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READ ME FIRST – Overview of EL Education's Common Core Learning Targets

What We Have Created and Why

- A group of 15 EL staff members wrote long-term learning targets aligned with the Common Core State Standards for English Language Arts (K-12), Disciplinary Reading (6-12), and Math.
- EL is committed to purposeful learning; to that end, learning targets are a key resource for students, teachers, and instructional leaders. Our hope is that these targets help launch teachers into what we've learned is the most powerful work: *engaging students* with targets during the learning process.
- The Common Core State Standards (CCSS) unite us nationally. The standards, along with these long-term learning targets provide us with a common framework and language.
- We offer these targets as an open educational resource (OER), intended to be shared publicly at no charge.

Next Steps for Schools and Teachers

- **Determine importance and sort for long-term vs. supporting targets**.
  In most cases, there are more targets here than teachers can realistically instruct to and assess, and not each target is "worthy" of being a long-term target. We suggest that leadership teams, disciplinary teams, or grade-level teams analyze these targets to determine which ones you consider to be truly long-term versus supporting. Reorganize them as necessary to make them yours.
- **Build out contextualized supporting targets and assessments**, looking back at the full text of the standard. Our intention is to offer a "clean translation" of the standards in student-friendly language to serve as a jumping-off point for teachers when developing daily targets used with students during instruction and formative assessment.

Resources

- A specific resource we recommend is *The Common Core: Clarifying Expectations for Teachers & Students* (2012), by Align Assess, Achieve, LLC and distributed through McGraw Hill. These are a series of grade level booklets for Math, ELA, and Literacy in Science, Social Studies & Technology. They include enduring understandings, essential questions, suggested daily-level learning targets and vocabulary broken out by cluster and standard. Find more information at http://www.mheonline.com/aaa/index.php?page=flipbooks. (Each grade-level booklet costs $15-25.)
- We also recommend installing the free Common Core Standards app by MasteryConnect. It's very useful to have the standards at your fingertips! http://itunes.apple.com/us/app/common-core-standards/id439424555?mt=8

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Common Core State Standards & Long-Term Learning Targets
Math, Grades 6-8

See page 9 for Grade 7
See page 15 for Grade 8

Grade level	**6**
Discipline(s)	CCSS - Math
Dates	April, 2012
Author(s)	Dirk Matthias & Myra Brooks

Note: Students should be able to apply all mathematical skills in context (through a word problem, open-ended real-world problem, or contextual scenario) and abstractly (in plain number problems or what the standards term "mathematical problems"). For example, when students are ask to "write, solve, and interpret two-step equations" students should be able to solve equations such as 3x + 2 = -5, and check for the validity of their solution as well as write equations from word problems.

"Fluency" is defined as accuracy, efficiency, and flexibility. (Russell, S. J. (2000). Developing computational fluency with whole numbers in the elementary grades. *The New England Math Journal, 32*(2), 40-54.)

CCS Standards: Ratios and Proportional Relationships	**Long-Term Target(s)**
6.RP.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."*	I can explain the concept of ratio. I can describe the relationship between two quantities using ratio language.
6.RP.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."*[1] (Expectations for unit rates in this grade are limited to non-complex fractions.)	I can explain the concept of unit rate. I can describe a ratio relationship using rate language.

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CCS Standards: Ratios and Proportional Relationships	Long-Term Target(s)
6.RP.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.	I can explain the relationship between rate, ratio, and percent. I can solve word problems using ratio and rate reasoning.
CCS Standards: The Number System	**Long-Term Target(s)**
6.NS.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? Compute fluently with multi-digit numbers and find common factors and multiples.*	I can solve word problems involving division of fractions by fractions. I can represent the context of a fraction word problem using a variety of models.
6.NS.2. Fluently divide multi-digit numbers using the standard algorithm.	I can fluently divide multi-digit numbers.
6.NS.3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	I can fluently add, subtract, multiply, and divide multi-digit decimals.

