Common Core State Standards

At-a-Glance Transition Documents

Seventh Grade

S^{2}TEM Centers SC
www.s2temsc.org

S^{2}TEM Centers SC are a statewide system of support for improving instruction and increasing student achievement in mathematics and science. S²TEM Centers SC, like S²MART Centers before them, are an initiative of South Carolina's Coalition for Mathematics and Science. The S²TEM Centers SC seek to work collaboratively with STEM-oriented partners in education, business and government.

<u>Preface</u>

The S[2]TEM Centers SC At-a-Glance Transition Documents were created in response to a request by district leaders for a quick overview of the magnitude of the changes as South Carolina moves from the 2007 SC Academic Standards for Mathematics to the Common Core State Standards for Mathematics (CCSSM). These documents do not provide a detailed analysis of the CCSSM or include all of the sub-skills that might need to be taught to ensure mastery of the standard, nor do they replace the current Support Documents for Mathematics that is available for Kindergarten through Algebra 1. More robust instructional resources will be created as SC gets closer to full implementation of the CCSSM.

In addition to the S[2]TEM Centers SC At-a-Glance Transition Documents, educators should have copies of the CCSSM from www.corestandards.org, as well as the appendices that accompany the standards. Specifically, K-8 educators will need access to the CCSSM glossary which includes tables 1, 2, and 3 to completely understand the intent of the standards.

The format of the documents is:

- Bulleted list of content that is new to the given grade level
- Bulleted list of content that is no longer included in the standards for the given grade level
- Four column table showing: Common Core State Standard, Understanding CCSS: Notes and Examples, 2007 SC Academic Standard, Major Changes

Throughout this document, the Common Core State Standards are identified by grade level, domain, and standard number. So, for example, 3.NBT.2 refers to the 3rd grade Number and Operations in Base Ten standard #2.

Please note: The CCSSM identifies a list of 8 Standards for Mathematical Practice in addition to the content standards for each grade. These mathematical practices are similar to NCTM's Process Standards. The Standards for Mathematical Practice identify the "habits of mind" used by proficient mathematics students. They are: (1) Make sense of problems and persevere in solving them, (2) Reason abstractly and quantitatively, (3) Construct viable arguments and critique the reasoning of others, (4) Model with mathematics, (5) Use appropriate tools strategically, (6) Attend to precision, (7) Look for and make use of structure, (8) Look for and express regularity in repeated reasoning.

As with any curriculum document, the S[2]TEM Center SC At-a-Glance Transition Documents are updated regularly to ensure accuracy of information. The date of the most recent edits is noted in the footer on each page of the documents. Please contact the S[2]TEM Centers SC CCSSM team at ccss.s2temsc@gmail.com with edits, refinements, and questions. Thank you.

During the period of July 1, 2009 to June 30, 2011, S2TEM Centers SC operated as S2MART Centers SC.

<u>Acknowledgements</u>

Grade 7 Overview

In Grade 7, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

Ratios and Proportional Relationships

- Analyze proportional relationships and use them to solve real-world and mathematical problems.

The Number System

- Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Expressions and Equations

- Use properties of operations to generate equivalent expressions.
- Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Geometry

- Draw, construct and describe geometrical figures and describe the relationships between them.
- Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Statistics and Probability

- Use random sampling to draw inferences about a population.
- Draw informal comparative inferences about two populations.
- Investigate chance processes and develop, use, and evaluate probability models.

Common Core State Standards Initiative. (2010). Common Core State Standards for Mathematics. Washington, DC: National Governors Association Center for Best Practices and the Council of Chief State School Officers.

SEVENTH GRADE CHANGES AT-A-GLANCE

What content is New to 7th Grade?

- Solve real-world and mathematical problems involving the four operations with rational numbers. (7.NS-3)

- Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. (7.EE-1)

- 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. (7.EE-2)

- Draw 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. (7.G-2)

- 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. (7.G-4)

- 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. (7.SP-1)

- 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. (7.SP-2)

- 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. (7.SP-3)

- 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 ½ indicates an event that is neither unlikely or likely, and a probability near 1 indicates a likely event. (7.SP-5)

Note: The Common Core State Standards are identified by grade level, domain, and standard number. So, for example, 7.NS.3 refers to the 7th grade Number System standard #3.

SEVENTH GRADE CHANGES AT-A-GLANCE

What content will no longer be included in the 7th Grade Standards?

