7-8 Math Curriculum

4/3/2019

STCHARLESR6

Grades 7-8 Math Curriculum Committee

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District Mission

The City of St. Charles School District will REACH, TEACH, and EMPOWER all students by providing a challenging, diverse, and innovative education.

District Vision

The City of St. Charles School District will be an educational leader recognized for high performance and academic excellence that prepares students to succeed in an ever-changing global society.

District Values

We, the City of St. Charles School District community of students, parents, staff, and patrons, value:

- High quality education for all students which includes:
  - Lifelong learning from early childhood through adult education
  - Rigorous learning experiences that challenge all students
  - Instruction that meets the needs of a diverse community
  - Respect for all
  - Real world, critical thinking and problem-solving skills to prepare students for the 21st Century
  - Developing caring, productive, and responsible citizens
  - Strong engagement of family and community
  - A safe, secure, and nurturing school environment

- Achievement through:
  - Celebration of individual success
  - Collaboration with parents and community stakeholders
  - Exploration, Innovation, and creativity

- High quality staff by:
  - Hiring and retaining highly qualified and invested employees
  - Providing professional development and collaboration focused on increasing student achievement
  - Empowering staff to use innovative resources and practices

- Informed decisions that are:
  - Student-centered
  - Focused on student achievement
  - Data Driven
  - Considerate of all points of view
  - Fiscally responsible

District Goals

For planning purposes, five overarching goals have been developed. These goals are statements of the key functions of the school district.

1. Student Performance
   - Develop and enhance the quality educational/instructional programs to improve student performance and enable students to meet their personal, academic, and career goals.
2. Highly qualified staff
   - Recruit, attract, develop, and retain highly qualified staff to carry out the District's mission, vision, goals, and objectives.
3. Facilities, Support, and Instructional Resource
   - Provide and maintain appropriate instructional resources, support services, and functional and safe facilities.
4. Parent and Community Involvement
   - Promote, facilitate and enhance parent, student, and community involvement in district educational programs.
5. Governance
   - Govern the district in an efficient and effective manner providing leadership and representation to benefit the students, staff, and patrons of the district.

School District Philosophical Foundations

Teachers in the School District of the City of St. Charles share in and ascribe to a philosophy that places children at the heart of the educational process. We feel that it is our professional responsibility to strive to be our best at all times and to maximize our efforts by ensuring that the following factors are present in our classrooms and our schools.

1. Learning is developed within the personal, physical, social, and intellectual contexts of the learner.
2. A strong educational program should provide developmental continuity.
3. The successful learner is motivated, strategic, knowledgeable, and interactive.
4. Children learn best when they have real purposes and can make connections to real life.
5. Effective learning is a combination of student exploration and teacher and mentor modeling.
6. Assessment is an ongoing and multidimensional process that is an integral part of instruction.
7. Making reading and writing connections across multiple sources and curricula facilitates meaning.
8. Literacy for the future means literacy in multiple technologies.
9. Education must respond to society's diverse population and serve all children.
10. Interactions among students, teachers, parents, and community form the network that supports learning.

7-8 Math Philosophy

It is the goal of the Secondary Math Department of the City of St. Charles School District to foster a deep understanding of mathematical concepts. As math educators, we will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have mathematical literacy, a complete mathematical skill set, and an understanding of the real life applications of mathematics.

In order to ensure that these goals are met for students, it is the philosophy of the City of St. Charles School District to provide ongoing professional development and support for teachers.

Course Description

Math 7

Seventh grade math is a year long course. Students study the structural characteristics of mathematics, expanding their mathematical skill-set, with attention devoted to developing mathematical literacy with an emphasis on real-life applications. The class will foster students' ability to think critically, persevere in problem solving, and collaboratively engage in rich mathematical discourse. Topics covered include the language of pre-algebra, problem solving, properties of real numbers, integers, solving equations, fractions, ratios, proportions, percents, formulas, graphing, geometry, and an introduction to coordinate geometry providing a foundation for the study of Introduction to Algebraic Concepts and the exploration of the other branches of mathematics.

Math 8

This is a yearlong course. Students study in a rigorous mathematics class with high expectations. Topics covered include a preview of algebra, properties of real numbers, signed numbers, solving equations and inequalities, graphs, slope, formulas, functions, systems of equations, exponents, sentences, radicals, polynomials, factorings, proportions, rational equations and quadratics.

Program Goals for 7-8 Mathematics Curriculum

This curriculum was developed with the belief that each student has the capability of understanding and applying mathematical practices in a variety of ways to real world problems. Guaranteeing a viable mathematics curriculum for each student in the City of St. Charles School District is ensured through continuous professional development for teachers, supporting students' individual mathematics learning style, and continuous review of best practices in mathematics. From the onset, this curriculum was developed with the overarching transfer goals of critical thinking, perseverance, collaboration, problem-solving, and communication. It is through these practices that students will be able to utilize their mathematics skills beyond the classroom, and apply them in real world situations. This curriculum will continue to be reviewed through assessment data collection, review of best practices, and ongoing teacher input and collaboration. The structural integrity of this secondary mathematics curriculum prepares the students of the City of St. Charles School District for mathematical success in college, career, and life.

Essential Learning Outcomes for Math 7

In Math 7, students will focus on enhancing skills for readiness in Math 8/PreAlgebra. Using instructional practices to promote critical thinking, perseverance, collaboration, problem-solving, and communication, students will:

- Recognize and represent proportional relationships between quantities.
- Determine when two quantities are in a proportional relationship.
- Identify and/or compute the constant of proportionality (unit rate).
- Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation.
- Recognize that the graph of any proportional relationship will pass through the origin.
- Solve problems involving ratios, rates, percentages and proportional relationships.
- Investigate the probability of chance events.
- Determine probabilities of simple events.
- Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.
- Solve problems involving the four arithmetic operations with rational numbers.
- Understand how to use equivalent expressions to clarify quantities in a problem.
- Write and/or solve linear equations and inequalities in one variable.
- Write and/or solve equations of the form $x+p = q$ and $px = q$ in which p and q are rational numbers.
- Write and/or solve two-step equations of the form $px + q = r$ and $p(x + q) = r$, where p, q and r are rational numbers, and interpret the meaning of the solution in the context of the problem.
- Write, solve and/or graph inequalities of the form $px + q > r$ or $px + q < r$, where p, q and r are rational numbers.
- Use angle properties to write and solve equations for an unknown angle.
- Understand the relationship between area, surface area and volume.
- Find the area of triangles, quadrilaterals and other polygons composed of triangles and rectangles.
- Find the volume and surface area of prisms, pyramids and cylinders
- Compare the numerical measures of center, measures of frequency and measures of variability from two random samples to draw inferences about the population.
- Understand that statistics can be used to gain information about a population by examining a sample of the population.
- Understand that a sample is a subset of a population.
- Understand that generalizations from a sample are valid only if the sample is representative of the population.
- Understand that random sampling is used to produce representative samples and support valid inferences.

Math 8/PreAlgebra Essential Learning Outcomes

In Math 8/PreAlgebra, students will focus on enhancing skills for readiness in Algebra 1. Using instructional practices to promote critical thinking, perseverance, collaboration, problem-solving, and communication, students will:

- Apply concepts of slope and y-intercept to graphs, equations and proportional relationships.
- Solve linear equations and inequalities in one variable.
- Use the Pythagorean Theorem to determine unknown side lengths in right triangles in problems in two- and three-dimensional contexts.
- Solve problems involving surface area and volume.
- Interpret the parameters of a linear model of bivariate measurement data to solve problems
- Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.
- Explore angle relationships and establish informal arguments
- Solve systems of two linear equations.

Middle School Scope and Sequence

Topic	7th	8th
Ratios & Proportions	Mastery	
Probability	Introduction/Mastery	
Population Inferences	Mastery	
Sampling	Mastery	
Number System	Introduction	Mastery
Equivalent Expressions	Mastery	
Linear Equations & Inequalities	Introduction	Introduction
Angle Properties	Introduction	Mastery
Area & Volume	Introduction	Mastery
Linear Relationships	Introduction	Introduction
Solving Equations/Inequalities	Introduction	Mastery
Pythagorean Theorem		Introduction/Mastery
Volume/Surface Area	Introduction	Mastery
Scatterplots		Introduction
Transformations		Introduction/Mastery
Angle Measurements/Relationships	Introduction	Mastery
Systems of Equations		Introduction

7th Grade Math *Course Overview*	
Grade level(s): 7th Grade	
Course Rationale	**Course Description**
Math 7 contains foundational components for success in Pre-Algebra. Proficiency within this course will inevitably lay the groundwork for success in Pre-Algebra.	Seventh grade math is a year long course. Students study the structural characteristics of mathematics, expanding their mathematical skill-set, with attention devoted to developing mathematical literacy with an emphasis on real-life applications. The class will foster students' ability to think critically, persevere in problem solving, and collaboratively engage in rich mathematical discourse. Topics covered include the language of pre-algebra, problem solving, properties of real numbers, integers, solving equations, fractions, ratios, proportions, percents, formulas, graphing, geometry, and an introduction to coordinate geometry providing a foundation for the study of Introduction to Algebraic Concepts and the exploration of the other branches of mathematics.
Transfer Goals/Big Ideas	
In 7th grade math, we will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas** Analyze proportional relationships and use them to solve problems.	

Priority Missouri Learning Standards/National Standards
7.RP.A.2 ***Recognize and represent proportional relationships between quantities.*** ***a. Determine when two quantities are in a proportional relationship.*** ***b. Identify and/or compute the constant of proportionality (unit rate).*** ***c. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation.*** ***d. Recognize that the graph of any proportional relationship will pass through the origin.*** ***7.RP.A.3*** ***Solve problems involving ratios, rates, percentages and proportional relationships.*** ***7.DSP.C.5*** ***Investigate the probability of chance events.*** ***a. Determine probabilities of simple events.*** ***b. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.*** ***7.NS.A.3*** ***Solve problems involving the four arithmetic operations with rational numbers.*** ***7.EEI.A.2*** ***Understand how to use equivalent expressions to clarify quantities in a problem.*** ***7.EEI.B.4*** ***Write and/or solve linear equations and inequalities in one variable.*** ***a. Write and/or solve equations of the form x+p = q and px = q in which p and q are rational numbers.*** ***b. Write and/or solve two-step equations of the form px + q = r and p(x + q) = r, where p, q and r are rational numbers, and interpret the meaning of the solution in the context of the problem.*** ***c. Write, solve and/or graph inequalities of the form px + q > r or px + q < r, where p, q and r are rational numbers.*** ***7.GM.B.5*** ***Use angle properties to write and solve equations for an unknown angle.*** ***7.GM.B.6*** ***Understand the relationship between area, surface area and volume.*** ***a. Find the area of triangles, quadrilaterals and other polygons composed of triangles and rectangles.*** ***b. Find the volume and surface area of prisms, pyramids and cylinders***

7.DSP.B.4

Compare the numerical measures of center, measures of frequency and measures of variability from two random samples to draw inferences about the population.

7.DSP.A.1

Understand that statistics can be used to gain information about a population by examining a sample of the population.

a. Understand that a sample is a subset of a population.

b. Understand that generalizations from a sample are valid only if the sample is representative of the population.

c. Understand that random sampling is used to produce representative samples and support valid inferences.

Unit 1: Ratios & Proportions
Desired Results

Standards	Transfer Goal(s) /Big Ideas
Priority: *7.RP.A.2* *7.RP.A.3* ***Supplemental:*** *7.RP.A.1*	**Transfer Goal(s)** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● Proportional relationships can be represented in tables and graphs. ● The graph of a proportional relationship has a constant rate of change which is also identified as the unit rate. ● Proportional relationships can be used to solve problems involving ratios, rates, and percentages.