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CCS Standards: The Number System	Long-Term Target(s)
6.NS.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). Apply and extend previous understandings of numbers to the system of rational numbers.*	I can find the greatest common factors of two whole numbers (up to 100). I can find the least common multiple of two whole numbers (less than or equal to 12). I can use the distributive property to express a sum of two whole numbers.
6.NS.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.	I can explain the meaning of positive and negative numbers. I can use positive and negative numbers to represent quantities in real-world contexts. I can explain the meaning of 0 in a variety of situations.
6.NS.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.	I can explain the concept of rational numbers. I can explain the relationship between the location of a number (on a number line or coordinate plane) and its sign. I can locate and plot rational numbers on a number line (horizontal and vertical) and a coordinate plane.

CCS Standards: The Number System	Long-Term Target(s)
6.NS.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.* b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 °C > –7 °C to express the fact that –3 °C is warmer than –7 °C.* 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.*	I can explain the concept of absolute value. I can interpret statements of inequality using a number line. I can explain the order and absolute value of rational numbers in real-world contexts.
6.NS.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.	I can graph points in all four quadrants of a coordinate plane. I can find distances between points using my knowledge of coordinates and absolute value.
CCS Standards: Expressions and Equations	**Long-Term Target(s)**
6.EE.1. Write and evaluate numerical expressions involving whole-number exponents.	I can explain the difference between an expression and an equation. I can write numerical expressions involving whole-number exponents. I can evaluate numerical expressions involving whole-number exponents.

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CCS Standards: Expressions and Equations	Long-Term Target(s)
6.EE.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 $V = s^3$ and $A = 6 s^2$ to find the volume and surface area of a cube with sides of length s = 1/2.*	I can translate words into expressions. I can read expressions using appropriate mathematical terms. I can evaluate expressions using the order of operations.
6.EE.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.*	I can use the properties of operations to create equivalent expressions.
6.EE.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. Reason about and solve one-variable equations and inequalities.*	I can identify equivalent expressions.
6.EE.5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	I can explain what an equation and inequality represents. I can determine whether a given number makes an equation or inequality true.

CCS Standards: Expressions and Equations	Long-Term Target(s)
6.EE.6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	I can explain what a variable represents. I can use variables to solve problems involving expressions.
6.EE.7. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.	I can write equations to represent real-world problems. I can solve one-step equations involving positive numbers.
6.EE.8. Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	I can explain the difference between an equation and an inequality. I can write an inequality to represent a real-world problem. I can identify multiple solutions to an inequality. I can represent solutions of inequalities on a number line.
6.EE.9.Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.	I can use variables to represent the relationship between quantities in real-world problems. I can explain the relationship between dependent and independent variables. I can analyze the relationship between dependent and independent variables.
CCS Standards: Geometry	**Long-Term Target(s)**
6.G.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.	I can find the area of polygons by composing or decomposing them into basic shapes. I can apply my understanding of shapes to solve real-world problems.

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CCS Standards: Geometry	Long-Term Target(s)
6.G.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.	I can explain the volume formula of a rectangular prism using unit cubes. I can find the volume of a rectangular prism using formulas. I can solve real-world problems involving volume.
6.G.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.	I can draw polygons in the coordinate plane. I can identify the length of a side using coordinates. I can solve real-world problems involving coordinate planes.
6.G.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.	I can represent three-dimensional shapes using nets. I can find the surface area of three-dimensional shapes (using nets). I can solve for surface area in real-world problems involving three-dimensional shapes.
CCS Standards: Statistics and Probability	**Long-Term Target(s)**
6.SP.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.*	I can identify statistical questions. I can explain how data answers statistical questions.
6.SP.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.	I can describe a statistical data set using center, spread, and shape.
6.SP.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.	I can compare a measure of center with a measure of variation.
6.SP.4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	I can communicate numerical data on a number line (dot plots, histograms, and box plots).

