Extended Common Core State Standards Mathematics 6-8

The *Alternate Achievement Standards for Students With the Most Significant Cognitive Disabilities Non-Regulatory Guidance* states, "…materials should show a clear link to the content standards for the grade in which the student is enrolled, although the grade-level content may be reduced in complexity or modified to reflect pre-requisite skills." Throughout the Standards descriptors such as, describe, count, identify, etc, should be interpreted to mean that the students will be taught and tested according to their mode of communication.

6th Grade Mathematics Ratios and Proportional Relationships		
Common Core State Standards	**Essence**	**Extended Common Core**
Understand ratio concepts and use ratio reasoning to solve problems.	**Understand ratios**	**Understand ratio concepts**

Cluster
1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*
2. Understand the concept of a unit rate *a/b* associated with a ratio *a:b* with *b* ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*
3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
  a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
  b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*
  c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
  d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
		Cluster
		1. Compare part-part and part-whole relationships (i.e., how many pieces of fruit? How many are apples how many are oranges?).
		2. Write ratios to represent relationships between two quantities.

6th Grade Mathematics		
The Number System		
Common Core State Standards	**Essence**	**Extended Common Core**
Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	**Understand fractions**	**Extend previous understandings of fractions.**
Cluster 1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc). How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*		**Cluster** 1. Compare the relationships between the unit fractions (1/2, 1/3, ¼, 1/5, 1/6, 1/8,1/10). 2. Add fractions with like denominators to make a whole (halves, thirds, fourths, fifths, sixths, eighths, and tenths).
Compute fluently with multi-digit numbers and find common factors and multiples.	**Understand multiplication**	**Multiply with numbers 0-10.**
2. Fluently divide multi-digit numbers using the standard algorithm. 3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. 4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*		3. Solve multiplication problems when groups and size of groups is known but the whole is unknown (a x b=).

	Apply and extend previous understandings of numbers to the system of rational numbers.	Extend Number knowledge		Apply and extend previous understandings of numbers to the system of rational numbers.

Cluster	5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
	6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
	  a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite.
	  b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
	  c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
	7. Understand ordering and absolute value of rational numbers.
	  a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.*
			Cluster	4. Understand that the order of the digits determines the given number and use this understanding to compare sets and numbers (i.e., 24 and 42, 24 is less than 42 because it contains 2 tens and 42 contains 4 tens).
				5. Compare temperatures including negatives (use a non-digital thermometer).

| Cluster | b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 oC > –7 oC to express the fact that –3 oC is warmer than –7 oC.*

c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write \|–30\| = 30 to describe the size of the debt in dollars.*

d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*

8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. | | Cluster | |

6th Grade Mathematics
Expressions and Equations

Common Core State Standards	Essence	Extended Common Core
Apply and extend previous understandings of arithmetic to algebraic expressions.	**Addition and subtraction of algebraic expressions**	**Apply and extend previous understandings of arithmetic to algebraic expressions.**

Cluster   1. Write and evaluate numerical expressions involving whole-number exponents.
2. Write, read, and evaluate expressions in which letters stand for numbers.
   a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 – y.*
   b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.*
   c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas V = s3 and A = 6 s2 to find the volume and surface area of a cube with sides of length s = 1/2.*
3. Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*
4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*
		Cluster 1. Write, read, and evaluate addition and subtraction expressions in which letters stand for numbers; i.e., 2 numbers with one number being represented by one letter (fixed variable 7+X=9 where x can only be one number)).

6th Grade Mathematics
Geometry

Common Core State Standards	Essence	Extended Common Core
Solve real-world and mathematical problems involving area, surface area, and volume.	**Area and perimeter of rectangles**	**Solve real-world and mathematical problems involving area, and perimeter.**
Cluster 1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. 2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\,w\,h$ and $V = b\,h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. 3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. 4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.		**Cluster** 1. Determine the perimeter of rectangular figures. 2. Partition rectangular figures into rows and columns of same-size squares without gaps and overlaps and count them to find the area.

6th Grade Mathematics Statistics and Probability		
Common Core State Standards	**Essence**	**Extended Common Core**
Develop understanding of statistical variability.	Create a statistical question	**Develop understanding of statistical variability.**
Cluster 1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.* 2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. 3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.		**Cluster** 1. Develop and implement a survey to collect data.

Summarize and describe distributions.		Summarize distributions	Summarize distributions on picture graphs, line plots, and bar graphs.	

Cluster	4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
	5. Summarize numerical data sets in relation to their context, such as by:
	  a. Reporting the number of observations.
	  b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
	  c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
	6. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
			Cluster	2. Display numerical data.
				3. Summarize numerical data sets in relation to their context by reporting the number of observations.

7th Grade Mathematics		
Ratios and Proportional Relationships		
Common Core State Standards	**Essence**	**Extended Common Core**
Analyze proportional relationships and use them to solve real-world and mathematical problems.	**Equivalent ratios**	**Understand ratio concepts and use ratio reasoning to solve problems.**

Cluster 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.*
2. Recognize and represent proportional relationships between quantities.
   a. 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.
   b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
   c. 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.*
   d. 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.
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.*
		Cluster 1. Model equivalent ratios (i.e., 2:1 two reds and 1 blue; If I put down to more red blocks how many blue blocks should be added?).

