



Transitional Colorado Assessment Program (TCAP) Assessment Framework Mathematics – Grade 8

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. Recognize and use equivalent representations of positive rational numbers and common irrational numbers (for example, locate rational numbers on a number line and demonstrate the meaning of square roots and perfect squares).	MA10-GR.8-S.1-GLE.1-EO.c	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. (CCSS: 8.NS.2)	
	MA10-GR.8-S.1-GLE.1-EO.f	Evaluate square roots of small perfect squares and cube roots of small perfect cubes. (CCSS: 8.EE.2)	
	MA10-GR.8-S.1-GLE.1-EO.d	Apply the properties of integer exponents to generate equivalent numerical expressions. (CCSS: 8.EE.1)	
	MA10-GR.7-S.2-GLE.1-EO.a	Use properties of operations to generate equivalent expressions. (CCSS: 7.EE)	

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. Compare and order sets of integers and rational numbers that are expressed in a variety of ways.	MA10-GR.6-S.1-GLE.3-EO.c (i-iv)	Order and find absolute value of rational numbers. (CCSS: 6.NS.7) <ul style="list-style-type: none"> 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) 	



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. Apply number theory concepts (for example, primes, factors, multiples, exponents) in problem-solving situations.	MA10-GR.4-S.2-GLE.1-EO.b	Apply concepts of squares, primes, composites, factors, and multiples to solve problems	

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. Use the relationships among fractions, decimals and percents including the concepts of ratio and proportion in problem-solving situations (similarity, scale factor, unit rate).	MA10-GR.7-S.1-GLE.1-EO.a	Analyze proportional relationships and use them to solve real-world and mathematical problems. (CCSS: 7.RP)	
	MA10-GR.7-S.1-GLE.1-EO.b	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. (CCSS: 7.RP.1)	
	MA10-GR.7-S.1-GLE.1-EO.d	Use proportional relationships to solve multistep ratio and percent problems. (CCSS: 7.RP.3)	
	MA10-GR.7-S.2-GLE.2-EO.b	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. (CCSS: 7.EE.3)	
	MA10-GR.7-S.4-GLE.1-EO.a.i	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. (CCSS: 7.G.1)	



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	Develop, test, and explain conjectures about properties of integers and rational numbers.		
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Develop and test conjectures about properties of integers (Does $3-5 = 5-3$?) and rational numbers.	MA10-GR.7-S.1-GLE.2-EO.a (i-viii)	<p>Apply understandings of addition and subtraction to add and subtract rational numbers including integers. (CCSS: 7.NS.1)</p> <ul style="list-style-type: none"> i. Represent addition and subtraction on a horizontal or vertical number line diagram. (CCSS: 7.NS.1) ii. Describe situations in which opposite quantities combine to make 0. (CCSS: 7.NS.1a) iii. Demonstrate $p + q$ as the number located a distance q from p, in the positive or negative direction depending on whether q is positive or negative. (CCSS: 7.NS.1b) iv. Show that a number and its opposite have a sum of 0 (are additive inverses). (CCSS: 7.NS.1b) v. Interpret sums of rational numbers by describing real-world contexts. (CCSS: 7.NS.1c) vi. Demonstrate subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. (CCSS: 7.NS.1c) vii. 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. (CCSS: 7.NS.1c) viii. Apply properties of operations as strategies to add and subtract rational numbers. (CCSS: 7.NS.1d) 	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.”



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		Develop, test, and explain conjectures about properties of integers and rational numbers.	
Assessment Objective "a" continued: Develop and test conjectures about properties of integers (Does $3-5 = 5-3$?) and rational numbers.	MA10-GR.7-S.1-GLE.2-EO.b (i-vi)	<p>Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers including integers. (CCSS: 7.NS.2)</p> <ul style="list-style-type: none"> i. Apply properties of operations to multiplication of rational numbers. (CCSS: 7.NS.2a) ii. Interpret products of rational numbers by describing real-world contexts. (CCSS: 7.NS.2a) iii. Apply properties of operations to divide integers. (CCSS: 7.NS.2b) iv. Apply properties of operations as strategies to multiply and divide rational numbers. (CCSS: 7.NS.2c) v. Convert a rational number to a decimal using long division. (CCSS: 7.NS.2d) vi. Show that the decimal form of a rational number terminates in 0s or eventually repeats. (CCSS: 7.NS.2d) 	

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 and justify the reasonableness of solutions to problems involving integers and rational numbers.	MA10-GR.7-S.2-GLE.2-EO.b	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. (CCSS: 7.EE.3)	This is part of the standard for mathematical practice, "Attend to precision."