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CCS Standards: Statistics and Probability	Long-Term Target(s)
6.SP.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. d. 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.	I can summarize numerical data sets. I can analyze the relationship between measures of center and the data distribution.

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Common Core State Standards & Long-Term Learning Targets
Math, Grades 7

Grade level	7
Discipline(s)	CCSS - Math
Dates	March, 2012
Author(s)	Jenny Seydel, Rebecca Tatistcheff, and Marcy DeJesus

CCS Standards: Ratios and Proportional Relationships	**Long-Term Target(s)**
Analyze proportional relationships and use them to solve real-world and mathematical problems.	
7RP1. 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.*	I can determine the appropriate unit rates to use in a given situation, including those with fractions.
7.RP2. 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.	I can recognize, represent, and explain proportions using tables, graphs, equations, diagrams, and verbal descriptions). This means that: e. I can compute unit rates. f. I can determine whether two quantities represent a proportional relationship. g. I can transfer my understanding of unit rates to multiple real-world problems.
7.RP3. 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.*	I can solve the following types of multistep and percent problems: simple interest, taxes, markups, gratuities and commissions, fees, percent increase and decrease, and percent error.

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CCS Standards: The Number System	Long-Term Target(s)
Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	
7.NS1. 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.	I can add and subtract rational numbers. This means that: • I can represent addition and subtraction on horizontal and vertical number lines. • I can subtract a rational number by adding its opposite (additive inverse). • I can use the absolute values of numbers on a number line to illustrate both addition and subtraction. • I can apply properties of operations (commutative, associative, and distributive) to add and subtract rational numbers.

CCS Standards: The Number System	Long-Term Target(s)
7.NS2. 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.	I can multiply and divide rational numbers. I can apply the commutative, associative, and distributive properties appropriately in multiplying and dividing rational numbers. I can convert a fraction to a decimal using long division. I can explain the difference between a rational and an irrational number.
7.NS3. Solve real-world and mathematical problems involving the four operations with rational numbers.1	I can use the four operations to solve problems involving rational numbers.
CCS Standards: Expressions and Equations	**Long-Term Target(s)**
Use properties of operations to generate equivalent expressions.	
7.EE1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	I can use the properties of operations to solve linear expressions with rational coefficients.
7.EE2. 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."*	I can rewrite an expression in different forms to help me understand and solve problems.
Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	

CCS Standards: Expressions and Equations	Long-Term Target(s)
7.EE3. 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.*	I can use properties of operations to analyze and solve problems with rational numbers in any form (whole numbers, fractions, and decimals). I can convert between whole numbers, fractions and decimals. I can estimate and compute in my head to determine whether an answer makes sense.
7.EE4. 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.*	I can write, solve, and interpret two-step equations using known and unknown values. I can write, solve, and interpret two-step inequalities using known and unknown values. I can represent the solution of an inequality graphically and algebraically.

CCS Standards: Geometry	Long-Term Target(s)
Draw, construct, and describe geometrical figures and describe the relationships between them.	
7.G1. 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.	I can solve problems with scale drawings of geometric figures. I can compute actual lengths and area from a scale drawing. I can reproduce a scale drawing using a different scale.
7.G2. 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.	I can draw (freehand, with ruler and protractor, with technology) geometric shapes with given conditions. I can construct triangles from three measures of angles or sides. I can notice when the given conditions determine a unique triangle, more than one triangle, or no triangle.
7.G3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	I can describe the two-dimensional figures that result from slicing three-dimensional figures.
Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	
7.G4. 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.	I know the formulas for the area and circumference of a circle. I can use circle formulas to solve problems. I can explain the relationship between the circumference and area of a circle.
7.G5. 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.	I can 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.

