Transitional Colorado Assessment Program (TCAP) Assessment Framework

Mathematics – Grade 6

The assessment frameworks specify the content that will be eligible for assessment in the 2012 and 2013 TCAP by aligning the assessment objectives from the Colorado Model Content Standards (old standards) with the Colorado Academic Standards (new standards). TCAP supports the transition to the CAS during the next two years as a gradual approach to statewide measuring of student achievement of the new standards.

Please remember that the TCAP frameworks, and thus TCAP, are not inclusive of **all** of the Colorado Academic Standards (CAS). **Districts should, however, still transition to the full range of the new standards as the complete set of CAS will be considered eligible content for inclusion in the new 2014 assessment.**

The frameworks are organized as indicated in the table below:

Standard	Indicates the broad knowledge skills that all students should be acquiring in Colorado schools at grade level. Each standard is assessed every year.		
Benchmark	Tactical descriptions of the knowledge and skills students should acquire by each grade level assessed by the TCAP.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
Specific knowledge and skills eligible for inclusion on TCAP for each grade level.	Provides the code(s) from the Colorado Academic Standards (CAS) that correspond(s) to the assessment objective.	Provides the text from the CAS which correspond(s) to the assessment objective.	Provides clarifying information.

The following may assist in understanding the revised frameworks:

- As the new standards are mastery based, any assessment objective that is aligned to a standard or a mathematical practice from the Colorado Academic Standards at the relevant grade level or below is eligible for assessment on the TCAP.
- A CAS may be aligned to multiple assessment objectives. To ensure a reasonable document length per grade, some instances of multiple CAS alignments have been omitted.

- Some assessment objectives, or parts of assessment objectives, do not explicitly align with the CAS but will still be assessed. Where this occurs, it is noted with language such as "this will continue to be assessed." The concepts from these assessment objectives are also compiled in a table at the bottom of each framework for easy reference. The purpose of continuing to assess non-CAS aligned objectives is to ensure the reliability and comparability of the TCAP to prior year's assessments.

- Assessment objectives and parts of assessment objectives that will no longer be assessed have been struck through and are included in the revised frameworks for purposes of comparison to the prior frameworks only.

- A key to the CAS Alignment Code can be by following this link: http://www.cde.state.co.us/cdeassess/UAS/AdoptedAcademicStandards/CAS_Reference_system.pdf

The revised frameworks directly build off of the work done on the original Colorado Student Assessment Program (CSAP) frameworks and reflect a joint endeavor between the Office of Assessment, Research and Evaluation and the content specialists from the Office of Academic and Instructional Support.

Standard 1	Students develop number sense and use numbers and number relationships in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 1	Demonstrate meanings for integers, rational numbers, percents, exponents, square roots and pi (π) using physical materials and technology in problem-solving situations.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Locate commonly used positive rational numbers including terminating decimals through hundredths, fractions (halves, thirds, fourths, eighths, and tenths), mixed numbers, and percents on a number line.	MA10-GR.6-S.1-GLE.3-EO.b (i-iv)	Use number line diagrams and coordinate axes to represent points on the line and in the plane with negative number coordinates. (CCSS: 6.NS.6) i. Describe a rational number as a point on the number line. (CCSS: 6.NS.6) ii. Use opposite signs of numbers to indicate locations on opposite sides of 0 on the number line. (CCSS: 6.NS.6a) iii. Identify that the opposite of the opposite of a number is the number itself. (CCSS: 6.NS.6a) iv. Explain when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. (CCSS: 6.NS.6b) v. Find and position integers and other rational numbers on a horizontal or vertical number line diagram. (CCSS: 6.NS.6c) vi. Find and position pairs of integers and other rational numbers on a coordinate plane. (CCSS: 6.NS.6c)	
b. Using physical materials or pictures to demonstrate the meaning and equivalence of fractions, decimals and/or percents (for example, write the fractions, decimal, and percent value for the shaded portion of a partially shaded circle).	MA10-GR.4-S.1-GLE.2-EO.a.i	Explain equivalence of fractions using drawings and models. (CCSS: 4.NF.1)	This is part of the standard for mathematical practice, "Model with mathematics".
	MA10-GR.5-S.1-GLE.1-EO.b (i-ii)	Read, write, and compare decimals to thousandths. (CCSS: 5.NBT.3) i. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form. (CCSS: 5.NBT.3a) ii. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. (CCSS: 5.NBT.3b)	
	MA10-GR.6-S.1-GLE.1-EO.c.iv	Find a percent of a quantity as a rate per 100. (CCSS: 6.RP.3c)	

