GRADE SEVEN				
MATHEMATICS		KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS		*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
CLUSTER	*Analyze Proportional Relationships And Use Them To Solve Real-World And Mathematical Problems.*			
DOMAIN	*Rations and Proportional Relationships*			
7.RP.1: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.				• Compute unit rates associated with ratios of fractions in like or different units
7.RP.2: Recognize and represent proportional relationships between quantities.		• Know that a proportion is a statement of equality between two ratios • Define a constant of proportionality as a unit rate • Recognize what (0, 0) represents on the graph of a proportional relationship • Recognize what (1, r) on a graph represents, where r is the unit rate	• Analyze two ratios to determine if they are proportional to one another with a variety of strategies (e.g., using tables, graphs, pictures, etc.) • Analyze tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships to identify the constant of proportionality • Represent proportional relationships by writing equations • Represent proportional relationships by writing equations	• Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. • Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. • Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn. • 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.
7.RP.3: Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.		• Recognize situations in which proportional relationships apply	•	• Apply proportional reasoning to solve multi-step ratio and percent problems

GRADE SEVEN			
MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
CLUSTER	*Apply And Extend Previous Understandings Of Operations With Fractions To Add, Subtract, Multiply, And Divide Rational Numbers.*		
DOMAIN	*The Number System*		
7.NS.1: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.	• Describe situations in which opposite quantities combine to • make 0 • Represent and explain how a number and its opposite have a • sum of 0 and are additive inverses • Identify subtraction of rational numbers as adding the additive • inverse property to subtract rational numbers, p - q = p + (-q) • Identify properties of addition and subtraction when adding • and subtracting rational numbers	• Apply and extend previous understanding to represent addition • and subtraction problems of rational numbers with a horizontal or vertical number line • Interpret sums of rational numbers by describing real-world contexts • Explain and justify why the sum of p + q is located a distance of |q| in the positive or negative direction from p on a number line • Represent the distance between two rational numbers on a number line as the absolute value of their difference and apply this principle in real-world contexts • Apply the principle of subtracting rational numbers in real-world contexts • Apply properties of operations as strategies to add and subtract rational numbers • Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. • Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (–q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.	• Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged. • Apply properties of operations as strategies to add and subtract rational numbers. • Demonstrate and explain how adding two numbers, p + q, if q is positive, the sum of p and q will be |q| spaces to the right of p on the number line • Demonstrate and explain how adding two numbers, p + q, if q is negative, the sum of p and q will be |q| spaces to the left of p on the number line

GRADE SEVEN

MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
CLUSTER	*Apply And Extend Previous Understandings Of Operations With Fractions To Add, Subtract, Multiply, And Divide Rational Numbers.*		
DOMAIN	*The Number System*		
7.NS.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.	• Recognize that the process for multiplying fractions can be used to multiply rational numbers including integers • Know and describe the rules when multiplying signed numbers • Explain why integers can be divided except when the divisor is 0 • Describe why the quotient is always a rational number • Know and describe the rules when dividing signed numbers, integers • Recognize that –(p/q) = (–p)/q = p/(–q) • Identify how properties of operations can be used to multiply and divide rational numbers • Convert a rational number to a decimal using long division • Explain that the decimal form of a rational number terminates (stops) in zeroes or repeats	• Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. • 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). Interpret quotients of rational numbers by describing real- world contexts. • Apply the properties of operations, particularly distributive property, to multiply rational numbers • Interpret the products of rational numbers by describing real-world contexts • Interpret the quotient of rational numbers by describing real-world contexts • Apply properties of operations as strategies to multiply and divide rational numbers	• Apply properties of operations as strategies to multiply and divide rational numbers. • Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
7.NS.3: Solve real-world and mathematical problems involving the four operations with rational numbers.		•	• Add, subtract, multiply, and divide rational numbers • Solve real-world mathematical problems by adding, subtracting, multiplying, and dividing rational numbers, including complex fractions

GRADE SEVEN			
MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
CLUSTER	*Use Properties Of Operations To Generate Equivalent Expressions.*		
DOMAIN	*Expressions And Equations*		
7.EE.1: Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.		• Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients	• Combine like terms with rational coefficients • Factor and expand linear expressions with rational coefficients using the distributive property
7.EE.2: Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."	•	•	• Write equivalent expressions with fractions, decimals, percents, and integers • Rewrite an expression in an equivalent form in order to provide insight about how quantities are related in a problem context
CLUSTER	*Solve Real-Life And Mathematical Problems Using Numerical And Algebraic Expressions And Equations.*		
DOMAIN	*Expressions And Equations*		
7.EE.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.	•	• Apply properties of operations to calculate with numbers in any form • Assess the reasonableness of answers using mental computation and estimation strategies	• Convert between numerical forms as appropriate • Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form

GRADE SEVEN			
MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
CLUSTER	*Solve Real-Life And Mathematical Problems Using Numerical And Algebraic Expressions And Equations.*		
DOMAIN	*Expressions And Equations*		
7.EE.4: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.		• Reasoning: Compare an algebraic solution to an arithmetic solution by identifying the sequence of the operations used in each approach • Think: Interpret the solution set of an inequality in the context of the problem	• Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? • Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions. • Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers • Identify the sequence of operations used to solve an algebraic equation of the form px + q = r and p(x + q) = r • Use variables and construct equations to represent quantities of the form px + q = r and p(x + q) = r from real-world and mathematical problems • Graph the solution set of the inequality of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers • Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers • Fluently solve equations of the form px + q = r and p(x + q) = r with speed and accuracy