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CCS Standards: Geometry	Long-Term Target(s)
7.G6. 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.	I can solve real-world and mathematical problems involving 2-dimensional area (triangles, quadrilaterals, polygons) and 3-dimensional volume and surface area (cubes, right prisms).
CCS Standards: Statistics and Probability	**Long-Term Target(s)**
Use random sampling to draw inferences about a population.	
7.SP1. 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.	I can determine whether generalizations are valid by examining sample size and sampling methods.
7.SP2. 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.*	I can use data from a random sample to draw conclusions and make reasonable arguments about a population. I can describe sample size and sampling methods that will allow me to make more accurate conclusions and arguments.
Draw informal comparative inferences about two populations.	
7.SP3. 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.*	I can compare and draw informal inferences about two populations using measures of center (median, mean) and measures of variation (range), visual overlap, and mean absolute deviation. I can compare the degree of visual overlap of the data plots from two different populations. I can explain what the difference between the two data plots means.
7.SP4. 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.*	I can use measures of center and measures of variability to draw informal inferences about two populations.

CCS Standards: Statistics and Probability	Long-Term Target(s)
CCS Standards: Investigate chance processes and develop, use, and evaluate probability models.	
7.SP5. 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.	I can explain why the numeric probability of an event must be between 0 and 1. I can explain the likeliness of an event occurring based on probability.
7.SP6. 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.*	I can determine probability for a single event by collecting and analyzing frequency in a chance process. I can explain the difference between experimental and theoretical probability.
7.SP7. 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?*	I can compare and contrast probability models and explain discrepancies using those probability models.

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CCS Standards: Statistics and Probability	Long-Term Target(s)
7.SP8. 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. c. 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?*	I can design and investigate a simulation that will allow me to collect data to generate frequencies for compound events using sample spaces, organized lists, tables and tree diagrams.

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Common Core State Standards & Long-Term Learning Targets
Math, Grades 8

Grade level	8
Discipline(s)	CCSS - Math
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CCS Standards: The Number System	**Long-Term Target(s)**
Know that there are numbers that are not rational, and approximate them by rational numbers.	
8.NS1. Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	I can identify whether a number is rational or irrational by whether its decimal form is exact, repeating, or does not repeat. I can convert repeating decimal numbers into their fraction equivalents.
8.NS2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., $\sqrt{2}$). *For example, by truncating the decimal expansion of* $\sqrt{2}$, *show that* $\sqrt{2}$ *is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*	I can estimate rational and irrational numbers in order to compare their relative size and location on a number line.
CCS Standards: Expressions and Equations	**Long-Term Target(s)**
Work with radicals and integer exponents.	
8.EE1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $32 \times 3^{-5} = 3^{-3} = 1/33 = 1/27$.	I can describe and apply the properties of integer exponents to expressions.
8.EE2. Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.	I can solve one-step equations requiring square or cube roots and determine when the solution is rational or irrational. I can evaluate square roots of small perfect squares and cube roots of small perfect cubes. I can explain why $\sqrt{2}$ is irrational.

CCS Standards: Expressions and Equations	Long-Term Target(s)
8.EE3. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 × 108 and the population of the world as 7 × 109, and determine that the world population is more than 20 times larger.*	I can estimate and compare very large and very small quantities using scientific notation. I can determine how many times bigger one number is than another using scientific notation.
8.EE4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	I can describe when and where to use scientific notation and choose appropriate units for very large and very small numbers. I can compare, interpret and calculate values using scientific notation and decimal equivalents in the same problem.
Understand the connections between proportional relationships, lines, and linear equations.	
8.EE5. 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.*	I can compare, contrast, and interpret multiple representations of proportional relationships (graphs, tables, equations, and verbal models). I can graph proportional relationships by using the unit rate as the slope of the graph. I can compare and contrast two different proportional relationships that are represented in different ways, i.e. an equation with a graph.
8.EE6. 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.	I can write and interpret an equation for a line in slope-intercept form and determine the relationship is linear using similar triangles to show the slope is the same between any two points.