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 patterns (for example, geometric and numeric) and relationships using tables, graphs, verbal rules, and standard algebraic notation.	MA10-GR.6-S.2-GLE.2-EO.g (i-iii)	<p>Represent and analyze quantitative relationships between dependent and independent variables. (CCSS: 6.EE)</p> <ul style="list-style-type: none"> 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.7-S.2-GLE.2-EO.c	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. (CCSS: 7.EE.4)	
	MA10-GR.8-S.2-GLE.1-EO.b	Graph proportional relationships, interpreting the unit rate as the slope of the graph. (CCSS: 8.EE.5)	
	MA10-GR8-S.2-GLE.3-EO.b.i	Construct a function to model a linear relationship between two quantities. (CCSS: 8.F.4)	



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.	
b. Convert from one functional representation (table, graph, verbal rule, standard algebraic notation) to another.	MA10-GR.8-S.2-GLE.3-EO.b (i-vi)	<p>Use functions to model relationships between quantities. (CCSS: 8.F)</p> <ul style="list-style-type: none"> i. Construct a function to model a linear relationship between two quantities. (CCSS: 8.F.4) ii. 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. (CCSS: 8.F.4) iii. 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. (CCSS: 8.F.4) iv. Describe qualitatively the functional relationship between two quantities by analyzing a graph. (CCSS: 8.F.5) v. Sketch a graph that exhibits the qualitative features of a function that has been described verbally. (CCSS: 8.F.5) vi. Analyze how credit and debt impact personal financial goals (PFL) 	

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 2		Describe patterns using variables, expressions, equations, and inequalities in problem-solving situations.	
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Describe patterns using variables, expressions, equations, and inequalities in problem-solving situations.	MA10-GR.7-S.2-GLE.2-EO.c	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. (CCSS: 7.EE.4)	
	MA10-GR8-S.2-GLE.3-EO.b.i	Construct a function to model a linear relationship between two quantities. (CCSS: 8.F.4)	



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. Analyze functional relationships to explain how a change in one quantity results in a change in another (for example, how a person’s height changes over time).	MA10-GR.6-S.2-GLE.2-EO.g (i-iii)	Represent and analyze quantitative relationships between dependent and independent variables. (CCSS: 6.EE) <ul style="list-style-type: none"> 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	CAS Expectation Text	Comment
a. Distinguish between linear and nonlinear functions through informal investigations.	MA10-GR.8-S.2-GLE.3-EO.a (i-v)	Define, evaluate, and compare functions. (CCSS: 8.F) <ul style="list-style-type: none"> i. Define a function as a rule that assigns to each input exactly one output. (CCSS: 8.F.1) ii. Show that the graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (CCSS: 8.F.1) iii. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). (CCSS: 8.F.2) iv. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line. (CCSS: 8.F.3) v. Give examples of functions that are not linear. 	



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).
a. Solve simple linear equations in problem-solving situations using a variety of methods (informal, formal, or graphic)	MA10-GR.8-S.2-GLE.2-EO.a (i-ii)	Solve linear equations in one variable. (CCSS: 8.EE.7) i. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. (CCSS: 8.EE.7a) ii. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. (CCSS: 8.EE.7b)		The graphic method is not explicitly in the CAS at 8 th grade or below.
	MA10-GR.7-S.2-GLE.2-EO.c	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. (CCSS: 7.EE.4)		

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. Read and construct displays of data using appropriate techniques (for example, circle graphs, scatter plots, box and whisker plots, stem-and-leaf plots).	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)		The CAS do not explicitly reference circle graphs. The CAS do not explicitly reference stem and leaf plots at 8 th grade or below; However, they will continue to be assessed.



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. Display and use measures of central tendency, (such as mean, median, and mode) and measures of variability, (such as range and quartiles) in problem-solving situations	MA10-GR.6-S.3-GLE.1-EO.d (i-ii and 1-4)	<p>Summarize and describe distributions. (CCSS: 6.SP)</p> <ul style="list-style-type: none"> 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) <ul style="list-style-type: none"> 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) 	The CAS do not explicitly reference mode at 8 th grade or below.



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.	
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Analyze a graph, table or summary for misleading characteristics.			This is part of the standards for mathematical practice, "Construct viable arguments and critique the reasoning of others."
b. Recognize the misuse of statistical data in written arguments.	MA10-GR.7-S.3-GLE.1-EO.a (i-iv)	Use random sampling to draw inferences about a population. (CCSS: 7.SP) i. Explain that generalizations about a population from a sample are valid only if the sample is representative of that population. (CCSS: 7.SP.1) ii. Explain that random sampling tends to produce representative samples and support valid inferences. (CCSS: 7.SP.1) iii. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. (CCSS: 7.SP.2) iv. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. (CCSS: 7.SP.2)	This is part of the standards for mathematical practice, "Construct viable arguments and critique the reasoning of others."
c. Describe how data can be interpreted in more than one way or be used to support more than one position in a debate.	MA10-GR6-S.3-GLE.1-EO.d	Summarize and describe distributions. (CCSS: 6.SP)	This is part of the standard for mathematical practice "Construct viable arguments and critique the reasoning of others".