Standard 1	Students develop number sense and use numbers and number relationships in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 2	Read and write and order integers, rational numbers and common irrational numbers such as $\sqrt{2}$, $\sqrt{5}$, and π.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Read, write, order and compare common fractions, decimals, and percents in a variety of forms.	MA10-GR.6-S.1-GLE.3-EO.c (i-iv)	Order and find absolute value of rational numbers. (CCSS: 6.NS.7) i. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. (CCSS: 6.NS.7a) ii. Write, interpret, and explain statements of order for rational numbers in real-world contexts. (CCSS: 6.NS.7b) iii. Define the absolute value of a rational number as its distance from 0 on the number line and interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. (CCSS: 6.NS.7c) iv. Distinguish comparisons of absolute value from statements about order. (CCSS: 6.NS.7d)	Rational numbers include fractions, decimals and percents in addition to integers.

Standard 1	Students develop number sense and use numbers and number relationships in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 3	Apply number theory concepts (for example, primes, factors, multiples) to represent numbers in various ways.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Identify and use the concepts of factor, multiple, prime, composite, and square numbers.	MA10-GR.4-S.2-GLE.1-EO.b (i-iv)	Apply concepts of squares, primes, composites, factors, and multiples to solve problems (CCSS: 4.OA.4) i. Find all factor pairs for a whole number in the range 1–100. (CCSS: 4.OA.4) ii. Recognize that a whole number is a multiple of each of its factors. (CCSS: 4.OA.4) iii. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. (CCSS: 4.OA.4) iv. Determine whether a given whole number in the range 1–100 is prime or composite. (CCSS: 4.OA.4)	

b. Describe numbers by characteristics (divisibility, even, odd, prime, composite, square).	MA10-GR.4-S.2-GLE.1-EO.b (i-iv)	Apply concepts of squares, primes, composites, factors, and multiples to solve problems (CCSS: 4.OA.4) i. Find all factor pairs for a whole number in the range 1–100. (CCSS: 4.OA.4) ii. Recognize that a whole number is a multiple of each of its factors. (CCSS: 4.OA.4) iii. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. (CCSS: 4.OA.4) iv. Determine whether a given whole number in the range 1–100 is prime or composite. (CCSS: 4.OA.4)	Although divisibility of numbers is not in the CAS at this grade level, it will continue to be assessed within this objective.

Standard 1	Students develop number sense and use numbers and number relationships in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 4	Use the relationships among fractions, decimals, and percents, including the concepts of ratio and proportion, in problem-solving situations.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Demonstrate equivalence relationships among fractions, decimals and percents in problem-solving situations (for example, two students out of eight is the same as 25%)	MA10-GR.6-S.1-GLE.1-EO.c	Use ratio and rate reasoning to solve real-world and mathematical problems. (CCSS: 6.RP.3)	Although converting between fractions, decimals and percents is not explicitly in the CAS at this grade level and below, it will continue to be assessed within this objective.
	MA10-GR.6-S.1-GLE.1-EO.c.iv	Find a percent of a quantity as a rate per 100. (CCSS: 6.RP.3c)	
	MA10-GR.6-S.1-GLE.1-EO.c.vi	Use common fractions and percents to calculate parts of whole numbers in problem situations including comparisons of savings rates at different financial institutions (PFL)	
	MA10-GR.4-S.1-GLE.1-EO.b.i	Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. (CCSS: 4.NF.5)	

Standard 1	Students develop number sense and use numbers and number relationships in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 5	Use number sense to estimate and justify the reasonableness of solutions to problems involving integers, rational numbers, and common irrational numbers such as $\sqrt{2}$, $\sqrt{5}$, and π.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Develop, test, and explain conjectures about properties of numbers (associative, commutative, identity, distributive multiplicative property of zero on whole and rational numbers.)	MA10-GR.6-S.2-GLE.1-EO.c	Apply the properties of operations to generate equivalent expressions.(CCSS: 6.EE.3)	This is part of the standard for mathematical practices, "Construct viable arguments and critique the reasoning of others" and "Look for and make use of structure."
	MA10-GR.6-S.2-GLE.1-EO.d	Identify when two expressions are equivalent. (CCSS: 6.EE.4)	