- Understand fractional percentages and percentages greater than one hundred. (7-2.1)
- Represent the location of rational numbers and square roots of perfect squares on a number line. (7-2.2)
- Compare rational numbers, percentages, and square roots of perfect squares by using the symbols $\leq, \geq. <, >$ and $=$. (7-2.3)
- Understand the meaning of absolute value. (7-2.4)
- Translate between standard form and exponential form. (7-2.6)
- Translate between standard form and scientific notation. (7-2.7)
- Understand the inverse relationship between squaring and finding the square roots of perfect squares. (7-2.10)
- Analyze geometric patterns and pattern relationships. (7-3.1)
- Analyze tables and graphs to describe the rate of change between and among quantities. (7-3.2)
- Understand slope as a constant rate of change. (7-3.3)
- Analyze geometric properties and the relationships among the properties of triangles, congruence, similarity, and transformations to make deductive arguments. (7-4.1)
- Explain the results of the intersection of two or more geometric shapes in a plane. (7-4.2)
- Translate between two- and three-dimensional representations of compound figures. (7-4.4)
- Compare the areas of similar shapes and the areas of congruent shapes. (7-4.6)
- Explain the proportional relationship among attributes of similar shapes. (7-4.7)
- Apply proportional reasoning to find missing attributes of similar shapes. (7-4.8)
- Create tessellations with transformations. (7-4.9)
- Explain the relationship of the angle measurements among shapes that tessellate. (7-4.10)
- Generate strategies to determine the perimeters and areas of trapezoids. (7-5.3)
- Recall equivalencies associated with length, mass and weight, and liquid volume. (7-5.4)
- Use one-step unit analysis to convert between and within the U.S. Customary System and the metric system. (7-5.5)
- Organize data in box plots or circle graphs as appropriate. (7-6.2)
- Apply procedures to calculate the interquartile range. (7-6.3)
- Interpret the interquartile range for data. (7-6.4)
- Use the fundamental counting principle to determine the number of possible outcomes for a multistage event. (7-6.8)

Note: Common Core standards implementation will begin in 2010-2011, with full implementation and assessment in 2014-2015.

SEVENTH GRADE

RATIOS AND PROPORTIONAL RELATIONSHIPS (RP)

Common Core State Standards	Understanding CCSS: Notes and Examples	2007 S.C. Academic Standards for Mathematics	Major Changes
7.RP - Analyze proportional relationships and use them to solve real-world and mathematical problems.			
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.	7-2.5 Apply ratios, rates, and proportions to discounts, taxes, tips, interest, unit costs, and similar shapes. 7-5.1 Use ratio and proportion to solve problems involving scale factors and rates.	Extend to include ratios of fractions (complex fractions), ratios of areas and unit rates. (See 2007 6-5.6 and 8-5.2 for reference) Reference CCSS glossary (complex fraction)
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		7-3.7 Classify relationships as either directly proportional, inversely proportional, or nonproportional. 7-3.6 Represent proportional relationships with graphs, tables, and equations.	Extend to include explanations of points on the graph of a proportional relationship.

relationships. c. Represent proportional relationships by equations. 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.	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.		
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.	7-2.5 Apply ratios, rates, and proportions to discounts, taxes, tips, interest, unit costs, and similar shapes.	Extend to include examples of mark-ups, commissions, fees, percent increase, percent decrease and percent error.

SEVENTH GRADE

THE NUMBER SYSTEM (NS)

Common Core State Standards	Understanding CCSS: Notes and Examples	2007 S.C. Academic Standards for Mathematics	Major Changes
7.NS – Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.			
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. 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. Interpret sums of rational numbers by describing real-world context. 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	For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.	7-2.8 Generate strategies to add, subtract, multiply, and divide integers.	Part of this standard is new to 7th grade. Students use their knowledge of absolute value to develop a conceptual understanding of adding and subtracting rational numbers. In addition to developing a conceptual understanding of addition and subtraction with integers and fractions, extend to include addition and subtraction with *all* rational numbers. (See 2007 8-2.1 for reference) NOTE: This is the first time CCSS introduces operations with positive and negative numbers. Reference CCSS Glossary (integer, rational number)

number line is the absolute value of their difference, and apply this principle in real-world context. d. Apply properties of operations as strategies to add and subtract rational numbers.			
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		7-2.8 Generate strategies to add, subtract, multiply, and divide integers. 7-2.9 Apply an algorithm to multiply and divide fractions and decimals.	In addition to developing a conceptual understanding of multiplication and division with integers and fractions, extend to include multiplication and division with *all* rational numbers. (See 2007 8-2.2 for reference) NOTE: This is the first time CCSS introduces operations with positive and negative numbers. Reference CCSS Glossary (integer, rational number)