	Enduring Understandings	Essential Questions
	Students will understand that… ● Proportional relationships can be represented in tables and graphs. ● Two quantities are in a proportional relationship when they share a constant of proportionality (y/x=k), and when their graph forms a straight line that passes through the origin. ● The graph of a proportional relationship has a constant rate of change which is also identified as the unit rate. ● A point (x,y) on the graph of a proportional relationship has a contextual meaning relative to the dependent and independent variables. ● The graph of any proportional relationship is linear with a positive slope, and a constant rate of change. ● The graph of any proportional relationship will pass through the origin. ● Proportional relationships can be used to solve problems involving ratios, rates, and percentages.	*Students will consider…* ● What is the relationship between a graph and a table of a proportional relationship? ● How can we use the concept of proportionality to describe real-world situations, model predictions, and solve problems? ● How can we use unit rate to make the best decisions in real world context? ● What is required if two quantities are considered to be proportional in a given context? ● What is a relationship between the unit rate and a constant of proportionality? ● How can we use the constant of proportionality to find missing values on a table? ● What does the origin represent in the context of a graph of a proportional relationship? ● In the coordinate point (x,y), what does x represent and what does y represent? ● How do you use ratios, proportions, percents, differences, and scales to make comparisons? ● What is the part, percent, and whole in a situation? ● How can tables, equations, and proportions be used to represent and solve percent problems?

Learning Targets
Students will… ● I can recognize and represent proportional relationships between quantities. ● I can determine when two quantities are in a proportional relationship. ● I can identify and/or compute the constant of proportionality (unit rate). ● I can explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation. ● I can recognize that the graph of any proportional relationship will pass through the origin. ● I can solve problems involving ratios, rates, percentages and proportional relationships. ● I can compute unit rates including those that involve complex fractions, with like or different units.
Unit Duration:
● This unit will take 6 weeks (30 instructional days) including pre and post tests.

Unit 2: Probability
Desired Results

Standards	Transfer Goal(s) /Big Ideas
Priority: *7.DSP.C.5* ***Supplemental:*** *7.DSP.C..6* *7.DSP.C.7* *7.DSP.C.8*	**Transfer Goal(s)** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● The probability of an event or combination of events occurring is determined by the number of desired or favorable outcomes divided by the total number of outcomes possible. This value ranges from 0, where the event is impossible, to 1, where the event is certain to occur, with various levels of likelihood in between. ● Experimental or theoretical probabilities can be used to estimate or predict long-run frequencies. ● Real-world situations can be simulated using various probability models in order to test hypotheses or make predictions based on data.

	Enduring Understandings	Essential Questions
	Students will understand that… ● The probability of simple events is determined by the number of desired or favorable outcomes divided by the total number of outcomes possible. ● Probability is expressed as a value which ranges from 0, where the event is impossible, to 1, where the event is certain to occur, with various levels of likelihood in between. ● Probability can be expressed as a fraction, decimal, and/or percent. ● Theoretical probability is based on mathematical models which attempt to predict outcomes and experimental probability is based on real-world data from probability experiments. ● Experimental or theoretical probabilities can be used to estimate or predict long-run frequencies. ● Real-world situations can be simulated using various probability models in order to test hypotheses or make predictions based on data. ● The sample spaces for compound events can be modeled using tree diagrams, organized lists, tables, and simulations	*Students will consider…* ● What does it mean for an event to be impossible or certain? ● What does it mean for an event to be equally likely as it is unlikely? ● What are the different ways that you can represent probability numerically? ● Where is the event located on a number line in relation to the likelihood of the event occurring? ● What is the difference between experimental and theoretical probability? Why do the experimental results not match the theoretical results of probability? ● How do we determine the most likely or least likely outcome of an event? ● How many different outcomes are possible for a given event? ● How could you use a probability model to simulate an event? ● What is the difference between simple and compound probability? ● How can you visually represent a sample space for compound events?

Learning Targets
Students will… ● I can determine the probability of simple events ● I can understand that the probability of a chance event is a number between one and zero that expresses the likelihood of that event occurring ● I can compare theoretical and experimental probabilities ● I can perform experiments that model experimental probability ● I can compare theoretical and experimental probabilities ● I can develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of all events ● I can develop a probability model by observing frequencies in data demonstrated from a chance process ● I can represent the sample space of a compound event ● I can design and use a simulation to generate frequencies for compound events
Unit Duration:
● This unit will take 3 weeks (15 instructional days) including pre and post tests.

Unit 3: Population Inferences
Desired Results

Standards	Transfer Goal(s) /Big Ideas
Priority: 7.DSP.B.4 ***Supplemental:*** 7.DSP.B.3	**Transfer Goal(s):** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● Surveys are an effective way to collect information from and about people to describe, compare, or explain their knowledge, feelings, values, and behavior. ● Generalizations, predictions, and inferences from surveys can be made from a random sampling of a larger population.

	Enduring Understandings	Essential Questions
	Students will understand that… ● The interquartile range of a data set can be used to compare variability between data sets. ● Mathematicians determine which measure of center best represents the typical value in the data set. ● Larger sample sizes tend to provide more accurate predictions of the population than smaller sample sizes. ● Larger sample sizes tend to produce less variability in the sample distribution than smaller sample sizes. ● The less variability in a data set, the more accurate predictions tend to be ● There is variability in sample proportions. ● The numerical measures of center, measures of frequency, and measures of variability can be used to make inferences about a population.	*Students will consider…* ● What does the shape of a dot plot distribution tell us about a population? ● What is the difference between median and mean and how do we know which one is a better measure of center for a given population? ● What do the quartile ranges tell you about a data set? What statistical values can you determine about a data set from the box plot? ● What does it mean to deviate from the mean? What can MAD tell you about the variability of a data set? What can you infer about a data set that has a high MAD? A low MAD? ● What is a population? How is it different than a sample? ● What impact does sample size have on accuracy of predictions? ● What is a measure of center and what does it tell us? ● What is a measure of variability and what does it tell us?

Learning Targets
Students will… ● I can analyze different data distributions using statistical measures. ● I can compare the numerical measures of center. ● I can interpret data from a box and whisker plot. ● I can calculate the mean absolute deviation of a data set. ● I can compare the measures of frequency. ● I can compare the measures of variability from two random samples to draw inferences about a population.
Unit Duration:
● This unit will take 2 weeks (10 instructional days) including pre and post tests.

Week(s)	Topic	Resources/Texts	Learning Targets	Assessment
2 Weeks	• Analyze different data distributions using statistical measures. • Compare numerical measures of center, variability, and frequency from two random samples. • Use measures of center, measures of frequency, and measures of variability from two random samples to draw inferences about a population	• Match Fishtank • Yummy Math. How much does it cost to make a Harry Potter Movie. •	• I can analyze different data distributions using statistical measures. • I can compare the numerical measures of center, measures of frequency, and measures of variability from two random samples to draw inferences about a population.	

Unit 4: Sampling
Desired Results

Standards	Transfer Goal(s) /Big Ideas	
Priority: **7.DSP.A.1** ***Supplemental:*** **7.DSP.A.2**	**Transfer Goal(s)** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● Draw inferences from a sample of data. ● Generate multiple samples of the same size of data and use this to estimate or make predictions. ● Compare multiple samples of data.	
	Enduring Understandings	**Essential Questions**
	Students will understand that… ● Studying sample statistics is a way to reasonably understand and make predictions about larger population characteristics. ● Random samples tend to produce the most representative samples of populations. The larger the sample size,	*Students will consider…* ● When is knowledge about the typical or average characteristics/actions/preferences of a population useful? ● How can we discover what a population thinks or does, without asking every member of that population?

	the more accurate and less variable the data tends to be. ● Sample data can be used to compare characteristics of interest between two or more populations	● How can we use data from random samples to make important decisions, or to accurately anticipate future outcomes? ● How can data be used to inform, mislead, and/or persuade people?

Learning Targets

Students will…

- I can understand that statistics can be used to gain information about a population by examining a sample of the population.
- I can understand that a sample is a subset of a population.
- I can understand that generalizations from a sample are valid only if the the sample is representative of the population.
- I can understand that random sampling is used to produce representative sample and support valid inferences.
- I can use data from multiple samples to draw inferences about a population and investigate variability in estimates of the characteristic of interest.

Unit Duration:

- This unit will take 1 week (5 instructional days) including pre and post tests.

Week(s)	Topic	Resources/Texts	Learning Targets	Assessment
1 Week	• Understand that statistics can be used to gain information about a population by examining a sample of the population • Understand that a sample is a subset of a population and valid only if the sample is representative of the population • Use data from multiple samples to draw inferences about a population and investigate variability in estimates of the characteristics of interest	• Word length: random sampling from the poem "Casey at the Bat" • Rolling Dice Activity: generating a random sample	• I can understand that statistics can be used to gain information about a population by examining a sample of the population. • I can understand that a sample is a subset of a population. • I can understand that generalizations from a sample are valid only if the the sample is representative of the population. • I can understand that random sampling is used to produce representative sample and support valid inferences. • I can use data from multiple samples to draw inferences about a population and investigate variability in estimates of the characteristic of interest	

Unit 5: Number System
Desired Results

Standards	Transfer Goal(s) /Big Ideas
Priority: *7.NS.A3* ***Supplemental:*** *7.NS.A1* *7.NS.A2*	**Transfer Goal(s)** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● A number line can be used to order rational numbers, find the distances between numbers, to find additive inverses, and absolute values. ● Addition and subtraction of rational numbers can be modeled on a number line. ● The properties of operations for addition, subtraction, multiplication, and division hold true for rational numbers. ● In the equation p +q = r, where p, q, and r are rational numbers, the absolute value of q represents the distance between p and r, and is also represented as the absolute value of r - p. ● The quotient or product of two negative or two positive numbers is positive. ● The quotient or product of two numbers, in which one of the numbers is negative, is negative.

	Enduring Understandings	Essential Questions
	Students will understand that… ● Numerical representations can be used to describe and compare the value of real-world quantities. ● Relationships exist between positive and negative rational numbers. ● Applying number properties can simplify expressions. ● Absolute value is a numbers distance from zero. ● Opposite quantities combine to make zero. ● Subtraction of integers is adding the additive inverse. ● Operations can be used to solve problems and equations with both positive and negative numbers. ● Solving real-world problems involves using all properties of operations and all integer rules. ● Every point on a number line corresponds to a Real Number. ● Every fraction has a decimal equivalent but the inverse may not always be true. ● A rational number is the quotient of two integers.	*Students will consider…* ● How can I represent and solve problems involving the addition and subtraction of rational numbers using a variety of models? ● How can I represent and solve problems involving the multiplication and division of rational numbers using a variety of models? ● How can we predict that the sum of two integers is positive, negative, or zero? ● What is the difference between the opposite and the absolute value of a number? ● How do we add integers with different signs? ● How can concrete and pictorial models represent operations with integers? ● How can any difference *(a-b)* of two integers be restated as an equivalent addition statement? ● How do we determine if the product or quotient of two integers is positive or negative? ● How are fractions and decimals that represent the same quantity related? ● What is the difference between a repeating and terminating decimal? ● Which methods can we use to compare rational numbers? ● How can we assess the reasonableness of answers using estimation?