Standard 1	Students develop number sense and use numbers and number relationships in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 6	Use number sense to estimate and justify the reasonableness of solutions to problems involving integers, rational numbers, and common irrational numbers such as $\sqrt{2}$, $\sqrt{5}$, and π.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Use number sense to estimate, determine, and justify the reasonableness of solutions involving whole numbers, decimals, and common fractions (only sums and differences for fractions and decimals). For example: Is 1/2 + 1/3 closer to 0, 1/2 or 1?	MA10-GR.5-S.1-GLE.3-EO.a.i	Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. (CCSS: 5.NF.2)	This is part of the standard for mathematical practice, "Attend to precision."
	MA10-GR.4-S.1-GLE.3-EO.b.vi	Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (CCSS: 4.OA.3)	

Standard 2	Students use algebraic methods to explore, model, and describe patterns and functions involving numbers, shapes, data, and graphs in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 1	Represent, describe, and analyze patterns and relationships using tables, graphs, verbal rules, and standard algebraic notation.		
a. Represent, describe, and analyze geometric and numeric patterns using tables, words, symbols, concrete objects, or pictures	MA10-GR.6-S.2-GLE.2-EO.g (i-iii)	Represent and analyze quantitative relationships between dependent and independent variables. (CCSS: 6.EE) i. Use variables to represent two quantities in a real-world problem that change in relationship to one another. (CCSS: 6.EE.9) ii. 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. (CCSS: 6.EE.9) iii. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (CCSS: 6.EE.9)	
	MA10-GR.4-S.2-GLE.1-EO.a.i	Use number relationships to find the missing number in a sequence. (CCSS: 4.OA.5)	
b. Use a variable to represent an unknown (letter, box, symbol).	MA10-GR.6-S.2-GLE.2-EO.c (i)	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem. (CCSS: 6.EE.6) i. Recognize that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (CCSS: 6.EE.6)	
	MA10-GR.6-S.2-GLE.1-EO.b	Write, read, and evaluate expressions in which letters stand for numbers. (CCSS: 6.EE.2)	

<table>
<tr><td>Standard 2</td><td colspan="3">Students use algebraic methods to explore, model, and describe patterns and functions involving numbers, shapes, data, and graphs in problem-solving situations and communicate the reasoning used in solving these problems.</td></tr>
<tr><td>Benchmark 2</td><td colspan="3">Describe patterns using variables, expressions, equations, and inequalities in problem-solving situations.</td></tr>
<tr><td>Assessment Objective</td><td>CAS Alignment Code</td><td>CAS Expectation Text</td><td>Comment</td></tr>
<tr><td rowspan="2">a. Solve problems by representing and analyzing patterns using tables, words, concrete objects, or pictures.</td><td>MA10-GR.6-S.2-GLE.2-EO.g (i-iii)</td><td>Represent and analyze quantitative relationships between dependent and independent variables. (CCSS: 6.EE)
i. Use variables to represent two quantities in a real-world problem that change in relationship to one another. (CCSS: 6.EE.9)
ii. 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. (CCSS: 6.EE.9)
iii. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (CCSS: 6.EE.9)</td><td rowspan="2"></td></tr>
<tr><td>MA10-GR.4-S.2-GLE.1-EO.a.i.</td><td>Use number relationships to find the missing number in a sequence (CCSS: 4.OA.5)</td></tr>
</table>

Standard 2	Students use algebraic methods to explore, model, and describe patterns and functions involving numbers, shapes, data, and graphs in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 3	Analyze functional relationships to explain how a change in one quantity results in a change in another (for example, how the area of a circle changes as the radius increases, or how a person's height changes over time).		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Predict and describe how a change in one quantity results in a change in another quantity in a linear relationship (for example, A creature gains 3 oz. a day, how much will it have gained over 10 days?)	MA10-GR.6-S.2-GLE.2-EO.g (i-iii)	Represent and analyze quantitative relationships between dependent and independent variables. (CCSS: 6.EE) i. Use variables to represent two quantities in a real-world problem that change in relationship to one another. (CCSS: 6.EE.9) ii. 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. (CCSS: 6.EE.9) iii. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (CCSS: 6.EE.9)	

Standard 2	Students use algebraic methods to explore, model, and describe patterns and functions involving numbers, shapes, data, and graphs in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 4	Distinguish between linear and nonlinear functions through informal investigations.		
Assessment Objective	**CAS Alignment Code**	**Assessment Objective**	**Comment**
a. Explain whether data presented in a chart or graph is changing at a constant rate.			The CAS do not explicitly refer to "constant rate" at 6th grade or below; however, "constant rate" will continue to be assessed.

