Assessment

Minutes for Topic: 40

Unit: Analyze and Solve Systems of Linear Equations

Unit Description:	Students will analyze and solve linear equations and pairs of simultaneous linear equations.
Unit Essential Questions:	What does it mean to solve a system of linear equations?
Unit Big Ideas:	Solve Systems of Linear Equations Graphically Solve Systems of Linear Equations Algebraically
Unit Key Terminology & Definitions :	system of linear equations solution of a system of linear equations

STANDARDS:

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.EE.C.8 (Advanced)	Analyze and solve pairs of simultaneous linear equations.
MA.8.EE.C.8.A (Advanced)	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.
MA.8.EE.C.8.B (Advanced)	Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.
MA.8.EE.C.8.C (Advanced)	Solve real-world and mathematical problems leading to two linear equations in two variables.
MA.8.F.B.4 (Advanced)	Construct a function to model a linear relationship between two quantities. 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.
MA.8.SP.A.3 (Advanced)	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

Topic: Estimate Solutions by Inspection

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to examine graphs of linear systems of equations to determine the number of solutions based on the number of intersection points. Students will be able to compare the equations in a linear system to look for a relationship between the number of solutions and the slopes and y-intercepts of the equations.
Core Lesson Big Ideas:	A system of linear equations can have no solution, one solution, or infinitely many solutions. The number of solutions is based on the number of intersection points of the lines in the system. The number of solutions can be determined by comparing the slopes and y-intercepts of the equations.

Topic: Solve Systems by Graphing

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to create and examine graphs of linear systems of equations to determine the solution.
Core Lesson Big Ideas:	Systems of equations can have zero solutions, one solution, or infinitely many solutions. The solution to a linear system is the point or points at which the lines intersect.

Topic: Solve Systems by Substitution

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to understand how substitution can be used to solve a linear system of equations. Students will be able to apply this understanding to solve a system of linear equations with one solution, no solutions, or infinitely many solutions.
Core Lesson Big Ideas:	Substitution is a useful method for solving a system of linear equations. It is accomplished by rewriting an equation for one variable in terms of the other and substituting that expression into the other equation and solving.

Topic: Solve Systems by Elimination

Minutes for Topic: 120

Core Lesson Student Learning Objectives:	Students will be able to understand how the process of elimination can be used to solve a system of linear equations with no solution, one solution, or infinitely many solutions. Students will be able to apply this understanding to solve mathematical and real-world problems.
Core Lesson Big Ideas:	Elimination can be used to solve a system of linear equations by adding or subtracting the equations to eliminate one variable. The resulting equation can be solved for the remaining variable or used to determine if there is no solution or an infinite number of solutions.

Topic: 3-Act Mathematical Modeling: Ups and Downs

Minutes for Topic: 80

Topic: Topic 5 Assessment

Minutes for Topic: 40

Unit: Congruence and Similarity

Unit Description: Students will understand congruence and similarity using a combination of physical models, transparencies, and geometry software.

Unit Essential Questions: How can you show that two figures are either congruent or similar to one another?

Unit Big Ideas: Transformations

Congruent and Similar Figures

Lines and Angles

Unit Key Terminology & Definitions :

transformation

translation

image

reflection

line of reflection

rotation

angle of rotation

center of rotation

congruent

dilation

scale factor

enlargement

reduction

similar

transversal

corresponding angles

alternate interior angles

same-side interior angles

remote interior angles

exterior angle of a triangle

STANDARDS:

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.G.A.1 (Advanced)	Verify experimentally the properties of rotations, reflections, and translations:
MA.8.G.A.1.A (Advanced)	Lines are taken to lines, and line segments to line segments of the same length.
MA.8.G.A.1.B (Advanced)	Angles are taken to angles of the same measure.
MA.8.G.A.1.C (Advanced)	Parallel lines are taken to parallel lines.
MA.8.G.A.2 (Advanced)	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.
MA.8.G.A.3 (Advanced)	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
MA.8.G.A.4	Understand that a two-dimensional figure is similar to

(Advanced)	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.
MA.8.G.A.5 (Advanced)	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.

Topic: Analyze Translations
Minutes for Topic: 120

Topic: Analyze Reflections
Minutes for Topic: 120

Topic: Analyze Rotations
Minutes for Topic: 120

Topic: Compose Transformations
Minutes for Topic: 120

Topic: 3-Act Mathematical Modeling: Tricks of the Trade
Minutes for Topic: 80

Topic: Understand Congruent Figures
Minutes for Topic: 120

Topic: Describe Dilations
Minutes for Topic: 120

Topic: Understand Similar Figures
Minutes for Topic: 120

Topic: Angles, Lines, and Transversals
Minutes for Topic: 120

Topic: Interior and Exterior Angles of Triangles
Minutes for Topic: 120

Topic: Angle-Angle Triangle Similarity
Minutes for Topic: 120

Topic: Topic 6 Assessment
Minutes for Topic: 40

Unit: Understand and Apply the Pythagorean Theorem

Unit Description:	Students will understand and apply the Pythagorean Theorem.
Unit Essential Questions:	How can you use the Pythagorean Theorem to solve problems?
Unit Big Ideas:	Pythagorean Theorem Concepts Apply the Pythagorean Theorem
Unit Key Terminology & Definitions :	hypotenuse leg Pythagorean Theorem proof Converse of the Pythagorean Theorem