Learning Targets

Students will…

- I can add and subtract rational numbers.
- I can represent addition and subtraction on a vertical and horizontal number line.
- I can describe situations and show that a number and its opposites have a sum of zero (additive inverse).
- I can understand subtraction of rational numbers as adding the additive inverse.
- I can determine the distance between two numbers on a numberline is the absolute value of their difference.
- I can interpret sums and differences of rational numbers.
- I can multiply and divide rational numbers.
- I can determine that a number and its reciprocal have a product of 1 (multiplicative inverse).
- I can understand that every quotient of integers (with non-zero divisor) is a rational number.
- I can convert a rational number to a decimal.
- I can understand that all rational numbers can be written as fractions or decimal numbers that terminate or repeat.
- I can interpret products and quotients of rational numbers by describing real-world context.
- I can solve problems involving the four arithmetic operations with rational numbers.

Unit Duration:

- This unit will take 4 weeks (20 instructional days) including pre and post tests.

Week(s)	Topic	Resources/Texts	Learning Targets	Assessment
4	• Adding and subtracting rational numbers. • Represent addition and subtraction on a vertical and horizontal number line. • Describe situations and show that a number and its opposites have a sum of zero (additive inverse). • Understand subtraction of rational numbers as adding the additive inverse. • Determine the distance between two numbers on a numberline is the absolute value of their difference. • Interpret sums and differences of rational numbers. • Multiply and divide rational numbers. • Determine that a number and its	• Human Number line • Temperature change on a thermometer • Match Fish Tank Number System Unit • Engage NY Integer Card Game	• I can add and subtract rational numbers. • I can represent addition and subtraction on a vertical and horizontal number line. • I can describe situations and show that a number and its opposites have a sum of zero (additive inverse). • I can understand subtraction of rational numbers as adding the additive inverse. • I can determine the distance between two numbers on a numberline is the absolute value of their difference. • I can interpret sums and differences of rational numbers. • I can multiply and divide rational numbers. • I can determine that a number and its reciprocal have a product of 1 (multiplicative inverse). • I can understand that every quotient of integers (with non-zero divisor) is a rational number. • I can convert a rational number to a decimal. • I can understand that all rational numbers can be written as fractions or decimal numbers that terminate or repeat. • I can interpret products and quotients of rational numbers by describing real-world context.	

	reciprocal have a product of 1 (multiplicative inverse). ● Understand that every quotient of integers (with non-zero divisor) is a rational number. ● Understand that all rational numbers can be written as fractions or decimal numbers that terminate or repeat. ● Interpret products and quotients of rational numbers by describing real-world context.		● I can solve problems involving the four arithmetic operations with rational numbers.	

Unit 6: Equivalent Expressions
Desired Results

Standards	Transfer Goal(s) /Big Ideas
Priority: 7.EEI.A.2 ***Supplemental:*** 7.EEI.A.1	**Transfer Goal(s)** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● Numbers can be decomposed in an infinite number of ways. For example, 15 can be broken down into 3×5, or 13 + 2, etc. ● Numerical expressions can be named in an infinite amount of ways. For example, 42 x 3= 3 (40 + 2), or 5 +3 = 4+4, etc. ● Every fraction/ratio can be represented by an infinite set of different but equivalent fractions/ratios. ● Algebraic expressions can be named in a number of different but equivalent ways. For example 2 (4x-3)= 8x – 6 ● An equation can be represented in an infinite number of different ways that have the same solution. For example 3x – 5 = 16 and 3x = 21 because both have a solution of x= 7

	Enduring Understandings	Essential Questions
	Students will understand that… ● The order of operations is a guide to understanding how an expression is organized and how it can be evaluated. ● Expressions can be expanded, factored, added, and subtracted using the properties of operations and the rules of operating with rational numbers. ● Expressions can be rewritten into equivalent, often simpler forms that can be interpreted in new and different ways.	*Students will consider…* ● What role do the parentheses play in each expression? How do they change the way you work with each expression? ● What is the order of operations? How does it guide you in evaluating expressions to the correct answer? ● Describe what is happening in the expression. How are the numbers interacting with each other? ● Will the expression (2ab) change when the values of a and b switch? Why or why not? ● Will the expression −b change if b=1 or b=−1? Why or why not? ● What role do parentheses play in these expressions? ● Are the two expressions equivalent? How do you know? ● How does the expression represent the situation? ● What impact does distributing a negative number have on the signs of the numbers in the parentheses? ● How can you rewrite a subtraction problem as an addition problem? ● How can you rewrite an addition problem as a subtraction problem? ● Describe the expression in words. What do you see happening?

		● What are “like terms”? How can you spot them? ● What makes 5x and 3x like terms? What do they have in common? ● Why is it necessary for two terms to have the same variable for them to be like terms? ● What algebraic expression represents the sum of the two given expressions? Is there more than one way to write the sum? Does order matter? ● How can you rearrange your expression to make simplifying easier? ● What like terms do you see? ● How many constants do you see? ● What properties of operations are you using in each step? ● Where do you see opportunity to apply the distributive property? What is being distributed? ● What are the signs of each term? ● How are the associative and distributive properties being used here? ● What benefit do you see in writing expressions in equivalent ways?

Learning Targets
Students will… ● I can apply properties of addition and subtraction to simplify linear algebraic expressions with rational coefficients. ● I can apply properties of multiplication and division to simplify linear algebraic expressions with rational coefficients. ● I can identify greatest common factor from coefficients. ● I can identify equivalent expressions represented in different ways. ● I can apply properties of operations to factor linear algebraic expressions with rational coefficients. ● I can understand how to use equivalent expressions to clarify quantities in a problem.
Unit Duration:
● This unit will take 2 weeks (10 instructional days) including pre and post tests.

Week(s)	Topic	Resources/Texts	Learning Targets	Assessment
Week 1	• Using properties to simplify expressions.	• Mad TV Fast Food Order Video • Organizing change problem • Deck of Cards Problem	• I can apply properties of addition and subtraction to simplify linear algebraic expressions with rational coefficients. • I can apply properties of multiplication and division to simplify linear algebraic expressions with rational coefficients.	
Week 2	• Factoring Expressions		• I can identify greatest common factor from coefficients. • I can identify equivalent expressions represented in different ways. • I can apply properties of operations to factor linear algebraic expressions with rational coefficients. • I can understand how to use equivalent expressions to clarify quantities in a problem.	

Unit 7: Linear Equations & Inequalities
Desired Results

Standards	Transfer Goal(s) /Big Ideas
Priority: 7.EEI.B.4 ***Supplemental:*** 7.EEI.B.3	**Transfer Goal(s)** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● Modeling a relationship with an equation if you have two equivalent expressions. ● Modeling simpler, equivalent equations and eventually solving for the unknown quantity. ● Using inequality symbols to represent equivalent and/or nonequivalent relationships between quantities.

	Enduring Understandings	Essential Questions
	Students will understand that… ● The rules for the properties of equality for addition, subtraction, multiplication and division apply to solving equations. ● They can identify inverse operations for addition, subtraction, multiplication, and division. ● They can solve one step equations with addition, subtraction, multiplication, and division. ● Using inverse operations allows you to solve multi-step equations. ● Inverse operations allows you to solve inequalities in a similar fashion to solving equations. ● Dividing by a negative coefficient flips the direction of an inequality symbol when solving for a given variable.	*Students will consider…* ● When is it useful to model a relationship with an equation? ● How does rewriting an equation help you think about the relationship in a new way? ● How can you represent relationships in a world where equations don't always work? ● When is it appropriate to use an inequality rather than an equation?

Learning Targets
Students will… ● I can write and/or solve linear equations and inequalities with one variable. ● I can write and/or solve equations of the form x + p = q in which p and q are rational numbers. ● I can write and/or solve two step equations of the form px + q = r and p(x + q) = r, where p, q, and r are rational numbers, and interpret the meaning of the solution in the context of the problem. ● I can write, solve, and/or graph inequalities of the form px + q greater than r or px + q less than r, where p, q, and r are rational numbers. ● I can solve multi-step problems posed with rational numbers. ● I can convert between equivalent forms of the same number. ● I can assess the reasonableness of answers using mental computation and estimation strategies.
Unit Duration:
● This unit will take 2 weeks (10 instructional days) including pre and post tests.

Week(s)	Topic	Resources/Texts	Learning Targets	Assessment
Week 1	• Combining Like Terms • One-Step Equations • Two-step Equations	Match Fishtank Website Lesson Tape Diagrams Kaplinsky 2,000 Calorie Lesson	• I can convert between equivalent forms of the same number. • I can write and/or solve equations of the form $x + p = q$ in which p and q are rational numbers. • I can write and/or solve two step equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are rational numbers, and interpret the meaning of the solution in the context of the problem.	
Week 2	• Distributive Property • One step inequality • Two-step inequality		• I can write, solve, and/or graph inequalities of the form $px + q$ greater than r or $px + q$ less than r, where p, q, and r are rational numbers. • I can solve multi-step problems posed with rational numbers.	

Unit 8: Angle Properties
Desired Results

Standards	Transfer Goal(s) /Big Ideas
Priority: 7.GM.B.5 ***Supplemental:***	**Transfer Goal(s)** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● When two lines intersect, a pair of congruent vertical angles are created. This angle relationship, along with complementary and supplementary angle relationships, can be used to determine missing angle measures in diagrams.

	Enduring Understandings	Essential Questions
	Students will understand that… ● Complementary angles are angles whose measures add up to 90°, and supplementary angles are angles whose measures add up to 180°. ● Pairs of complementary and supplementary angles in angle diagrams. ● Vertical angles are the pair of angles formed across from one another when two lines intersect, and that the measurements of vertical angles are congruent. ● Pairs of vertical angles in angle diagrams. ● The values of angles can be found by using vertical, complementary, and supplementary angle relationships and equations. ● Angle relationships can be determined in angle diagrams involving vertical, supplementary, and complementary angles. ● Equations can be used to represent relationships between known and unknown angle measurements.	*Students will consider…* ● What defines an angle? ● What defines an acute angle? An obtuse angle? ● Describe the relationship between the two angles. ● How many degrees in a straight line? In a right angle? ● What angle relationships do you see in the diagram? ● Do you see any supplementary relationships? ● Do you see any complementary relationships? ● What angle measure labels can you add in the diagram? ● What do you know about the sum of supplementary angles?

Learning Targets
Students will… ● I can use angle properties to write and solve equations for an unknown angle.
Unit Duration:
● This unit will take 2 weeks (10 instructional days) including pre and post tests.