Standard 2	Students use algebraic methods to explore, model, and describe patterns and functions involving numbers, shapes, data, and graphs in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 5	Solve simple linear equations in problem-solving situations using a variety of methods (informal, formal, and graphical) and a variety of tools (physical materials, calculators, and computers).		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Solve problems using tables, concrete objects, or pictures involving linear relationships with whole numbers.	MA10-GR.5-S.2-GLE.1-EO.a	Generate two numerical patterns using given rules. (CCSS: 5.OA.3)	
	MA10-GR.5-S.2-GLE.1-EO.b	Identify apparent relationships between corresponding terms. (CCSS: 5.OA.3)	
	MA10-GR.5-S.2-GLE.1-EO.c	Form ordered pairs consisting of corresponding terms from the two patterns, and graphs the ordered pairs on a coordinate plane. (CCSS: 5.OA.3)	
	MA10-GR.5-S.2-GLE.1-EO.d	Explain informally relationships between corresponding terms in the patterns. (CCSS: 5.OA.3)	
	MA10-GR.5-S.2-GLE.1-EO.e	Use patterns to solve problems including those involving saving and checking accounts (PFL)	
	MA10-GR.5-S.2-GLE.1-EO.f	Explain, extend, and use patterns and relationships in solving problems, including those involving saving and checking accounts such as understanding that spending more means saving less (PFL)	
	MA10-GR.6-S.1-GLE.1-EO.c	Use ratio and rate reasoning to solve real-world and mathematical (CCSS: 6.RP.3)	
	MA10-GR.6-S.2-GLE.2-EO.g.iii	Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.	

Standard 3	Students use data collection and analysis, statistics, and probability in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 1	Read and construct displays of data using appropriate techniques (for example, line graphs, circle graphs, scatter plots, box plots, stem-and-leaf plots) and appropriate technology.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Organize and construct a line graph, bar graph, and frequency table from a given set of data.	MA10-GR.6-S.3-GLE.1-EO.d (i)	Summarize and describe distributions. (CCSS: 6.SP) i. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (CCSS: 6.SP.4)	Although line graphs are not in the CAS at 6th grade and below, they will continue to be assessed within this objective.
b. Read, interpret and draw conclusions from a line graph, bar graph, circle graph and frequency table.	MA10-GR.6-S.3-GLE.1-EO.d (i-ii and 1-4)	Summarize and describe distributions. (CCSS: 6.SP) i. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (CCSS: 6.SP.4) ii. Summarize numerical data sets in relation to their context. (CCSS: 6.SP.5) 1. Report the number of observations. (CCSS: 6.SP.5a) 2. Describe the nature of the attribute under investigation, including how it was measured and its units of measurement. (CCSS: 6.SP.5b) 3. Give 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. (CCSS: 6.SP.5c) 4. Relate the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. (CCSS: 6.SP.5d)	This is part of the standard for mathematical practice, “Construct viable arguments and critique the reasoning of others”. Although line and circle graphs are not in the CAS at 6th grade and below, they will continue to be assessed within this objective.

Standard 3	Students use data collection and analysis, statistics, and probability in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 2	Display and use measures of central tendency, such as mean, median and mode and measures of variability, such as range and quartiles.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Find and use measures of central tendency including mean, median, and mode.	MA10-GR.6-S.3-GLE.1-EO.d.ii (1-4)	Summarize numerical data sets in relation to their context. (CCSS: 6.SP.5) 1. Report the number of observations. (CCSS:6.SP.5a) 2. Describe the nature of the attribute under investigation, including how it was measured and its units of measurement. (CCSS: 6.SP.5b) 3. Give 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. (CCSS: 6.SP.5c) 4. Relate the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. (CCSS: 6.SP.5d)	
b. Find and use the range from a given set of data (for example, find the range from 2 to 12. Note: the range is 10).	MA10-GR.6-S.3-GLE.1-EO.d.ii.3	Give 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. (CCSS: 6.SP.5c)	

Standard 3	Students use data collection and analysis, statistics, and probability in problem-solving situations and communicate the reasoning used in solving these problems.
Benchmark 3	Evaluate arguments that are based on statistical claims.
No objectives assessed at this level on the TCAP.	