GRADE SEVEN			
MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
CLUSTER	*Draw, Construct, And Describe Geometrical Figures And Describe The Relationships Between Them.*		
DOMAIN	*Geometry*		
7.G.1: Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	• Identify corresponding sides of scaled geometric figures	•	• Use ratios and proportions to create scale drawing • Solve problems involving scale drawings of geometric figures using scale factors • Compute lengths and areas from scale drawings using strategies such as proportions • Reproduce a scale drawing that is proportional to a given geometric figure using a different scale
7.G.2: Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	• Know which conditions create unique triangles, more than one • triangle, or no triangle	• Analyze given conditions, based on the three measures of angles or sides of a triangle, to determine when there is a unique triangle, more than one triangle, or no triangle	• Construct triangles from three given angle measures to determine when there is a unique triangle, more than one triangle or no triangle • Construct triangles from three given side measures to determine when there is a unique triangle, more than one triangle or no triangle
7.G.3: Describe the two-dimensional figures that result from slicing three- dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	• Define “slicing” as the cross-section of a 3-D figure • Describe the two-dimensional figures that result from slicing a three-dimensional figure such as a right rectangular prism or pyramid	• Analyze three-dimensional shapes by examining two-dimensional cross-sections	•

GRADE SEVEN				
MATHEMATICS		KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS		*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
CLUSTER	*Solve Real-Life And Mathematical Problems Involving Angle Measure, Area, Surface Area, And Volume.*			
DOMAIN	*Geometry*			
7.G.4: Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.		• Know the parts of a circle including radius, diameter, area, circumference, center, and chord • Identify pi (n) • Know the formulas for area and circumference of a circle	• Justify that pi (n) can be derived from the circumference and diameter of a circle • Apply circumference or area formulas to solve mathematical and real-world problems • Justify the formulas for area and circumference of a circle and how they relate to pi (n)	• Informally derive the relationship between circumference and area of a circle • Given the circumference of a circle, find its area • Given the area of a circle, find its circumference
7.G.5: 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.		• Identify and recognize types of angles: supplementary, • complementary, vertical, adjacent	• Determine complements and supplements of a given angle • Determine unknown angle measures by writing and solving algebraic equations based on relationships between angles	•
7.G.6: Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.		• Know the formulas for area and volume and the procedure for finding surface area and when to use them in real-world and mathematical problems	•	• Solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms

GRADE SEVEN				
MATHEMATICS		KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS		*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
CLUSTER	*Use Random Sampling To Draw Inferences About A Population.*			
DOMAIN	*Statistics And Probability*			
7.SP.1: Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.		• Know statistics terms such as population, sample, sample size, random sampling, generalizations, valid, biased and unbiased • Recognize sampling techniques such as convenience, random, systematic, and voluntary • Know that generalizations about a population from a sample are valid only if the sample is representative of that population	• Apply statistics to gain information about a population from a • sample of the population • Generalize that random sampling tends to produce • representative samples and support valid inferences	•
7.SP.2: Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, 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 the estimate or prediction might be.		• Define random sample • Identify an appropriate sample size	• Analyze and interpret data from a random sample to draw inferences about a population with an unknown characteristic of interest	• Generate multiple samples (or simulated samples) of the same size to determine the variation in estimates or predictions by comparing and contrasting the samples
7.SP.3: 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. For example, 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.		• Identify measures of central tendency (mean, median, and mode) in a data distribution • Identify measures of variation including upper quartile, lower quartile, upper extreme-maximum, lower extreme-minimum, range, interquartile range, and mean absolute deviation	• Compare two numerical data distributions on a graph by visually comparing data displays, and assessing the degree of visual overlap • Compare the differences in the measure of central tendency in two numerical data distributions by measuring the difference between the centers and expressing it as a multiple of a measure of variability	
7.SP.4: Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.		• Find measures of central tendency (mean, median, and mode) and measures of variability (range, quartile, etc.)	• Analyze and interpret data using measures of central tendency and variability • Draw informal comparative inferences about two populations from random samples	•

GRADE SEVEN				
MATHEMATICS		KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS		*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
CLUSTER	*Investigate Chance Processes And Develop, Use, And Evaluate Probability Models.*			
DOMAIN	*Statistics And Probability*			
7.SP.5: Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.		• Know that probability is expressed as a number between 0 and 1 • Know that a random event with a probability of 1/2 is equally likely to happen • Know that as probability moves closer to 1 it is increasingly likely to happen • Know that as probability moves closer to 0 it is decreasingly likely to happen	• Draw conclusions to determine that a greater likelihood occurs as the number of favorable outcomes approaches the total number of outcomes	
7.SP.6: Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times..		• Determine relative frequency (experimental probability) is the number of times an outcome occurs divided by the total number of times the experiment is completed	• Determine the relationship between experimental and theoretical probabilities by using the law of large numbers • Predict the relative frequency (experimental probability) of an event based on its theoretical probability	

GRADE SEVEN			
MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
CLUSTER	*Investigate Chance Processes And Develop, Use, And Evaluate Probability Models.*		
DOMAIN	*Statistics And Probability*		
7.SP.7: 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.	• Recognize uniform (equally likely) probability	• Analyze a probability model and justify why it is uniform or explain the discrepancy if it is not	• Use models to determine the probability of events • Develop a uniform probability model and use it to determine the probability of each outcome/event • Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process • Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, 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. • Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, 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.SP.8: Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.	• Define and describe a compound event • Know that the probability of a compound event is the fraction of • outcomes in the sample space for which the compound event occurs • Define simulation	•	• Identify the outcomes in the sample space for an everyday event • Find probabilities of compound events using organized lists, tables, tree diagrams, etc. and analyze the outcomes • Choose the appropriate method such as organized lists, tables and tree diagrams to represent sample spaces for compound events • Design and use a simulation to generate frequencies for compound events • Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. • 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. • Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?