Week(s)	Topic	Resources/Texts	Learning Targets	Assessment
3	• Use angle properties to write and solve equations for an unknown angle	• •	• I can use angle properties to write and solve equations for an unknown angle.	
1	• Review and assessment		•	
			•	

Unit 9: Area & Volume
Desired Results

Standards	Transfer Goal(s) /Big Ideas	
	Enduring Understandings	**Essential Questions**
	Students will understand that… ● When two lines intersect, a pair of congruent vertical angles are created. This angle relationship, along with complementary and supplementary angle relationships, can be used to determine missing angle measures in diagrams. ● A circle is a closed shape that is defined by the set of points that are the same distance from the center of the circle. The distance from the center to any point on the circle is called the radius, and the distance across the circle through the center is called the diameter. The measurement around a circle is called the circumference and is proportional to the diameter of the circle with a constant of proportionality equivalent to π. The area of a circle can be found using the formula A=πr2. ● In any triangle, the sum of any two side	*Students will consider* ● What is the relationship between the two angles? ● How many degrees in a straight line? In a right angle? ● What angle relationships do you see? ● What angles are formed by the two lines? ● How can you write an equation to solve for the missing angle? ● What do you know about the sum of supplementary angles? ● What do you know about the sum of complementary angles? ● What do you need to do to determine the measure of the angles? ● What are characteristics of a circle? ● What is the relationship between any point on the circle and the center point of the circle? ● What is a radius? ● What is diameter? ● What is the relationship between radius and diameter? ● If you know the diameter of a circle, how

	lengths must be longer than the measure of the third side. Given different conditions about the side and angle measures of a triangle, one unique triangle may be formed, more than one triangle may be formed, or no triangle may be formed. ● Two-dimensional figures result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. ● Surface area of right prisms can be found by analyzing the structure of the shapes and their nets. ● The area of the base of a prism multiplied by the height of the prism gives the volume of the prism.	can you use this relationship to find the circumference? ● If you know the circumference of a circle, how can you use this relationship to find the diameter? ● What defines a triangle? Does it need to be closed? Does it need to have area? Does it have to lay flat? Do the vertices need to touch? ● If the sum of two side lengths is the same as the third side, are you able to make a triangle? ● If the sum of two side lengths is less than the third side, are you able to make a triangle? ● If the sum of any two side lengths is greater than the third side, are you able to make a triangle? ● Where will the slice start and end, what shape does it create? ● How is a vertical slice different than a horizontal slice? ● What is surface area? ● How many faces are on the prism? ● How can finding the area of the faces help you more efficiently find the surface area of the figure? ● What is volume of a three-dimensional figure? How is it different from surface area? ● How do you find the volume of a three-

		dimensional figure? ● How is the base and height of a three-dimensional figure related to its volume? ● What is the difference between units squared and units cubed

Learning Targets

Students will…

- I can solve problems involving scale drawings of real objects and geometric figures, including computing actual lengths and areas from a scale drawing and reproducing the drawing at a different scale.
- I can use a variety of tools to construct geometric shapes.
- I can determine if provided constraints will create a unique triangle through construction.
- I can construct special quadrilaterals given specific parameters.
- I can describe two-dimensional cross sections of pyramids, prisms, cones, and cylinders.
- I can understand concepts of circles.
- I can analyze the relationships among the circumference, the radius, the diameter, the area, and Pi in a circle.
- I can know and apply the formulas for circumference and area of circles to solve problems.
- I can use angle properties to write and solve equations for an unknown angle.
- I can understand the relationship between area, surface area, and volume.
- I can find the area of triangles, quadrilaterals, and other polygons composed of triangles and rectangles.
- I can find the volume and surface area of prisms, pyramids, and cylinders.

Unit Duration:

- This unit will take 2 weeks (10 instructional days) including pre and post tests.

Week 1	• Scale drawings • Solve for unknown angles. • Triangle construction rules. • Two-dimensional cross-sections.	• Wumps Project (Scale Drawings) • Dan Meyer Coffee Problem (Volume of Cylinder) • Kyle Pierce Filling up Pyramids and Prisms •	• I can solve problems involving scale drawings of real objects and geometric figures, including computing actual lengths and areas from a scale drawing and reproducing the drawing at a different scale. • I can use a variety of tools to construct geometric shapes. • I can determine if provided constraints will create a unique triangle through construction. • I can construct special quadrilaterals given specific parameters. • I can describe two-dimensional cross sections of pyramids, prisms, cones, and cylinders. • I can understand concepts of circles. • I can analyze the relationships among the circumference, the radius, the diameter, the area, and Pi in a circle. • I can know and apply the formulas for circumference and area of circles to solve problems. • I can use angle properties to write and solve equations for an unknown angle. • I can understand the relationship between area, surface area, and volume. • I can find the area of triangles, quadrilaterals, and other polygons composed of triangles and rectangles. • I can find the volume and surface	

			area of prisms, pyramids, and cylinders.	
Week 2	• Analyze the relationships of circle characteristics. • Solve for area and circumference of circles.			
Week 3	• Find the area of triangles, quadrilaterals, and other polygons.			
Week 4	• Understand the relationship between area, surface area, and volume. • Find the volume and surface area of prisms, pyramids, and cylinders.			

Strand 1: Ratios and Proportions			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student will be able to:** ● Recognize and represent proportional relationships between quantities. ● Determine when two quantities are in a proportional relationship. ● Identify and/or compute the constant of proportionality (unit rate). ● Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation. ● Recognize that the graph of any proportional relationship will pass through the origin. ● Solve problems involving ratios, rates, percentages and proportional relationships. ● Compute unit rates including those that involve complex fractions, with like or different units. **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details.** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 2: Probability			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Can determine the probability of simple events ● Can understand that the probability of a chance event is a number between one and zero that expresses the likelihood of that event occurring ● Can compare theoretical and experimental probabilities ● Can perform experiments that model experimental probability ● Can compare theoretical and experimental probabilities ● Can develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of all events ● Can develop a probability model by observing frequencies in data demonstrated from a chance process ● Can represent the sample space of a compound event ● Can design and use a simulation to generate frequencies for compound events **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details. However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 3: Population Inferences			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Can analyze different data distributions using statistical measures. ● Can compare the numerical measures of center. ● Can interpret data from a box and whisker plot. ● Can calculate the mean absolute deviation of a data set. ● Can compare the measures of frequency. ● Can compare the measures of variability from two random samples to draw inferences about a population. **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details.** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 4: Sampling			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Can understand that statistics can be used to gain information about a population by examining a sample of the population. ● Can understand that a sample is a subset of a population. ● Can understand that generalizations from a sample are valid only if the the sample is representative of the population. ● Can understand that random sampling is used to produce representative sample and support valid inferences. ● Can use data from multiple samples to draw inferences about a population and investigate variability in estimates of the characteristic of interest. **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details.** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 5: Number System			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Can add and subtract rational numbers. ● Can represent addition and subtraction on a vertical and horizontal number line. ● Can describe situations and show that a number and its opposites have a sum of zero (additive inverse). ● Can understand subtraction of rational numbers as adding the additive inverse. ● Can determine the distance between two numbers on a numberline is the absolute value of their difference. ● Can interpret sums and differences of rational numbers. ● Can multiply and divide rational numbers. ● Can determine that a number and its reciprocal have a product of 1 (multiplicative inverse). ● Can understand that every quotient of integers (with non-zero divisor) is a rational number. ● Can convert a rational number to a decimal. ● Can understand that all rational numbers can be written as fractions or decimal numbers that terminate or repeat. ● Can interpret products and quotients of rational numbers by describing real-world context. ● Can solve problems involving the four arithmetic operations with rational numbers. ● Can identify and/or compute the constant of proportionality (unit rate). ● Can explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation. ● Can recognize that the graph of any proportional relationship will		

	pass through the origin. ● Can solve problems involving ratios, rates, percentages and proportional relationships. ● Can compute unit rates including those that involve complex fractions, with like or different units. **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details.** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 6: Equivalent Expressions			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Can apply properties of addition and subtraction to simplify linear algebraic expressions with rational coefficients. ● Can apply properties of multiplication and division to simplify linear algebraic expressions with rational coefficients. ● Can identify greatest common factor from coefficients. ● Can identify equivalent expressions represented in different ways. ● Can apply properties of operations to factor linear algebraic expressions with rational coefficients. ● Can understand how to use equivalent expressions to clarify quantities in a problem. **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details.** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 1: Ratios and Proportions			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student will be able to:** ● Recognize and represent proportional relationships between quantities. ● Determine when two quantities are in a proportional relationship. ● Identify and/or compute the constant of proportionality (unit rate). ● Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation. ● Recognize that the graph of any proportional relationship will pass through the origin. ● Solve problems involving ratios, rates, percentages and proportional relationships. ● Compute unit rates including those that involve complex fractions, with like or different units. **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details.** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 2: Probability			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Can determine the probability of simple events ● Can understand that the probability of a chance event is a number between one and zero that expresses the likelihood of that event occurring ● Can compare theoretical and experimental probabilities ● Can perform experiments that model experimental probability ● Can compare theoretical and experimental probabilities ● Can develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of all events ● Can develop a probability model by observing frequencies in data demonstrated from a chance process ● Can represent the sample space of a compound event ● Can design and use a simulation to generate frequencies for compound events **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details. However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 3: Population Inferences			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Can analyze different data distributions using statistical measures. ● Can compare the numerical measures of center. ● Can interpret data from a box and whisker plot. ● Can calculate the mean absolute deviation of a data set. ● Can compare the measures of frequency. ● Can compare the measures of variability from two random samples to draw inferences about a population. **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details.** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 4: Sampling			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Can understand that statistics can be used to gain information about a population by examining a sample of the population. ● Can understand that a sample is a subset of a population. ● Can understand that generalizations from a sample are valid only if the the sample is representative of the population. ● Can understand that random sampling is used to produce representative sample and support valid inferences. ● Can use data from multiple samples to draw inferences about a population and investigate variability in estimates of the characteristic of interest. **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details.** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 5: Number System			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Can add and subtract rational numbers. ● Can represent addition and subtraction on a vertical and horizontal number line. ● Can describe situations and show that a number and its opposites have a sum of zero (additive inverse). ● Can understand subtraction of rational numbers as adding the additive inverse. ● Can determine the distance between two numbers on a numberline is the absolute value of their difference. ● Can interpret sums and differences of rational numbers. ● Can multiply and divide rational numbers. ● Can determine that a number and its reciprocal have a product of 1 (multiplicative inverse). ● Can understand that every quotient of integers (with non-zero divisor) is a rational number. ● Can convert a rational number to a decimal. ● Can understand that all rational numbers can be written as fractions or decimal numbers that terminate or repeat. ● Can interpret products and quotients of rational numbers by describing real-world context. ● Can solve problems involving the four arithmetic operations with rational numbers. ● Can identify and/or compute the constant of proportionality (unit rate). ● Can explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation. ● Can recognize that the graph of any proportional relationship will		

	pass through the origin. ● Can solve problems involving ratios, rates, percentages and proportional relationships. ● Can compute unit rates including those that involve complex fractions, with like or different units. **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details.** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 7: Linear Equations and Inequalities			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details.** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 2: Probability			
Topic 4:Probability of chance events			
Grade:			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student will be able to:** ● Determine the probability of simple events ● Understand that the probability of a chance event is a number between one and zero that expresses the likelihood of that event occurring **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 3:Population Inferences			
Topic 8:Measures of Central Tendency			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student will be able to:** ● Compare the numerical measures of center. ● Compare the measures of frequency. ● Compare the measures of variability from two random samples to draw inferences about a population. **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 4:Sampling			
Topic 10:Random Sampling			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student will be able to:** ● Understand that statistics can be used to gain information about a population by examining a sample of the population. ● Understand that a sample is a subset of a population. ● Understand that generalizations from a sample are valid only if the the sample is representative of the population. ● Understand that random sampling is used to produce representative sample and support valid inferences. ● Use data from multiple samples to draw inferences about a population and investigate variability in estimates of the characteristic of interest. **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 5: Number System			
Topic 13:Multiplying & Dividing Rational Numbers			
Grade: 7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student will be able to:** ● Multiply and divide rational numbers. ● Determine that a number and its reciprocal have a product of 1 (multiplicative inverse). ● Understand that every quotient of integers (with non-zero divisor) is a rational number. ● Convert a rational number to a decimal. ● Understand that all rational numbers can be written as fractions or decimal numbers that terminate or repeat. ● Interpret products and quotients of rational numbers by describing real-world context. **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Strand 6: Equivalent Expressions			
Topic 14:Equivalent Expressions			
Grade:7			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student will be able to:** ● Identify equivalent expressions represented in different ways. ● Understand how to use equivalent expressions to clarify quantities in a problem. **The student exhibits no major errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

8th Grade

Math

Grade Level(s): 8th **Course Rationale**	**Course Description**

Math 8 contains foundational components for success in Algebra 1. Proficiency within this course will inevitably lay the groundwork for success in Algebra 1.	*This course is designed to provide students with a strong foundation and conceptual understanding in real-life problem solving. The focus is on three critical areas: 1) formulating and reasoning about expressions and equations 2) grasping the concept of a function and using functions to describe quantitative relationships; 3) analyzing two- and three-dimensional space and figures.*

Transfer Goals/Big Ideas

Transfer Goals

We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have:

1) Mathematical literacy.
2) A complete mathematical skill set.
3) An understanding of the real life applications of mathematics.