STANDARDS: **STANDARDS**

NATIONAL: US Common Core State Standards (2010)

MA.8.G.B.6 (Advanced)	Explain a proof of the Pythagorean Theorem and its converse.
MA.8.G.B.7 (Advanced)	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
MA.8.G.B.8 (Advanced)	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Topic: 3-Act Mathematical Modeling: Go with the Flow

Minutes for Topic: 80

Topic: Understand the Pythagorean Theorem

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to understand the Pythagorean Theorem. Students will be able to use the Pythagorean Theorem to find the length of the missing side of a right triangle given the other two side lengths.

Core Lesson Big Ideas: The Pythagorean Theorem can be used to determine if a triangle is a right triangle and to find the missing side length of a triangle.

Topic: Understand the Converse of the Pythagorean Theorem

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to understand why the Converse of the Pythagorean Theorem is true. Students will be able to apply the Converse of the Pythagorean Theorem to identify right triangles. Students will be able to use the Converse of the Pythagorean Theorem to analyze two-dimensional shapes.

Core Lesson Big Ideas: If a triangle has side lengths such that $a^2 + b^2 = c^2$, the triangle is a right triangle.

Topic: Apply the Pythagorean Theorem to Solve Problems

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to apply the Pythagorean Theorem and its converse to solve real-world problems. Students will be able to apply the Pythagorean Theorem to solve problems that involve three dimensions.

Core Lesson Big Ideas: The Pythagorean Theorem and its converse can be used to solve real-world problems that involve right triangles. Both can be used to determine the unknown leg lengths of a right triangle or to identify or verify whether a triangle is a right triangle.

Topic: Find Distance in the Coordinate Plane

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to apply the Pythagorean Theorem to find the distance between two points on a map or coordinate plane. Students will be able to find the perimeter of a figure on a coordinate plane. Students will be able to identify the coordinates of the third vertex of a triangle on the coordinate plane.

Core Lesson Big Ideas: The Pythagorean Theorem can be used to find the distance between any two points on a coordinate plane by drawing a line to connect the points and using it as the hypotenuse of a right triangle where the legs are the horizontal and vertical distances.

Topic: Topic 7 Assessment

Minutes for Topic: 40

Unit: Solve Problems Involving Surface Area and Volume

Unit Description: Students will solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

Unit Essential Questions: How are the formulas for volume of a cylinder, cone, and sphere related to one another?

Unit Big Ideas: Surface Area

Volume

Unit Key Terminology & Definitions :

cone

cylinder

sphere

composite figure

STANDARDS:

STANDARDS

NATIONAL: US Common Core State Standards (2010)

MA.8.G.C.9 (Advanced)	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Topic: Find Surface Area of Three-Dimensional Figures

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to find the surface areas of cylinders, cones, and spheres.

Core Lesson Big Ideas: Formulas for finding the areas of polygons such as rectangles, squares, triangles, and circles can be used to find the surface areas of cylinders, cones, and spheres.

Topic: Find Volume of Cylinders

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to recognize the relationship between the volume of a rectangular prism and the volume of a cylinder. Students will be able to solve real-world problems involving the volume of a cylinder. Students will be able to use the formula for the volume of a cylinder to find an unknown measure.

Core Lesson Big Ideas: Finding the volume of a cylinder is an extension of finding the volume of a rectangular prism. The volume of a rectangular prism is the product of the area of its base and its height. Similarly, the volume of a cylinder is equal to the product of the area of its circular base and its height.

Topic: Find Volume of Cones

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to recognize the relationship between the volume of a cylinder and the volume of a cone. Students will be able to use the Pythagorean Theorem when solving volume problems. Students will be able to find the volume of a cone whether or not they are given the circumference of the base.

Core Lesson Big Ideas: The volume of a cone is 1/3 the volume of a cylinder given that the bases have the same radius and the heights are the same. The formula for the volume of a cone is V = (1/3)Bh, where B is the area of its circular base and h is the height of the cone.

Topic: Find Volume of Spheres

Minutes for Topic: 120

Core Lesson Student Learning Objectives: Students will be able to recognize the relationship between the volume of a cone and the volume of a sphere. Students will be able to find the volume of a sphere whether or not they are given the surface area. Students will be able to find the volume of a composite figure.

Core Lesson Big Ideas: The volumes of a sphere and cone are proportionally related. The volume of a sphere is twice the volume of a cone that has the same circular base and height. The formula for the volume of a sphere is $V = (4/3)*pi*r^3$, where r is the radius of the sphere.

Topic: 3-Act Mathematical Modeling: Measure Up

Minutes for Topic: 80

Topic: Topic 8 Assessment

Minutes for Topic: 40