Standard 3	Students use data collection and analysis, statistics, and probability in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 4	Formulate hypotheses, drawing conclusions, and making convincing arguments based on data analysis		
a. Analyze data and draw conclusions to predict outcomes based on data displays such as line graphs, bar graphs, or frequency tables.	MA10-GR.6-S.3-GLE.1-EO.d (i-ii and 1-4)	Summarize and describe distributions. (CCSS: 6.SP) i. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (CCSS: 6.SP.4) ii. Summarize numerical data sets in relation to their context. (CCSS: 6.SP.5) 1. Report the number of observations. (CCSS: 6.SP.5a) 2. Describe the nature of the attribute under investigation, including how it was measured and its units of measurement. (CCSS: 6.SP.5b) 3. Give 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. (CCSS: 6.SP.5c) 4. Relate the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. (CCSS: 6.SP.5d)	Although line graphs are not in the CAS at 6th grade and below, they will continue to be assessed within this objective.

Standard 3	Students use data collection and analysis, statistics, and probability in problem-solving situations and communicate the reasoning used in solving these problems.
Benchmark 5	Determine probabilities through experiments or simulations.
No objectives assessed at this level on the TCAP.	

Standard 3	Students use data collection and analysis, statistics, and probability in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 6	Make predictions and compare results using both experimental and theoretical probability drawn from real-world problems.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Using a chance device, such as a number cube or spinner, design a fair game and an unfair game, and explain why they are fair and unfair respectively.			Although probability is not in the CAS at 6th grade and below, it will continue to be assessed within this objective.
b. Make predictions based on data obtained from simple probability experiments.			Although probability is not in the CAS at 6th grade and below, it will continue to be assessed within this objective.
c. Describe an event as likely or unlikely and explain the degree of likelihood using words such as certain, very likely, not likely, or impossible.			Although probability is not in the CAS at 6th grade and below, it will continue to be assessed within this objective.

Standard 3	Students use data collection and analysis, statistics, and probability in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 7	Use counting strategies to determine all the possible outcomes from an experiment (for example, the number of ways students can line up to have their picture taken).		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Determine the number of possible outcomes for simple events using a variety of methods such as: organized lists or tree diagrams.	MA10-GR.4-S.1-GLE.3-EO.b.iv	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. (CCSS: 4.OA.3)	

Standard 4	Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems.
Benchmark 1	Construct two-and three-dimensional models using a variety of materials and tools.
No objectives assessed at this level on the TCAP.	

Standard 4	Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 2	Describe, analyze and reason informally about the properties (for example, parallelism, perpendicularity, congruence) of two- and three-dimensional figures.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Identify, compare, and analyze the attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes (for example, acute, obtuse, right angle, parallel lines, perpendicular lines, intersecting lines, and line segments).	MA10-GR.5-S.4-GLE.2-EO.c (i-ii)	Classify two-dimensional figures into categories based on their properties. (CCSS: 5.G) i. Explain that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. (CCSS: 5.G.3) ii. Classify two-dimensional figures in a hierarchy based on properties. (CCSS: 5.G.4)	The CAS do not refer to three dimensional figures in this way at 6th grade or below. However, three dimensional figures within this context will continue to be assessed.
	MA10-GR.4-S.4-GLE.2-EO.c	Classify and identify two-dimensional figures according to attributes of line relationships or angle size. (CCSS: 4.G.2)	
b. Make and test conjectures about geometric relationships and develop logical arguments to justify conclusions.	MA10-GR.5-S.4-GLE.2-EO.c.i	Explain that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. (CCSS: 5.G.3)	This is part of the standard for mathematical practice, "Construct viable arguments and critique the reasoning of others".

Standard 4	Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems.
Benchmark 3	Apply the concept of ratio, proportion and similarity in problem-solving situations.
No objectives assessed at this level on the TCAP.	