Big Ideas

Equations can be used to model linear relationships.

A variable can be isolated by using inverse operations.

Priority Missouri Learning Standards/National Standards

1. **8.EEI.B.6** - Apply concepts of slope and y-intercept to graphs, equations and proportional relationships.
2. **8.EEI.C.7** - Solve linear equations and inequalities in one variable.
3. **8.GM.B.7** - Use the Pythagorean Theorem to determine unknown side lengths in right triangles in problems in two- and three-dimensional contexts.
4. **8.GM.C.9** - Solve problems involving surface area and volume.
5. **8.DSP.A.3** - Interpret the parameters of a linear model of bivariate measurement data to solve problems
6. **8.GM.A.3** - Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.
7. **8.GM.A.5** - Explore angle relationships and establish informal arguments
8. **8.EEI.C.8** - Solve systems of two linear equations.

Unit 1: Linear Relationships
Desired Results

Standards	Transfer Goal(s) /Big Ideas
Priority *8.EEI.B.6* **Supplemental** *8.F.A.1* *8.F.A.2* *8.F.A.3* *8.F.B.4* *8.F.B.5* *8.EEI.5*	**Transfer Goal(s):** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● Linear relationships are functions between two quantities that contain a slope and can be modeled using graphs, equations, and contexts. ● Slope of a linear proportional relationship represents a constant rate of change.

Enduring Understandings	Essential Questions
Students will understand that… ● Slope can be found between any two distinct points. ● In a linear relationship, slope is the same between any two points. ● The same linear relationship can be modeled in a graph, table, equation, and context equivalently. ● A linear relationship is represented by the equation y = mx + b, where *m* is the slope and *b* is the y-intercept. ● A linear relationship assumes a starting	*Students will consider…* ● How can all relationships be modeled the same way? ● How can functions describe real-world situations, model predictions, and solve problems? ● How can relationship between two things help me make the best decision? ● Budget question (How can we use relationships between two quantities to budget?) ● What makes a linear relationship unique?

	value *b*, while a proportional relationship assume a starting value of 0. ● The relationship between two lines can be determined by comparing their slopes and y-intercepts.	

Learning Targets

Students will…

- I can apply my knowledge of patterns to discover slope.
- I can apply my knowledge of patterns to discover y-intercept.
- I can describe slope and y-intercept in terms of context
- I can apply slope and y-intercept to solve problems.
- I can model a linear relationship using an equation.
- I can identify a linear relationship.
- I can apply my knowledge of slope and y-intercept to create a table or graph from an equation of a line.
- I can model linear relationships using multiple representations (equivalence between representations).
- I can compare two functions using slope and y-intercept.
- I can compare functions represented in different ways.
- I can construct an equation when given two points.

Unit Duration:

- This unit will take 6 weeks (30 instructional days) including pre and post tests.

Unit 2: Solving Equations and Inequalities
Desired Results

Standards	Transfer Goal(s) /Big Ideas
Priority *8.EEI.C.7* **Supplemental**	**Transfer Goal(s):** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● Solving an equation/inequality is determining what value makes the statement true ● Any linear equation/inequality can be solved using inverse operations. ● Proportionality involves a relationship in which the ratio of two quantities remains constant as the corresponding values of the quantities change. ● Real world situations can be modeled and solved by using equations and inequalities.

Enduring Understandings	Essential Questions
Students will understand that… ● An inverse operation is the opposite operation. ● The distributive property is multiplicative. ● Multiply the outside term by each inside term when applying the distributive property to remove parentheses. ● The inequality sign is reversed when multiplying or dividing by a negative.	*Students will consider…* ● How can understanding a relationship between two things help me make the best decision? ● How does solving an equation compare to solving an inequality? ● How can I solve for an unknown variable?

Learning Targets
Students will… ● I can apply the distributive property to simplify expressions. ● I can apply my knowledge of combining like terms to simplify expressions. ● I can apply my knowledge of inverse operations to solve equations/inequalities. ● I can generalize situations of solving inequalities. ● I can model a situation with an equation.
Unit Duration:
● This unit will take 3 weeks (15 instructional days) including pre and post tests.

Week(s)	Topic	Resources/Texts	Learning Targets	Assessment
1	• Solving one-step equations (inverse operations) • Simplifying expressions: combining like terms and distributive property • Solving two-step equations (inverse operations)	• QT problem • Problem-based learning ● Appropriate text	● I can apply the distributive property to simplify expressions. ● I can apply my knowledge of combining like terms to simplify expressions. ● I can apply my knowledge of inverse operations to solve equations/inequalities.	
1	• Simplify and solve (inverse operations) • Solving equations with variables on both sides • Solving 2 step inequalities	● Great race problem ● Problem-based learning ● Appropriate text	• I can apply my knowledge of inverse operations to solve equations/inequalities. ● I can generalize situations of solving inequalities.	
1	• Graphing solutions to linear inequalities • Modeling scenarios with equations • Review and assessment	● Appropriate text	● I can apply my knowledge of inverse operations to solve equations/inequalities. ● I can generalize situations of solving inequalities. ● I can model a situation with an equation.	

Unit 3: Pythagorean Theorem
Desired Results

Standards	Transfer Goal(s) /Big Ideas
Priority *8.GM.B.7* **Supplemental** *8.GM.B.6* *8.GM.B.8* *8.NS.A.2* *8.EEI.A.2*	**Transfer Goal(s):** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● The Pythagorean Theorem and its converse are related to the formula used to determine the distance between two points on the coordinate plane. ● The Pythagorean Theorem can be used both algebraically and geometrically to solve problems involving right triangles. ● The Pythagorean Theorem can be used to find unknown side lengths in a coordinate plane and real world situation. ● The Pythagorean Theorem can only be used to find lengths of a right triangle or a line that can be modeled as a right triangle. ● Finding the square root of a number is the inverse operation of squaring that number. ● When given a non-perfect square, its value falls between two whole number (perfect squares).

	Enduring Understandings	Essential Questions
	Students will understand that… ● The Pythagorean Theorem is a geometric proof that can be derived and proved ○ Understand the connection between formula and model ○ How to label a right triangle based on the formula ● Pythagorean theorem can be applied to find unknown distances ● The Pythagorean Theorem only applies to right triangles ● The sum of the legs is longer than the hypotenuse, the hypotenuse is longer than each leg ● The side length of a square is the square root of the area ● Any two points on a coordinate grid can be turned into a line, that line can be turned into a right triangle, and the Pythagorean Theorem can be applied to find the distance ● Perfect squares from 1 to 20 ● How to estimate the value of imperfect square	*Students will consider…* ● How can I calculate an unknown distance? ● How can the Pythagorean Theorem be used to solve problems in life? ● What are the applications of the Pythagorean Theorem and its converse? ● Does where you live impact how you live?

Learning Targets
Students will… ● I can apply the Pythagorean Theorem to solve real world problems. ● I can derive the Pythagorean Theorem. ● I can apply the Pythagorean Theorem to find distance. ● I can explain the Pythagorean Theorem geometrically and algebraically. ● I can find the distance between two points using the Pythagorean Theorem. ● I can apply my number sense to estimate the square root of a number.
Unit Duration:
● This unit will take 3 weeks (15 instructional days) including pre and post tests.

Week(s)	Topic	Resources/Texts	Learning Targets	Assessment
1	• Estimating Square roots • Derive the Pythagorean Theorem • Apply the Pythagorean Theorem to find unknown distances • Solving word problems with the Pythagorean Theorem	• 6-8-10 problem • Pythagorean Theorem word problem document • Appropriate Text	• I can derive the Pythagorean Theorem. • I can apply the Pythagorean Theorem to find distance. • I can explain the Pythagorean Theorem geometrically and algebraically	
1	• Explaining the geometric proof of the Pythagorean Theorem • Is it a right triangle? • Determining the distance between two points • Application of the Pythagorean Theorem.	● Problem-based learning ● Application lessons • Appropriate text	• I can find the distance between two points using the Pythagorean Theorem. • I can explain the Pythagorean Theorem geometrically and algebraically. • I can apply the Pythagorean Theorem to find distance. • I can apply the Pythagorean Theorem to solve real world problems	
1	• Application of the Pythagorean Theorem • Multi-step Pythagorean Theorem problems • Review and Assessment	• Application lessons • Appropriate text	• I can apply the Pythagorean Theorem to find distance. ● I can apply the Pythagorean Theorem to solve real world problems	

Unit 4: Volume/Surface Area
Desired Results

Standards	Transfer Goal(s) /Big Ideas	
<u>Priority</u> *8.GM.C.9* **<u>Supplemental</u>**	**Transfer Goal(s):** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● To find the surface area of a three-dimensional figure, find the sum of the areas of all the surfaces of the figure. ● You can find the volume of a prism, cylinder, pyramid, and cone when you know the area of the base and the height of the figure, and spheres when you know the radius. ● You can use ratios to compare the areas and volumes of similar solids.	
	Enduring Understandings	**Essential Questions**
	Students will understand that… ● Surface area is the sum of the areas from each side of the figure ● How to use area formulas for two dimensional figures to calculate the surface area for three dimensional figures ● Volume is function of the area of the base and a figures height ● The volume formulas for a cone, sphere, and pyramid ● How to solve real-world problems using the volume formulas. ●	*Students will consider…* ● How can you determine the surface area and volume of three dimensional figures? ● How can you find and compare the areas and volumes of similar solids? ● How do we take a geometric approach to solving a problem?

Learning Targets
Students will… ● I can find the surface area of rectangular and triangular pyramids. ● I can apply my knowledge of surface area to solve problems. ● I can derive the volume formulas for cylinder, cone, and pyramids. ● I can apply the volume formulas of a cylinder, cone, pyramid, and sphere to find unknown volumes. ● I can apply the volume formulas to solve real world problems. ● I can apply my knowledge of the Pythagorean Theorem to find the slant height and volume of a cone.
Unit Duration:
● . This unit will take 3 weeks (15 instructional days) including pre and post tests.

Week(s)	Topic	Resources/Texts	Learning Targets	Assessment
1	Surface area of pyramids Application of surface area Deriving the volume formulas for a cylinder, cone, and pyramid	Problem-based learning lessons Appropriate textbook	● I can find the surface area of rectangular and triangular pyramids. ● I can apply my knowledge of surface area to solve problems. ● I can derive the volume formulas for cylinder, cone, and pyramids.	
1	Deriving the volume formulas for a cylinder, cone, and pyramid Volume of a sphere Applying the volume formulas to solve problems	● Problem-based learning lessons ● Appropriate textbook	● I can derive the volume formulas for cylinder, cone, and pyramids. ● I can apply the volume formulas of a cylinder, cone, pyramid, and sphere to find unknown volumes. ● I can apply the volume formulas to solve real world problems.	
1	Applying the volume formulas to solve problems Slant height and volume of a cone. Review and assessment	● Problem-based learning lessons ● Appropriate textbook	● I can apply the volume formulas to solve real world problems. ● I can apply my knowledge of the Pythagorean Theorem to find the slant height and volume of a cone.	