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CCS Standards: Expressions and Equations	Long-Term Target(s)
Analyze and solve linear equations and pairs of simultaneous linear equations.	
8.EE7. 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.	I can write, solve, and interpret the solution set of multi-step linear equations in one variable. This means: • I can determine when a solution gives one solution, infinitely many solutions, or no solutions. • I can apply the distributive property to algebraic expressions. • I can combine like terms to simplify expressions and equations.
8.EE8. 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.*	I can write, solve, and interpret the solutions to systems of linear equations with two variables graphically and algebraically. This means, in part: • I can recognize and explain the solution to a system of linear equations graphically (as a point of intersection). • I can describe instances when a system of equations will yield one solution, no solutions, or infinitely many solutions.
CCS Standards: Functions	**Long-Term Target(s)**
Define, evaluate, and compare functions.	
8.F1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.1	I can determine if a relation is a function using a table, graph, or set of ordered pairs.

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CCS Standards: Functions	Long-Term Target(s)
8.F2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*	I can compare and contrast multiple representations of (tables, graphs, equations, and verbal models) of two functions. This means that from any type of representation: • I can determine whether the relationship is a function. • I can identify the rate of change and y-intercept for a linear function.
8.F3. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*	I can determine if a function is linear or non-linear from a table, equation, graph, or verbal model.
Use functions to model relationships between quantities.	
8.F4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, *y)* values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	I can write, graph, and interpret linear functions. This means: • I can construct a function to model a linear relationship from a table of values, two points, or verbal description. • I can determine the rate of change (slope) and initial value (y-intercept) from a table and graph. • I can explain the meaning of the rate of change and initial value of a linear function in terms of the situation it models.
8.F5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	I can describe the relationship between two quantities when given a graph. I can sketch a graph from a verbal description of a function.

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CCS Standards: Geometry	Long-Term Target(s)
Understand congruence and similarity using physical models, transparencies, or geometry software.	
8.G1. 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.	I can describe and apply the properties of translations, rotations, and reflections on lines, line segments, angles, parallel lines and geometric figures.
8.G2. 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.	I can describe how two figures are congruent if the first figure can be rotated, reflected, and/or translated to create the second figure. Given two congruent figures, I can describe the transformations needed to create the second from the first.
8.G3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	I can describe and apply dilation, translation, rotation, and reflection to two-dimensional figures in a coordinate plane.
8.G4. 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.	I can describe how two figures are similar if the first figure can be rotated, reflected, dilated and/or translated to create the second figure. Given two similar figures, I can describe the transformations needed to create the second from the first.
8.G5. 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.*	I can informally prove the following: h. The angle-sum theorem; i. The properties of angles when parallel lines are cut by a transversal; j. The angle-angle criterion for similar triangles.
Understand and apply the Pythagorean Theorem.	
8.G6. Explain a proof of the Pythagorean Theorem and its converse.	I can describe a proof of the Pythagorean Theorem and its converse.

CCS Standards: Geometry	Long-Term Target(s)
8.G7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	I can determine the unknown side lengths in a right triangle problem using the Pythagorean Theorem.
8.G8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	I can determine the distance between two points in a coordinate plane using the Pythagorean Theorem.
Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	
8.G9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	I know and can apply the formulas for volumes of cones, cylinders, and spheres.
CCS Standards: Statistics and Probability	**Long-Term Target(s)**
Investigate patterns of association in bivariate data.	
8.SP1. 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.	I can construct and interpret scatter plots. This means: • I can describe the relationships shown in a scatter-plot by identifying patterns such as: clustering; • outliers; • positive or negative association; • linear association; • nonlinear association.
8.SP2. 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.	I can sketch a line of best fit on a scatter plot, justify the location of the line; and explain why or why not a given line is a good fit.
8.SP3. 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.*	I can write the equation of a line of best fit and use it to make predictions. I can use the slope and y-intercept to describe he relationship represented in a data set.

CCS Standards: Statistics and Probability	Long-Term Target(s)
8.SP4. 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?*	I can construct two-way frequency and relative frequency tables to summarize categorical data. I can use relative frequencies to describe the possible association between two variables of categorical data.