Standard 4	Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 4	Solve problems using coordinate geometry.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Plot points on a coordinate graph in quadrant 1	MA10-GR.6-S.1-GLE.3-EO.d	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane including the use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. (CCSS: 6.NS.8)	
b. Draw a graph (in quadrant 1) from a given scenario or table.	MA10-GR.6-S.4-GLE.1-EO.c (i-ii)	Draw polygons in the coordinate plan to solve real-world and mathematical problems. (CCSS: 6.G.3) i. Draw polygons in the coordinate plane given coordinates for the vertices. ii. Use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. (CCSS: 6.G.3)	
Standard 4	Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 5	Solving problems involving perimeter and area in two dimensions, and involving surface area and volume in three dimensions.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Solve problems involving the perimeter of polygons.	MA10-GR.3-S.4-GLE.2-EO.c (i-iii)	Solve real world and mathematical problems involving perimeters of polygons. (CCSS: 3.MD.8) i. Find the perimeter given the side lengths. (CCSS: 3.MD.8) ii. Find an unknown side length given the perimeter. (CCSS: 3.MD.8) iii. Find rectangles with the same perimeter and different areas or with the same area and different perimeters. (CCSS: 3.MD.8)	
b. Solve problems involving area of polygons (square, rectangle, parallelogram, rhombus, triangle)	MA10-GR.6-S.4-GLE.1-EO.a (i-ii)	Develop and apply formulas and procedures for area of plane figures i. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes. (CCSS: 6.G.1) ii. Apply these techniques in the context of solving real-world and mathematical problems. (CCSS: 6.G.1)	

Standard 4	Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 6	Transforming geometric figures using reflections, translations, and rotations to explore congruence.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Identify congruent shapes using reflections, rotations, and translations.			Although congruency is not in the CAS at 6th grade and below, it will continue to be assessed.
b. Show lines of symmetry on a two-dimensional figure.	MA10-GR.4-S.4-GLE.2-EO.d	Identify a line of symmetry for a two-dimensional figure. (CCSS: 4.G.3)	

Standard 5	Students use a variety of tools and techniques to measure, apply the results in problem-solving situations, and communicate the reasoning used in solving these problems		
Benchmark 1	Estimate, use and describe measures of distance, perimeter, area, volume, capacity, weight, mass, and angle comparison.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Determine the appropriate unit of measure (metric and US customary) when estimating distance, capacity, and weight.	MA10-GR.4-S.4-GLE.1-EO.a.i	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. (CCSS: 4.MD.1)	
b. Estimate and use standard and/or metric units for length, weight and temperature	MA10-GR.3-S.4-GLE.3-EO.a	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. (CCSS: 3.MD)	Knowing relative sizes is part of the standard for mathematical practice, "Attend to precision". Although temperature is not in the CAS at 6th grade and below, it will continue to be assessed.
	MA10-GR.4-S.4-GLE.1-EO.a.i	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. (CCSS: 4.MD.1)	
c. Estimate the area of a polygon.	MA10-GR.6-S.4-GLE.1-EO.a (i-ii)	Develop and apply formulas and procedures for area of plane figures i. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes. (CCSS: 6.G.1) ii. Apply these techniques in the context of solving real-world and mathematical problems. (CCSS: 6.G.1)	This part of the standard for mathematical practice, "Attend to precision".

Standard 5	Students use a variety of tools and techniques to measure, apply the results in problem-solving situations, and communicate the reasoning used in solving these problems		
Benchmark 2	Estimate, make, and use direct and indirect measurements to describe and make comparisons.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Estimate, make and use direct and indirect measurements to describe and make comparisons.	MA10-GR6-S.1-GLE.1-EO.a.	Apply the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (CCSS: 6.RP.1)	This is part of the standard for mathematical practice, "Attend to precision".
	MA10-GR1-S.4-GLE.2-EO.a.	Measure lengths indirectly and by iterating length units. (CCSS:1.MD)	

Standard 5	Students use a variety of tools and techniques to measure, apply the results in problem-solving situations, and communicate the reasoning used in solving these problems		
Benchmark 3	Read and interpret various scales including those based on number lines, graphs, and maps.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Read and interpret scales on number lines, graphs, and maps.	MA10-GR.4-S.4-GLE.1-EO.a.iv	Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (CCSS: 4.MD.2)	
	MA10-GR6-S.1-GLE.3-EO.b.v	Find and position integers and other rational numbers on a horizontal or vertical number line diagram. (CCSS: 6.NS.6c)	
b. Select the appropriate scale for a given problem (for example, using the appropriate scale when setting up a graph or determining the order of numbers on a number line).	MA10-GR.6-S.3-GLE.1-EO.d.i	Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (CCSS: 6.SP.4)	The CAS do not explicitly indicate that students should select an appropriate scale but it is implied when constructing a graph.