Unit 5: Scatterplots
Desired Results

<table>
<tr><th>Standards</th><th colspan="2">Transfer Goal(s) /Big Ideas</th></tr>
<tr><td rowspan="3"><u>Priority</u>
8.DSP.A.3

<u>Supplemental</u>
8.DSP.A.1
8.DSP.A.2</td><td colspan="2">Transfer Goal(s):
We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have:
1) Mathematical literacy.
2) A complete mathematical skill set.
3) An understanding of the real life applications of mathematics.
Big Ideas:
● Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools, and technology.
● Data can be analyzed to make informed decisions using a variety of strategies, tools and technology.</td></tr>
<tr><th>Enduring Understandings</th><th>Essential Questions</th></tr>
<tr><td>Students will understand that…
● Data can be modeled with relationships to make predictions.
● Data can be modeled specifically with a linear relationship to make predictions
● Correlation is a relationship between two variables
● A data set can have no, positive, or negative correlation/trend
● Bivariate data can be modeled with a line of best fit to make predictions
● A line of best fit has a slope and y-intercept</td><td>Students will consider…
● How can we use scatter plots to draw conclusions and make predictions about real world situations?
● Can we always draw conclusions and make predictions using a scatter plot?</td></tr>
</table>

Learning Targets
Students will… ● Analyze two sets of data to determine if they have a relationship (Positive (linear) association/trend/correlation, negative, no correlation) ● Describe the relationship present with a scatterplot ● Make predictions using scatter plots ● Create a line of best fit for scatter plots with a linear correlation ● Use a line of best fit to draw conclusions about data by applying slope and y-intercept to construct equations
Unit Duration:
● This unit will take 1.5 weeks (8 instructional days) including pre and post tests.

Week(s)	Topic	Resources/Texts	Learning Targets	Assessment
1	● Correlation, association, trend ● Line of Best Fit	● Problem-based learning lessons ● Appropriate textbook	● I can analyze two sets of data to determine if they have a relationship ● I can use line of best fit to draw conclusions about data by applying slope and y-intercept to construct equations.	
0.5	● Line of Best Fit(Cont.) ● Conclusions and predictions using equation for line of best fit	● Problem-based learning lessons ● Appropriate textbook	● I can create a line of best fit for a linear correlation ● I can use line of best fit to draw conclusions about data by applying slope and y-intercept	

Unit 6: Transformations
Desired Results

Standards	Transfer Goal(s) /Big Ideas
Priority *8.GM.A.3* **Supplemental** *8.GM.A.1* *8.GM.A.2*	**Transfer Goal(s)** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● An image and a preimage are congruent after transformations, specifically a rotation, reflection, or translation, are applied to the coordinate points. ● An image and a preimage are similar after transformations of any kind are applied to the coordinate points. ● Each transformation has a specific set of rules that can be applied to the coordinate points of a preimage to construct a new image.

Enduring Understandings	Essential Questions
Students will understand that… ● Rigid transformations i.e. reflections, rotations, and translation do not affect size and shape of the preimage therefore they are similar and congruent ● Dilations do affect the size and shape of a preimage therefore the new image is similar ● How to describe sequence of transformations between an image and preimage	*Students will consider…* ● What relationship's can we determine through transformed images and preimages?

	● Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.	

Learning Targets

Students will…

- Describe how to reflect an image.
- Describe how to rotate an image.
- Describe how to translate an image.
- Describe how to dilate an image.
- Determine what sequence of transformations led from the preimage to the transformed image.
- Apply their knowledge of transformations to determine whether a transformed image is congruent or similar to the preimage.

Unit Duration:

- This unit will take 1.5 weeks (8 instructional days) including pre and post tests.

Week(s)	Topic	Resources/Texts	Learning Targets	Assessment
1	Properties of transformations - describe how to complete each transformation	• Problem-based learning lessons • Appropriate textbook	• I can describe a possible sequence of transformations between two figures.	
0.5	Application of rigid transformations Similarity and congruence	• Problem-based learning lessons • Appropriate textbook	• I can describe how rigid transformations affect the coordinate points of a preimage • I can describe whether the transformed image is similar or congruent to the preimage	

Unit 7: Angle Measurements/Relationships
Desired Results

<table>
<tr><th>Standards</th><th>Transfer Goal(s) /Big Ideas</th></tr>
<tr><td><u>Priority</u>
8.GM.A.5

<u>Supplemental</u>
● 8.GM.A.5 Explore angle relationships and establish informal arguments.
○ a. Derive the sum of the interior angles of a triangle.
○ b. Explore the relationship between the interior and exterior angles of a triangle.
○ c. Construct and explore the angles created when parallel lines are cut by a transversal.
○ d. Use the properties of similar figures to solve problems.</td><td>Transfer Goal(s)
We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have:
1) Mathematical literacy.
2) A complete mathematical skill set.
3) An understanding of the real life applications of mathematics.

Big Ideas:
● Angle relationships can be applied to solve problems

Enduring Understandings
Students will understand that…
● Angles have specific relationships, those relationships can be used to find unknown angle measurements
● When parallel lines are cut by a transversal, eight angles are created that have specific relationships.
● A triangle and straight line have an angle sum of 180^0.
● Properties of angle relationships can be applied to solve problems
●

Essential Questions
Students will consider…
● How can properties of congruence be used to solve problems?</td></tr>
</table>

Learning Targets
Students will… ● Identify and apply relationships of interior and exterior angles of triangles. ● Identify and apply angle relationships of parallel lines cut by a transversal. ● Use angle relationships to solve problems.
Unit Duration:
● This unit will take 1.5 weeks (8 instructional days) including pre and post tests.

Week(s)	Topic	Resources/Texts	Learning Targets	Assessment
1	Interior and exterior angles of triangles	● Problem-based learning lessons ● Appropriate textbook	● I can identify and apply relationships of interi ● ● or and exterior angles of triangles. ● I can use angle relationships to solve problems.	
0.5	Parallel lines cut by a transversal	● Problem-based learning lessons ● Appropriate textbook	● I can identify and apply angle relationships of parallel lines cut by a transversal. ● I can use angle relationships to solve problems.	

Unit 8: Systems of Equations
Desired Results

Standards	Transfer Goal(s) /Big Ideas	
Priority *8.EEI.C.8* **Supplemental** *8.EEI.C.7*	**Transfer Goal(s)** We will use critical thinking, perseverance, collaboration, problem-solving, and communication, to ensure that students have: 1) Mathematical literacy. 2) A complete mathematical skill set. 3) An understanding of the real life applications of mathematics. **Big Ideas:** ● Solve systems of two linear equations	
	Enduring Understandings	**Essential Questions**
	Students will understand that… ● Equations can have infinitely many solutions, no solutions or one solution. ● Solutions of equations that have one solution are shown by intersections on a graph ● Systems of Equations that have no solution are represented by parallel lines. ● Systems of Equations that have infinite solutions have the same slope and y-intercept (same line). ● Systems of equations can be solved graphically, or algebraically.	*Students will consider…* ● What are the advantages and disadvantages of solving a system of linear equations graphically versus algebraically? ● How can systems of equations be used to represent situations and solve problems?

Learning Targets
Students will… ● Solve systems of equations graphically ● Solve systems of equations algebraically ● Describe the solutions to a systems of equations
Unit Duration:
● . This unit will take 2 weeks (10 instructional days) including pre and post tests.

Week(s)	Topic	Resources/Texts	Learning Targets	Assessment
1	● Solve systems of equations graphically ● Describe the solutions to a systems of equations	● Problem-based learning lessons ● Appropriate textbook	I can solve systems graphically. I can describe the solutions to a systems of equations.	
1	● Solve systems of equations algebraically ● Describe the solutions to a systems of equations	● Problem-based learning lessons ● Appropriate textbook	I can solve systems of algebraically. I can describe the solutions to a systems of equations.	

8th grade Math			
Unit 1: Linear Relationships			
Grade: 8th Grade			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student can:** ● Calculate/identify a slope from a table, graph, two points, or contextualized situation ● Calculate /identify a y-intercept from a table, graph, two points, or contextualized situation ● Create a linear equation. **The student exhibits no major conceptual errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** ● Calculate/identify a slope from a table, graph, two points, or contextualized situation ● Calculate /identify a y-intercept from a table, graph, two points, or contextualized situation ● Create a linear equation. **However, the student exhibits major conceptual errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Pre-Algebra			
Unit 2:			
Grade: 8th Grade			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Apply the distributive property to simplify expressions. ● Apply my knowledge of combining like terms to simplify expressions. ● Apply my knowledge of inverse operations to solve equations/inequalities. ● Generalize situations of solving inequalities. ● Model a situation with an equation. **The student exhibits no major conceptual errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** **However, the student exhibits major conceptual errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

8th grade Math			
Unit 3: Pythagorean Theorem			
Grade: 8th Grade			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The students can:** ● Describe the conceptual foundation of the Pythagorean theorem and how it works ● Determine a missing side length of a triangle given two other side lengths ● Apply the Pythagorean theorem to solve problems **The student exhibits no major conceptual errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** ● Describe the conceptual foundation of the Pythagorean theorem and how it works ● Determine a missing side length of a triangle given two other side lengths ● Apply the Pythagorean theorem to solve problems **However, the student exhibits major conceptual errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Pre-Algebra			
Unit 4:			
Grade: 8th Grade			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Find the surface area of rectangular and triangular pyramids. ● Apply my knowledge of surface area to solve problems. ● Derive the volume formulas for cylinder, cone, and pyramids. ● Apply the volume formulas of a cylinder, cone, pyramid, and sphere to find unknown volumes. ● Apply the volume formulas to solve real world problems. ● Apply my knowledge of the Pythagorean Theorem to find the slant height and volume of a cone. **The student exhibits no major conceptual errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** **However, the student exhibits major conceptual errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Pre-Algebra			
Unit 5:			
Grade: 8th Grade			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Analyze two sets of data to determine if they have a relationship (Positive (linear) association/trend/correlation, negative, no correlation) ● Describe the relationship present with a scatterplot ● Make predictions using scatter plots ● Create a line of best fit for scatter plots with a linear correlation ● Use a line of best fit to draw conclusions about data by applying slope and y-intercept to construct equations **The student exhibits no major conceptual errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** **However, the student exhibits major conceptual errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Pre-Algebra			
Unit 6:			
Grade: 8th Grade			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Describe how to reflect an image. ● Describe how to rotate an image. ● Describe how to translate an image. ● Describe how to dilate an image. ● Determine what sequence of transformations led from the preimage to the transformed image. ● Apply their knowledge of transformations to determine whether a transformed image is congruent or similar to the preimage. **The student exhibits no major conceptual errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** **However, the student exhibits major conceptual errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Pre-Algebra			
Unit 7:			
Grade: 8th Grade			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Identify and apply relationships of interior and exterior angles of triangles. ● Identify and apply angle relationships of parallel lines cut by a transversal. ● Use angle relationships to solve problems. **The student exhibits no major conceptual errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** **However, the student exhibits major conceptual errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

Pre-Algebra			
Unit 8:			
Grade: 8th Grade			
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**		**Sample Activities**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
Score 3.0	**The student:** ● Solve systems of equations graphically ● Solve systems of equations algebraically ● Describe the solutions to a systems of equations **The student exhibits no major conceptual errors or omissions.**		
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.	
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** **However, the student exhibits major conceptual errors or omissions regarding the more complex ideas and processes.**		
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.	
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**		
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.	
Score 0.0	**Even with help, no understanding or skill demonstrated.**		

APPENDIX

Grade 7 Grade-Level Expanded Expectations

RATIOS AND PROPORTIONAL RELATIONSHIPS: RP

7.RP.A	**Analyze proportional relationships and use them to solve problems.**	
7.RP.A.1	Compute unit rates, including those that involve complex fractions, with like or different units.	The expectation of the student is to compute unit rates, including those that involve complex fractions, with like or different units.
7.RP.A.2	Recognize and represent proportional relationships between quantities. a) Determine when two quantities are in a proportional relationship. b) Identify and/or compute the constant of proportionality (unit rate). c) Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation. d) Recognize that the graph of any proportional relationship will pass through the origin.	The expectation of the student is to recognize and represent proportional relationships between quantities in equations, tables, graphs, diagrams and real-world situations. The quantities y and x are proportional if $\frac{y}{x}$ is a constant. a. Determine when two quantities are in a proportional relationship. b. Identify and/or compute the constant of proportionality (unit rate). c. Explain what a point (*x, y*) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate. d. Recognize that the graph of any proportional relationship will pass through the origin.
7.RP.A.3	Solve problems involving ratios, rates, percentages and proportional relationships.	The expectation of the student is to solve real-world and mathematical problems involving ratios and percentages using proportional relationships such as simple interest, tax markups and markdowns, gratuities and commissions, fees, percent increase and decrease and percent error.