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.	Computations with rational numbers extend the rules for manipulating fractions to complex fractions.		This standard is new to 7th grade. See CCSS Glossary (rational number)

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SEVENTH GRADE

EXPRESSIONS AND EQUATIONS (EE)

Common Core State Standards	Understanding CCSS: Notes and Examples	2007 S.C. Academic Standards for Mathematics	Major Changes
7.EE – Use properties of operations to generate equivalent expressions.			
1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.			This standard is new to 7th grade. (See 2007 6-3.4 and 8-3.3 for reference)
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."		This standard is new to 7th grade.
7.EE – 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, 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.	7-3.4 Use inverse operations to solve two-step equations and two-step inequalities	Extend to include multi-step equations with positive and negative rational numbers. (See 2007 6-2.4, 7-2.9, 8-2.1 and 8-3.4)

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.
  b. Solve word problems leading to inequalities of the form $px + q > r$ of $px + q < r$, 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, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
	
	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.
		7-3.4 Use inverse operations to solve two-step equations and two-step inequalities.
		
		7-3.5 Represent on a number line the solution of a two-step inequality.
			Extend to include rational coefficients and solutions to word problems.
			
			(See 2007 6-3.3 and 8-3.2 for reference)

SEVENTH GRADE

GEOMETRY (G)

Common Core State Standards	Understanding CCSS: Notes and Examples	2007 S.C. Academic Standards for Mathematics	Major Changes
7.G – Draw, construct, and describe geometrical figures and describe the relationships between them.			
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.		7-5.1 Use ratio and proportion to solve problems involving scale factors and rates.	Extend to include computing areas and reproducing scale drawings.
2. Draw 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.			This standard is new to 7th grade.
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.		7-4.3 Illustrate the cross section of a solid.	None noted.

7.G – Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.			
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.			This standard is new to 7th grade. Students are no longer introduced to the specific attributes of a circle in 3rd grade. (See 2007 3-4.1, 6-5.1, 6-5.2 and 8-5.4 for reference)
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.		7-4.5 Analyze the congruent and supplementary relationships – specifically, alternate interior, alternate exterior, corresponding, and adjacent – of the angles formed by parallel lines and a transversal.	This standard is new to 7th grade. (Reference 2007 6-4.9, 8-3.2) No longer include alternate interior, alternate exterior or corresponding angles. Extend to include an understanding of complementary and vertical angles and writing and solving simple equations for an unknown angle.
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.		7-5.2 Apply strategies and formulas to determine the surface area and volume of the three-dimensional shapes prism, pyramid, and cylinder.	Extend to include area of objects composed of triangles and quadrilaterals. (See 2007 6-5.3, 6-5.5 and 8-5.5)

SEVENTH GRADE

STATISTICS AND PROBABILITY (SP)

Common Core State Standards	Understanding CCSS: Notes and Examples	2007 S.C. Academic Standards for Mathematics	Major Changes
7.SP – Use random sampling to draw inferences about a population.			
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.			This standard is new to 7th grade. (See 2007 6-6.1 for reference)
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.		This standard is new to 7th grade. (See 2007 6-6.1 for reference)
7.SP – Draw informal comparative inferences about two populations.			
3. Informally assess the degree of visual overlap of two numerical data distributions with similar	For example, the mean height of players on the basketball team is 10 cm greater than the mean		This standard is new to 7th grade.

variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.	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.	7-6.1 Predict the characteristics of two populations based on the analysis of sample data.	Extend to include using measures of center and measures of variability (in addition to range) to make inferences.

7.SP – Investigate chance processes and develop, use, and evaluate probability models.

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 ½ indicates an event that is neither unlikely or likely, and a probability near 1 indicates a likely event.			This standard is new to 7th grade. (See 2007 3-6.6 and 3-6.7)
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	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.	7-6.7 Differentiate between experimental and theoretical probability of the same event. 7-6.5 Apply procedures to calculate the probability of mutually exclusive simple or compound	(See 2007 8-6.3 for reference)

probability.		events.	

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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 determined probabilities of events.
  b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.
	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.
	
	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?
		7-6.6 Interpret the probability of mutually exclusive simple or compound event.	Extend to include developing a probability model of a single event and comparing probability models.
			
			(See 2007 5-6.5 and 6-6.4 for reference)
			
			Reference CCSS Glossary (probability model and uniform probability model)

8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulations. 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		7-6.5 Apply procedures to calculate the probability of mutually exclusive simple or compound events. 7-6.6 Interpret the probability of mutually exclusive simple or compound event.	Extend to include developing a probability model of a compound event and comparing probability models. (See 2007 6-6.4 for reference)

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?		