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	
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Formulate hypotheses, draw conclusions, and make convincing arguments based on data analysis.	MA10-GR.7-S.3-GLE.1-EO.a (i-iv)	<p>Use random sampling to draw inferences about a population. (CCSS: 7.SP)</p> <ul style="list-style-type: none"> i. Explain that generalizations about a population from a sample are valid only if the sample is representative of that population. (CCSS: 7.SP.1) ii. Explain that random sampling tends to produce representative samples and support valid inferences. (CCSS: 7.SP.1) iii. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. (CCSS: 7.SP.2) iv. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. (CCSS: 7.SP.2) 	This is part of the standard for mathematical practice “Construct viable arguments and critique the reasoning of others”.

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.	
<i>No objectives assessed at this level on the TCAP.</i>			



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. Use a model (list, tree diagram, area model) to determine theoretical probabilities to solve problems involving uncertainty.	MA10-GR.7-S.3-GLE.2-EO.d (i-iv)	<p>Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. (CCSS: 7.SP.8)</p> <ul style="list-style-type: none"> i. Explain that the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. (CCSS: 7.SP.8a) ii. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. (CCSS: 7.SP.8b) iii. For an event described in everyday language identify the outcomes in the sample space which compose the event. (CCSS: 7.SP.8b) iv. Design and use a simulation to generate frequencies for compound events. (CCSS: 7.SP.8c) gathered. (CCSS: 6.SP.5c) 	
b. Make predictions using theoretical probability in real-world problems.	MA10-GR.7-S.3-GLE.2-EO.c (i-iii)	<p>Develop a probability model and use it to find probabilities of events. (CCSS: 7.SP.7)</p> <ul style="list-style-type: none"> i. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (CCSS: 7.SP.7) ii. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. (CCSS: 7.SP.7a) iii. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. (CCSS: 7.SP.7b) 	



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. Use a model or counting technique to determine all the possible outcomes from an experiment (for example, the number of ways students can line up to have their picture taken).	MA10-GR.7-S.3-GLE.2-EO.d (i-iv)	<p>Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. (CCSS: 7.SP.8)</p> <ul style="list-style-type: none"> i. Explain that the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. (CCSS: 7.SP.8a) ii. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. (CCSS: 7.SP.8b) iii. For an event described in everyday language identify the outcomes in the sample space which compose the event. (CCSS: 7.SP.8b) iv. Design and use a simulation to generate frequencies for compound events. (CCSS: 7.SP.8c) 	

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.		
<i>No objectives assessed at this level on the TCAP.</i>			



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. Describe, analyze and reason informally about properties (for example, parallelism, perpendicularity, congruence, and similarity) of two- and three-dimensional figures.	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 8 th 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)	
	MA10-GR.8-S.4-GLE.1-EO.a	Verify experimentally the properties of rotations, reflections, and translations. (CCSS: 8.G.1)	
	MA10-GR.8-S.4-GLE.1-EO.b	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. (CCSS: 8.G.3)	
	MA10-GR.8-S.4-GLE.1-EO.c	Demonstrate 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. (CCSS: 8.G.2)	
	MA10-GR.8-S.4-GLE.1-EO.d	Given two congruent figures, describe a sequence of transformations that exhibits the congruence between them. (CCSS: 8.G.2)	
	MA10-GR.8-S.4-GLE.1-EO.e	Demonstrate 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. (CCSS: 8.G.4)	
	MA10-GR.8-S.4-GLE.1-EO.f	Given two similar two-dimensional figures, describe a sequence of transformations that exhibits the similarity between them. (CCSS: 8.G.4)	
	MA10-GR.8-S.4-GLE.1-EO.g	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. (CCSS: 8.G.5)	



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.			
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Apply the concept of ratio, proportion, and similarity in problem-solving situations.	MA10-GR.7-S.1-GLE.1-EO.a	Analyze proportional relationships and use them to solve real-world and mathematical problems. (CCSS: 7.RP)	Similarity at eighth grade is taught through transformations and should be explicitly connected to the concept of ratio.
	MA10-GR.7-S.1-GLE.1-EO.b	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. (CCSS: 7.RP.1)	

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. Solve problems in real-world situations using coordinate geometry (for example, maps, distance on a number line).	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)	
	MA10-GR.8-S.4-GLE.2-EO.c	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. (CCSS: 8.G.8)	