7th Grade Mathematics		
The Number System		
Common Core State Standards	**Essence**	**Extended Common Core**
Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	**Operations with fractions and whole numbers**	**Apply and extend previous understandings of operations with fractions and whole numbers.**

Cluster
 	
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.
   a. 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.*
   b. 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.
   c. 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.
   d. Apply properties of operations as strategies to add and subtract rational numbers.
		Cluster
		
		1. Subtract fractions with like denominators (halves, thirds, fourths, fifths, sixths, eighths, and tenths) by modeling with fraction bars.
		2. Use all operations to solve problems with whole numbers (0-100).

| Cluster | 2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
  a. 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.
  b. 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.
  c. Apply properties of operations as strategies to multiply and divide rational numbers.
  d. 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.
3. Solve real-world and mathematical problems involving the four operations with rational numbers. | | Cluster | |

7th Grade Mathematics Expressions and Equations		
Common Core State Standards	**Essence**	**Extended Common Core**
Use properties of operations to generate equivalent expressions.	**Properties of operations**	**Use properties of operations to generate equivalent expressions.**
Cluster 1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. 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."*		**Cluster** 1. Understand that adding zero to a number leaves it unchanged. 2. Use concrete objects and representations to illustrate addition of 3 or more numbers, regardless of which pair is added first, equal the cardinal number (associative). 3. Use concrete objects and representations to illustrate multiplication of 2 numbers regardless of order equal the cardinal number (commutative).

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	Equality	Solve real-life and mathematical addition and subtraction problems using numerical and algebraic equations.
Cluster		**Cluster**

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

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.*

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.
   a. 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?*
   b. 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.*

Equality

Solve real-life and mathematical addition and subtraction problems using numerical and algebraic equations.

4. Understand the concept of equality with models (i.e., if there is a quantity of 5 on one side of the equation and a quantity of 2 on the other what quantity is added to make it equal).

5. Use the concept of equality to solve problems with unknown quantities.

7th Grade Mathematics		
Geometry		
Common Core State Standards	**Essence**	**Extended Common Core**
Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	Area of rectangles	**Solve real-life and mathematical problems involving area.**
Cluster 1. 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. 2. 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. 3. 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.		**Cluster** 1. Use rectangles and multiplication to solve area problems.

7th Grade Mathematics Statistics and Probability		
Common Core State Standards	**Essence**	**Extended Common Core**
Use random sampling to draw inferences about a population.	**Random Sampling**	**Use random sampling to draw inferences about a population.**
Cluster	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. 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.*		**Cluster** 1. Identify a representative random sample (i.e., would not select only the people who ride buses) 2. Use samples to gain information about a population. 3. Interpret the results of the sampling.

Draw informal comparative inferences about two populations.	Compare date	Draw informal comparative inferences about two populations.
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.* 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.*		4. Compare data from two picture graphs, line plots, or bar graphs.

Investigate chance processes and develop, use, and evaluate probability models.	Likelihood of events	Investigate chance processes and develop, use, and evaluate probability models.

Cluster
 	
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.
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.*
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.
   a. 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.*
   b. 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?*
		Cluster
		
		5. Understand the events of probability as being possible or impossible.

| Cluster | 8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
    a. 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.
    b. 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.
9. 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?* | | Cluster | |

8th Grade Mathematics
Expressions and Equations

Common Core State Standards	Essence	Extended Common Core
Understand the connections between proportional relationships, lines, and linear equations.	**Proportional relationships**	**Understand the connections between proportional relationships, lines, and linear equations.**
Cluster 1. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.* 2. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.		**Cluster** 1. Make equivalent ratios given the unit rate. 2. Graph equivalent ratios in the first quadrant.

Analyze and solve linear equations and pairs of simultaneous linear equations.	Solve equations	Analyze and solve linear equations and pairs of simultaneous linear equations.

Cluster   3. Solve linear equations in one variable.
    a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
    b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
   4. Analyze and solve pairs of simultaneous linear equations.
    a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
    b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.*
    c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*
		Cluster 3. Use equations to solve problems using all operations when a part is unknown.

8th Grade Mathematics		
Geometry		
Common Core State Standards	**Essence**	**Extended Common Core**
Understand congruence and similarity using physical models, transparencies, or geometry software.	Congruency	**Understand congruence using physical models.**

Cluster
 	
1. Verify experimentally the properties of rotations, reflections, and translations:
  a. Lines are taken to lines, and line segments to line segments of the same length.
  b. Angles are taken to angles of the same measure.
  c. Parallel lines are taken to parallel lines.
2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*
	Cluster	1. Describe the attributes of figures: number of faces or edges, equal sizes of sides and number angles.
		2. Understand congruence in polygons with different orientations (proximity, position, directions and turns).

Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.		Measure volume	Solve real-world and mathematical problems involving volume of right rectangular prisms.	

Cluster	6. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.		**Cluster**	3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
				    a. A cube with side length 1 unit called a "unit cube" is said to have "one cubic unit" of volume, and can be used to measure volume.
				    b. Understand volume is the number of cubes used to fill a solid figure without gaps and overlaps.
				4. Measure volumes of right rectangular figures by counting unit cubes.

8th Grade Mathematics
Statistics and Probability

Common Core State Standards	Essence	Extended Common Core
Investigate patterns of association in bivariate data.	**Patterns of association in bivariate data**	**Investigate patterns of association in bivariate data.**
Cluster 1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. 2. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. 3. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.* 4. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*		**Cluster** 1. Describe trends such as positive, negative or no association given a scatter plot.