Standard 5	Students use a variety of tools and techniques to measure, apply the results in problem-solving situations, and communicate the reasoning used in solving these problems		
Benchmark 4	Develop and use formulas and procedures to solve problems involving measurement.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Use formulas and/or procedures to solve problems involving the perimeter of a polygon.	MA10-GR.3-S.4-GLE.2-EO.c	Solve real world and mathematical problems involving perimeters of polygons. (CCSS: 3.MD.8)	
b. Use formulas and/or procedures to solve problems involving the area of squares, rectangles, parallelograms, rhombus, and triangles.	MA10-GR.6-S.4-GLE.1-EO.a (i-ii)	Develop and apply formulas and procedures for area of plane figures i. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes. (CCSS: 6.G.1) ii. Apply these techniques in the context of solving real-world and mathematical problems. (CCSS: 6.G.1)	

Standard 5	Students use a variety of tools and techniques to measure, apply the results in problem-solving situations, and communicate the reasoning used in solving these problems		
Benchmark 5	Describe how a change in an object's linear dimensions affects its perimeter, area, and volume.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Demonstrate how changing one of the dimensions of a rectangle affects its perimeter (using concrete materials or graph paper).	MA10-GR.3-S.4-GLE.2-EO.c.iii	Find rectangles with the same perimeter and different areas or with the same area and different perimeters. (CCSS: 3.MD.8)	

Standard 5	Students use a variety of tools and techniques to measure, apply the results in problem-solving situations, and communicate the reasoning used in solving these problems
Benchmark 6	Select and use appropriate units and tools to measure to the degree of accuracy required in a particular problem-solving situation.
No objectives assessed at this level on the TCAP.	

Standard 6	Students link concepts and procedures as they develop and use computational techniques, including estimation, mental arithmetic, paper-and-pencil, calculators, and computers, in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 1	Use models to explain how ratios, proportions, and percents can be used to solve real-world problems.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Use concrete materials or pictures, determine commonly used percentages (for example, 25%, 50%) in problem-solving situations.	MA10-GR.6-S.1-GLE.1-EO.c.iv	Find a percent of a quantity as a rate per 100. (CCSS: 6.RP.3c)	
	MA10-GR.6-S.1-GLE.1-EO.c.v	Solve problems involving finding the whole, given a part and the percent. (CCSS: 6.RP.3c)	

Standard 6	Students link concepts and procedures as they develop and use computational techniques, including estimation, mental arithmetic, paper-and-pencil, calculators, and computers, in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 2	Construct, use and explain procedures to compute and estimate with whole numbers, fractions, decimals, and integers.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Demonstrate conceptual meaning of addition and subtraction of fractions and decimals, in problem solving situations.	MA10-GR.5-S.1-GLE.3-EO.a.	Use equivalent fractions as a strategy to add and subtract fractions. (CCSS: 5.NF)	
	MA10-GR.4-S.1-GLE.2-EO.b.i	Apply previous understandings of addition and subtraction to add and subtract fractions. (CCSS: 4.NF.3)	
	MA10-GR.5-S.1-GLE.2-EO.c (i-ii)	Add, subtract, multiply, and divide decimals to hundredths. (CCSS: 5.NBT.7) i. Use concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. (CCSS: 5.NBT.7) ii. Relate strategies to a written method and explain the reasoning used. (CCSS: 5.NBT.7)	
b. Use and explain strategies to add/subtract decimals and fractions in problem-solving situations (common fractions with like and unlike denominators, mixed numbers, and decimals to thousandth.)	MA10-GR.5-S.1-GLE.3-EO.a (i)	Use equivalent fractions as a strategy to add and subtract fractions. (CCSS: 5.NF) i. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. (CCSS: 5.NF.2)	
	MA10-GR6-S.1-GLE.2-EO.b	Fluently add, subtract, multiply, and divide multi-digit decimals using standard algorithms for each operation. (CCSS: 6.NS.3)	
c. Find equivalent representations by decomposing and composing whole numbers (for example, 48 x 12 = (48 x 10) + (48 x 2)).	MA10-GR.6-S.2-GLE.1-EO.c	Apply the properties of operations to generate equivalent expressions. (CCSS: 6.EE.3)	
	MA10-GR.6-S.2-GLE.1-EO.d	Identify when two expressions are equivalent. (CCSS: 6.EE.4)	
d. Demonstrate proficiency with the four basic operations using whole numbers	MA10-GR.4-S.1-GLE.3-EO.b	Use the four operations with whole numbers to solve problems. (CCSS: 4.OA)	