NUMBER SENSE AND OPERATIONS: NS		
7.NS.A	**Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.**	
7.NS.A.1	Apply and extend previous understandings of numbers to add and subtract rational numbers. a) Add and subtract rational numbers. b) Represent addition and subtraction on a horizontal or vertical number line. c) Describe situations and show that a number and its opposite have a sum of 0 (additive inverses). d) Understand subtraction of rational numbers as adding the additive inverse. e) Determine the distance between two rational numbers on the number line is the absolute value of their difference. f) Interpret sums and differences of rational numbers.	The expectation of the student is to apply and extend previous understandings of numbers to add and subtract rational numbers. a. Add and subtract rational numbers to include fractions, decimals and integers. b. Represent addition and subtraction on a horizontal or vertical number line. c. Describe situations and show that a number and its opposite have a sum of 0 (are additive inverses). d. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. e. Show that the distance between two rational numbers on the number line is the absolute value of their difference. f. Interpret sums and differences of rational numbers by describing real world contexts.

7.NS.A.2	Apply and extend previous understandings of numbers to multiply and divide rational numbers. a) Multiply and divide rational numbers. b) Determine that a number and its reciprocal have a product of 1 (multiplicative inverse). c) Understand that every quotient of integers (with non-zero divisor) is a rational number. d) Convert a rational number to a decimal. e) Understand that all rational numbers can be written as fractions or decimal numbers that terminate or repeat. f) Interpret products and quotients of rational numbers by describing real-world contexts.	The expectation of the student is to apply and extend previous understandings of numbers to multiply and divide rational numbers. a. Multiply and divide rational numbers to include fractions, decimals and integers. b. Determine that a number and its reciprocal have a product of 1 (multiplicative inverse). c. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. d. Convert a rational number to a decimal using long division. e. Understand that some rational numbers can be written as integers and all rational numbers can be written as fractions or decimal numbers that terminate or repeat. f. Interpret products and quotients of rational numbers by describing real-world contexts.
7.NS.A.3	Solve problems involving the four arithmetic operations with rational numbers.	The expectation of the student is to solve real-world and mathematical problems involving the four arithmetic operations with rational numbers.
EXPRESSIONS, EQUATIONS AND INEQUALITIES: EEI		
7.EEI.A	**Use properties of operations to generate equivalent expressions.**	
7.EEI.A.1	Apply properties of operations to simplify and to factor linear algebraic expressions with rational coefficients.	The expectation of the student is to apply properties of operations (*e.g.*, *commutative*, *associative*, *distributive*) to simplify and to factor linear algebraic expressions with rational coefficients.
7.EEI.A.2	Understand how to use equivalent expressions to clarify quantities in a problem.	The expectation of the student is to understand how to use equivalent expressions to clarify quantities in a problem context. (*e.g., Adding a 5% tax to the total is the same as multiplying the total by 1.05; a + 0.05a = 1.05a.)*
7.EEI.B	**Solve problems using numerical and algebraic expressions and equations.**	

7.EEI.B.3	Solve multi-step problems posed with rational numbers. a) Convert between equivalent forms of the same number. b) Assess the reasonableness of answers using mental computation and estimation strategies.	The expectation of the student is to solve multistep real-life and mathematical problems posed with positive and negative rational numbers in any form (*e.g., integers, fractions and decimals*) by applying properties of operations as strategies to calculate with numbers. a. Convert between forms as appropriate. b. Assess the reasonableness of answers using mental computation and estimation strategies.
7.EEI.B.4	Write and/or solve linear equations and inequalities in one variable. a) Write and/or solve equations of the form x+p = q and px = q in which p and q are rational numbers. b) Write and/or solve two-step equations of the form px + q = r and p(x + q) = r, where p, q and r are rational numbers, and interpret the meaning of the solution in the context of the problem. c) Write, solve and/or graph inequalities of the form px + q > r or px + q < r, where p, q and r are rational numbers.	The expectation of the student is to write and/or solve real-world and mathematical problems by using and solving linear equations and inequalities in one variable. a. Write and solve equations of the form *x*+p = q and p*x* = q in which p and q are rational numbers. b. Write and solve two-step equations of the form p*x* + q = r and p(*x* + q) = r, where p, q and r are rational numbers and interpret the meaning of the solution in the context of the problem. c. Write and solve inequalities of the form p*x* + q > r or p*x* + q < r, where p, q and r are rational numbers. d. Write, solve and/or graph the solution set of the inequality and interpret it in the context of a problem.
GEOMETRY AND MEASUREMENT: GM		
7.GM.A	**Draw and describe geometrical figures and describe the relationships between them.**	
7.GM.A.1	Solve problems involving scale drawings of real objects and geometric figures, including computing actual lengths and areas from a scale drawing and reproducing the drawing at a different scale.	The expectation of the student is to solve problems involving scale drawings of real-world objects and geometric figures, including computing actual lengths and areas from a scale drawing and reproducing the drawing at a different scale.

7.GM.A.2	Use a variety of tools to construct geometric shapes. a) Determine if provided constraints will create a unique triangle through construction. b) Construct special quadrilaterals given specific parameters.	The expectation of the student is to use a variety of tools (freehand, ruler, protractor and/or technology) to construct geometric shapes. a. Construct triangles given 3 sides, given 3 angles or given a combination of 3 sides and/or angles and decide if the measurements determine a unique triangle, more than one triangle or no triangle. b. Construct special quadrilaterals given specific parameters about angles or sides. (e.g., kite, trapezoid, rhombus, parallelogram and rectangle)
7.GM.A.3	Describe two-dimensional cross sections of pyramids, prisms, cones and cylinders.	The expectation of the student is to describe two-dimensional cross sections of pyramids, cones, cylinders and prisms including cross-sections that are not necessarily parallel to the base of the figure.
7.GM.A.4	Understand concepts of circles. a) Analyze the relationships among the circumference, the radius, the diameter, the area and Pi in a circle. b) Know and apply the formulas for circumference and area of circles to solve problems.	The expectation of the student is to understand concepts of circles. a. Demonstrate an understanding of the relationships among radius, diameter and circumference of a circle. b. Understand the relationship among the circumference, the diameter and π. c. Explore the relationship between circumference and area of a circle. d. Know and apply the formulas for circumference and area of circles to solve real-world and mathematical problems.
7.GM.B	**Apply and extend previous understanding of angle measure, area and volume.**	
7.GM.B.5	Use angle properties to write and solve equations for an unknown angle.	The expectation of the student is to use facts about supplementary, complementary, vertical and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

7.GM.B.6	Understand the relationship between area, surface area and volume. a) Find the area of triangles, quadrilaterals and other polygons composed of triangles and rectangles. b) Find the volume and surface area of prisms, pyramids and cylinders.	The expectation of the student is to understand the relationship between area, surface area and volume. Solve real-world and mathematical problems involving area, volume and surface area. a. Understand the concept of area and find area of triangles, quadrilaterals and other polygons composed of triangles and rectangles. b. Understand the concepts of volume and surface area and find related measures for cubes, right triangular prisms and pyramids, right rectangular prisms and pyramids and cylinders.
DATA ANALYSIS, STATISTICS AND PROBABILITY: DSP		
7.DSP.A	**Use random sampling to draw inferences about a population.**	
7.DSP.A.1	Understand that statistics can be used to gain information about a population by examining a sample of the population. a) Understand that a sample is a subset of a population. b) Understand that generalizations from a sample are valid only if the sample is representative of the population. c) Understand that random sampling is used to produce representative samples and support valid inferences.	The expectation of the student is to understand that statistics can be used to gain information about a population by examining a sample of the population. a. Understand that a sample is a subset of a population and both the sample and the population have similar characteristics. b. Understand that generalizations from a sample are valid only if the sample is representative of the population. c. Understand that random sampling is used to produce representative samples and support valid inferences.
7.DSP.A.2	Use data from multiple samples to draw inferences about a population and investigate variability in estimates of the characteristic of interest.	The expectation of the student is to use data from multiple samples to draw inferences about a population and investigate variability in estimates of the characteristic of interest. *(e.g., Estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data; gauge how far off each of the estimates or predictions might be.)*
7.DSP.B	**Draw informal comparative inferences about two populations.**	

7.DSP.B.3	Analyze different data distributions using statistical measures.	The expectation of the student is to analyze different data distributions using statistical measures. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. (*e.g., The mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.)*
7.DSP.B.4	Compare the numerical measures of center, measures of frequency and measures of variability from two random samples to draw inferences about the population.	The expectation of the student is to compare the numerical measures of center (mean and median), measures of frequency (mode) and measures of variability (range, interquartile range and mean absolute deviation) from two random samples to draw inferences about the populations.
7.DSP.C	**Develop, use and evaluate probability models.**	
7.DSP.C.5	Investigate the probability of chance events. a) Determine probabilities of simple events. b) Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.	The expectation of the student is to investigate probability of chance events. a. Determine probabilities of simple (single) events. b. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. c. Understand that a probability near 0 indicates an unlikely event, a probability near 1/2 indicates an event that is neither unlikely nor likely and a probability near 1 indicates a likely event.
7.DSP.C.6	Investigate the relationship between theoretical and experimental probabilities for simple events. a) Predict outcomes using theoretical probability. b) Perform experiments that model theoretical probability. c) Compare theoretical and experimental probabilities.	The expectation of the student is to investigate the relationship between theoretical and experimental probabilities for simple events. a. Predict outcomes using theoretical probability. b. Perform experiments that model theoretical probability. c. Compare theoretical and experimental probabilities.

7.DSP.C.7	Explain possible discrepancies between a developed probability model and observed frequencies. a) Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. b) Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.	The expectation of the student is to explain possible discrepancies between a developed probability model and observed frequencies. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes and use the model to determine probabilities of events. (*e.g., If a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.)* b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. (*e.g., Find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?)*
7.DSP.C.8	Find probabilities of compound events using organized lists, tables, tree diagrams and simulations. a) Represent the sample space of a compound event. b) Design and use a simulation to generate frequencies for compound events.	The expectation of the student is to find probabilities of compound events using organized lists, tables, tree diagrams and simulations. a. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (*e.g., "rolling double sixes"*), identify the outcomes in the sample space which compose the event. b. Design and use a simulation to generate frequencies for compound events.