Standard 6	Students link concepts and procedures as they develop and use computational techniques, including estimation, mental arithmetic, paper-and-pencil, calculators, and computers, in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 3	Develop, apply and explain a variety of different estimation strategies in problem-solving situations, and explain why an estimate may be acceptable in place of an exact answer.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Develop, apply and explain a variety of different estimation strategies in problem-solving situations and explain why an estimate may be acceptable in place of an exact answer.	MA10-GR.4-S.1-GLE.3-EO.b.vi	Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (CCSS: 4.OA.3)	This is part of the standard for mathematical practice, "Attend to precision".

Standard 6	Students link concepts and procedures as they develop and use computational techniques, including estimation, mental arithmetic, paper-and-pencil, calculators, and computers, in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 4	Select and use appropriate methods for computing with commonly used fractions and decimals, percents, and integers in problem-solving situations from among mental arithmetic, estimation, paper-and-pencil, calculator, and computer methods, and determining whether the results are reasonable.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Apply appropriate computation methods to solve problems involving whole numbers, common fractions, and decimals (use only addition and subtraction of fractions and decimals).	MA10-GR.5-S.1-GLE.2-EO.a	Fluently multiply multi-digit whole numbers using standard algorithms. (CCSS: 5.NBT.5)	
	MA10-GR.6-S.1-GLE.2-EO.a	Fluently divide multi-digit numbers using standard algorithms. (CCSS: 6.NS.2)	
	MA10-GR.6-S.1-GLE.2-EO.b	Fluently add, subtract, multiply, and divide multi-digit decimals using standard algorithms for each operation. (CCSS: 6.NS.3)	
	MA10-GR5-S.1-GLE.3-EO.a.ii	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions with like denominators. (CCSS: 5.NF.1)	
	MA10-GR4-S.1-GLE.3-EO.a.i	Fluently add and subtract multi-digit whole numbers using standard algorithms. (CCSS: 4.NBT.4)	

Standard 6	Students link concepts and procedures as they develop and use computational techniques, including estimation, mental arithmetic, paper-and-pencil, calculators, and computers, in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 4	Select and use appropriate methods for computing with commonly used fractions and decimals, percents, and integers in problem-solving situations from among mental arithmetic, estimation, paper-and-pencil, calculator, and computer methods, and determining whether the results are reasonable.		
b. In a problem-solving situation, determine whether the results are reasonable and justify those results with accurate computation.	MA10-GR5-S.1-GLE.3-EO.a.i	Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. (CCSS: 5.NF.2)	This is part of the standard for mathematical practice, "Attend to precision".
	MA10-GR4-S.1-GLE.3-EO.b	Use the four operations with whole numbers to solve problems. (CCSS: 4.OA)	
	MA10-GR.6-S.1-GLE.2-EO.b	Fluently add, subtract, multiply, and divide multi-digit decimals using standard algorithms for each operation. (CCSS: 6.NS.3)	

Note: Some assessment objectives or parts of assessment objectives are not contained within the Colorado Academic Standards at or below this grade level but will continue to be assessed by the TCAP in 6th grade. The concepts from these objectives are reflected in the tables below.

Grade 6 Mathematics	Relevant Assessment Objective(s)
Divisibility as a characteristic of numbers	1.3b
Conversions between fractions, decimals and percents	1.4a
Constant rate	2.4a
Line and circle graphs	3.1a; 3.1b; 3.4a
Probability	3.6a; 3.6b; 3.6c
Analysis and description of three dimensional figures	4.2a
Congruence	4.6a
Temperature	5.1b