Grade 8 Grade-Level Expanded Expectations

NUMBER SENSE AND OPERATIONS: NS		
8.NS.A	**Know that there are numbers that are not rational, and approximate them by rational numbers.**	
8.NS.A.1	Explore the real number system. 1. Know the differences between rational and irrational numbers. 2. Understand that all rational numbers have a decimal expansion that terminates or repeats. 3. Convert decimals which repeat into fractions and fractions into repeating decimals. 4. Generate equivalent representations of rational numbers.	The expectation of the student is to explore the real number system. a. Know the differences between rational and irrational numbers. b. Understand that all rational numbers have a decimal expansion that terminates or repeats. c. Convert decimals which repeat into fractions and fractions into repeating decimals. d. Generate equivalent representations of rational numbers (fractions, decimals and percentages).
8.NS.A.2	Estimate the value and compare the size of irrational numbers and approximate their locations on a number line.	The expectation of the student is to estimate the value and compare the size of irrational numbers and approximate their locations on a number line. (e.g., $\pi, \sqrt{2}, \sqrt{3}$, etc.)
EXPRESSIONS, EQUATIONS AND INEQUALITIES: EEI		
8.EEI.A	**Work with radicals and integer exponents.**	
8.EEI.A.1	Know and apply the properties of integer exponents to generate equivalent expressions.	The expectation of the student is to know and apply the properties of integer exponents to generate equivalent numerical expressions including expressions with more than one operation.

8.EEI.A.2	Investigate concepts of square and cube roots. a) Solve equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. b) Evaluate square roots of perfect squares less than or equal to 625 and cube roots of perfect cubes less than or equal to 1000. c) Recognize that square roots of non-perfect squares are irrational.	The expectation of the student is to investigate concepts of square and cube roots. a. 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. b. Evaluate square roots of perfect squares less than or equal to 625 and cube roots of perfect cubes less than or equal to 1000. c. Recognize that square roots of non-perfect squares are irrational. (*e.g., explain why numbers are or are not perfect squares using area models)*
8.EEI.A.3	Express very large and very small quantities in scientific notation and approximate how many times larger one is than the other.	The expectation of the student is to express very large and very small quantities in scientific notation and approximate how many times larger one is than the other.
8.EEI.A.4	Use scientific notation to solve problems. a) Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. b) Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities.	The expectation of the student is to use scientific notation to solve real-world and mathematical problems. a. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. b. 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 tectonic plate movement.)* c. Input and interpret scientific notation using technology. (e.g., different types of calculators)
8.EEI.B	**Understand the connections between proportional relationships, lines and linear equations.**	
8.EEI.B.5	Graph proportional relationships. a) Interpret the unit rate as the slope of the graph. b) Compare two different proportional relationships.	The expectation of the student is to graph proportional relationships a. Interpreting the unit rate as the slope of the graph. b. Compare two different proportional relationships given multiple representations including tables, graphs and equations.

8.EEI.B.6	Apply concepts of slope and y-intercept to graphs, equations and proportional relationships. a) Explain why the slope (m) is the same between any two distinct points on a non-vertical line in the Cartesian coordinate plane. b) 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.	The expectation of the student is to apply concepts of slope and *y*-intercept to graphs, equations and proportional relationships. a. Explain why the slope m is the same between any two distinct points on a non-vertical line in the Cartesian coordinate plane. b. 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.EEI.C	**Analyze and solve linear equations and inequalities and pairs of simultaneous linear equations.**	
8.EEI.C.7	Solve linear equations and inequalities in one variable. a) Create and identify linear equations with one solution, infinitely many solutions or no solutions. b) Solve linear equations and inequalities with rational number coefficients, including equations and inequalities whose solutions require expanding expressions using the distributive property and combining like terms.	The expectation of the student is to solve linear equations and inequalities in one variable. a. Give examples of linear equations with one solution, infinitely many solutions or no solutions. b. Solve linear equations and inequalities with rational number coefficients, including equations and inequalities whose solutions require expanding expressions using the distributive property and combining like terms.

8.EEI.C.8	Analyze and solve systems of linear equations. a) Graph systems of linear equations and recognize the intersection as the solution to the system. b) Explain why solution(s) to a system of two linear equations in two variables correspond to point(s) of intersection of the graphs. c) Explain why systems of linear equations can have one solution, no solution or infinitely many solutions. d) Solve systems of two linear equations.	The expectation of the student is to analyze and solve systems of linear equations. a. Graph systems of linear equations and recognize the approximation of their intersection as the solution to the system. b. Explain why solution(s) to a system of two linear equations in two variables correspond to point(s) of intersection of their graphs. c. Explain why systems of linear equations can have one solution, no solution or infinitely many solutions. d. Solve systems of two linear equations in two variables algebraically, including methods of substitution and elimination or through inspection. e. Solve real-world and mathematical problems leading to two linear equations in two variables.
GEOMETRY AND MEASUREMENT: GM		
8.GM.A	**Understand congruence and similarity using physical models, transparencies or geometry software.**	
8.GM.A.1	Verify experimentally the congruence properties of rigid transformations. a) Verify that angle measure, betweenness, collinearity and distance are preserved under rigid transformations. b) Investigate if orientation is preserved under rigid transformations.	The expectation of the student is to verify experimentally the congruence properties of rigid transformations (rotations, reflections and translations). a. Verify that betweenness, collinearity and distance are preserved under rigid transformations. b. Verify that lines are mapped to lines, including parallel lines. c. Verify that corresponding angles are congruent. d. Verify that corresponding line segments are congruent. e. Investigate if orientation is preserved under rigid transformations.

8.GM.A.2	Understand that two-dimensional figures are congruent if a series of rigid transformations can be performed to map the pre-image to the image. a) Describe a possible sequence of rigid transformations between two congruent figures.	The expectation of the student is to understand that two-dimensional figures are congruent if a series of rigid transformations (rotations, reflections, translations) can be performed to map the pre-image to the image. Given two congruent figures, describe the sequence of transformations that justifies the congruence between them.
8.GM.A.3	Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.	The expectation of the student is to describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates. (limit the center of rotation to a vertex of the figure or the origin)
8.GM.A.4	Understand that two-dimensional figures are similar if a series of transformations (rotations, reflections, translations and dilations) can be performed to map the pre-image to the image. a) Describe a possible sequence of transformations between two similar figures.	The expectation of the student is to understand that two-dimensional figures can be similar if a series of transformations (rotations, reflections, translations and dilations) can be performed to map the pre-image to the image. Given two similar figures, describe a sequence of transformations that justifies the similarity between them.
8.GM.A.5	Explore angle relationships and establish informal arguments. a) Derive the sum of the interior angles of a triangle. b) Explore the relationship between the interior and exterior angles of a triangle. c) Construct and explore the angles created when parallel lines are cut by a transversal. d) Use the properties of similar figures to solve problems.	The expectation of the student is to explore angle relationships and establish informal arguments for the following: a. The sum of the angles in a triangle. b. The relationship between the interior and exterior angles of a triangle. c. The angles created when parallel lines are cut by a transversal. d. Congruent corresponding angles in similar figures.
8.GM.B	**Understand and apply the Pythagorean Theorem.**	
8.GM.B.6	Use models to demonstrate a proof of the Pythagorean Theorem and its converse.	The expectation of the student is to use models to demonstrate a proof of the Pythagorean Theorem and its converse.

8.GM.B.7	Use the Pythagorean Theorem to determine unknown side lengths in right triangles in problems in two- and three-dimensional contexts.	The expectation of the student is to use the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensional contexts.
8.GM.B.8	Use the Pythagorean Theorem to find the distance between points in a Cartesian coordinate system.	The expectation of the student is to use the Pythagorean Theorem to find the distance between two points in a coordinate system.
8.GM.C	**Solve problems involving volume of cones, pyramids and spheres.**	
8.GM.C.9	Solve problems involving surface area and volume. a) Understand the concept of surface area and find surface area of pyramids. b) Understand the concepts of volume and find the volume of pyramids, cones and spheres.	The expectation of the student is to solve real-world and mathematical problems involving surface area and volume. a. Understand the concept of surface area and find surface area of pyramids (triangular and rectangular). b. Understand the concepts of volume and find the relationships among pyramids (triangular and rectangular), cones and spheres.
DATA ANALYSIS, STATISTICS AND PROBABILITY: DSP		
8.DSP.A	**Investigate patterns of association in bivariate data.**	
8.DSP.A.1	Construct and interpret scatter plots of bivariate measurement data to investigate patterns of association between two quantities.	The expectation of the student is to construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative correlation, linear association and nonlinear association.
8.DSP.A.2	Generate and use a trend line for bivariate data, and informally assess the fit of the line.	The expectation of the student is to know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally find a line of best fit and informally assess the fit of the line by evaluating the closeness of the data points to the line. a. Understand that not all trend lines start at the origin. b. Know that not all trend lines pass through the data points.

8.DSP.A.3	Interpret the parameters of a linear model of bivariate measurement data to solve problems.	The expectation of the student is to use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. (*e.g., In a linear model for a biology experiment, interpret a slope of 1.5 mm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 mm in mature plant height.)*
8.DSP.A.4	Understand the patterns of association in bivariate categorical data displayed in a two-way table. a) Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. b) Use relative frequencies calculated for rows or columns to describe possible association between the two variables.	The expectation of the student is to understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. a. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. b. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. (*e.g., Collect data from students in your class on whether or not they ride a bus to school and whether or not they have assigned chores at home. Is there evidence that those who ride a bus also tend to have chores?)*
FUNCTIONS: F		
8.F.A	**Define, evaluate and compare functions.**	
8.F.A.1	Explore the concept of functions. (The use of function notation is not required.) a) Understand that a function assigns to each input exactly one output. b) Determine if a relation is a function. c) Graph a function.	The expectation of the student is to explore the concept of functions. (The use of function notation is not required.) a. Understand that a function assigns to each input exactly one output. b. Determine if a relation is a function using multiple representations including mappings, tables and graphs. c. Graph a function from a table of values.
8.F.A.2	Compare characteristics of two functions each represented in a different way.	The expectation of the student is to compare characteristics of two functions each represented in a different way. (*e.g., algebraically, graphically, numerically in tables or by verbal description)*

8.F.A.3	Investigate the differences between linear and nonlinear functions. a) Interpret the equation y = mx + b as defining a linear function, whose parameters are the slope (m) and the y-intercept (b). b) Recognize that the graph of a linear function has a constant rate of change c) Give examples of nonlinear functions.	The expectation of the student is to investigate the differences between linear and nonlinear functions. a. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line. b. Recognize that the graph of a linear function has a constant rate of change. c. Give examples of nonlinear functions.
8.F.B	**Use functions to model relationships between quantities.**	
8.F.B.4	Use functions to model linear relationships between quantities. a) Explain the parameters of a linear function based on the context of a problem. b) Determine the parameters of a linear function. c) Determine the x-intercept of a linear function.	The expectation of the student is to use functions to model linear relationships between quantities. a. Understand that the slope is the constant rate of change and the initial value is the *y*-intercept. Describe their meanings in the context of a given situation. b. Determine the slope and the *y*-intercept of a linear function given a description of the relationship or from two points, tables or graphs. c. Determine the *x*-intercept, if it exists. Describe its meaning in the context of a given situation.
8.F.B.5	Describe the functional relationship between two quantities from a graph or a verbal description.	The expectation of the student is to describe the functional relationship between two quantities from a graph (*e.g., constant, increasing/decreasing, linear/nonlinear and continuous/discontinuous*) and be able to sketch a graph given a verbal description.