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 perimeter and area in two dimensions, and involving surface area and volume in three dimensions (include right prisms and cylinders).	MA10-GR.3-S.4-GLE.2-EO.c	Solve real world and mathematical problems involving perimeters of polygons. (CCSS: 3.MD.8)	
	MA10-GR.6-S.4-GLE.1-EO.d	Develop and apply formulas and procedures for the surface area.	
	MA10-GR.7-S.4-GLE.2-EO.d	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. (CCSS: 7.G.6)	
	MA10-GR.8-S.4-GLE.2-EO.d	State the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. (CCSS: 8.G.9)	
b. Apply the Pythagorean Theorem to solve real-world problems.	MA10-GR.8-S.4-GLE.2-EO.b	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (CCSS: 8.G.7)	

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. Transform geometric figures using reflections, translations, and rotations to determine congruence.	MA10-GR.8-S.4-GLE.1-EO.c	Demonstrate 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. (CCSS: 8.G.2)	
	MA10-GR.8-S.4-GLE.1-EO.d	Given two congruent figures, describe a sequence of transformations that exhibits the congruence between them. (CCSS: 8.G.2)	



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. Estimate and use measures of area, volume, capacity, weight, and angle comparisons to solve problems.	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)	This is part of the standard for mathematical practice, "Attend to precision."	
	MA10-GR.7-S.4-GLE.2-EO.c	Use properties of supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. (CCSS: 7.G.5)		
	MA10-GR.7-S.4-GLE.2-EO.d	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. (CCSS: 7.G.6)		

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 (for example, use a proportion to find the height of a flag pole).	MA10-GR1-S.4-GLE.2-EO.a	Measure lengths indirectly and by iterating length units. (CCSS: 1.MD)	This is part of the standard for mathematical practice, "Attend to precision"	
	MA10-GR.7-S.1-GLE.1-EO.a	Analyze proportional relationships and use them to solve real-world and mathematical problems. (CCSS: 7.RP)		
	MA10-GR8-S.2-GLE.1-EO.d	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. (CCSS: 8.EE.6)		
	MA10-GR.8-S.4-GLE.2-EO.b	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (CCSS: 8.G.7)		



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 (for example, given a map and a scale, determine the distance between two points on the map).	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-GR.7-S.4-GLE.1-EO.a.i	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. (CCSS: 7.G.1)	
	MA10-GR.7-S.1-GLE.1-EO.b.	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. (CCSS: 7.RP.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 4		Develop and use formulas and procedures to solve problems involving measurement.	
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Develop and use procedures or formulas to solve problems involving measurement (for example, distance, area, surface area, and volume of right prisms and cylinders).	MA10-GR.7-S.4-GLE.2-EO.d	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. (CCSS: 7.G.6)	
	MA10-GR.8-S.4-GLE.2-EO.d	State the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. (CCSS: 8.G.9)	



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. Describe how a change in an object's linear dimensions affects its perimeter, area and volume (for example, how the area of a circle changes as the radius increases).	MA10-GR.7-S.1-GLE.1-EO.b	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. (CCSS: 7.RP.1)	
	MA10-GR.7-S.4-GLE.2-EO.a.	State the formulas for the area and circumference of a circle and use them to solve problems. (CCSS: 7.G.4)	

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.	
<i>No objectives assessed at this level on the TCAP.</i>			



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 models to explain how ratios, proportions, and percents can be used to solve real-world problems.	MA10-GR.7-S.1-GLE.1-EO.a	Analyze proportional relationships and use them to solve real-world and mathematical problems. (CCSS: 7.RP)	Models are part of the mathematical practice, "Model with mathematics".
	MA10-GR.7-S.1-GLE.1-EO.d	Use proportional relationships to solve multistep ratio and percent problems. (CCSS: 7.RP.3)	
b. Convert from one set of units to another using proportions.	MA10-GR.6-S.1-GLE.1-EO.c.viii	Use ratio reasoning to convert measurement units. (CCSS: 6.RP.3d)	

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. Apply order of operations (including exponents with positive rational numbers).	MA10-GR.6-S.2-GLE.1-EO.b.iv	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). (CCSS: 6.EE.2c)	
	MA10-GR.8-S.1-GLE.1-EO.d	Apply the properties of integer exponents to generate equivalent numerical expressions. (CCSS: 8.EE.1)	

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.			
<i>No objectives assessed at this level on the TCAP</i>			



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 computational methods (including ratio and proportion) to solve problems involving commonly used fractions, decimals, percents, and integers (for example, discount, tax, sale price, unit price) and determine whether the results are reasonable.	MA10-GR.7-S.1-GLE.1-EO.a	Analyze proportional relationships and use them to solve real-world and mathematical problems. (CCSS: 7.RP)	This is part of the standard for mathematical practice, "Attend to precision."
	MA10-GR.7-S.1-GLE.1-EO.d	Use proportional relationships to solve multistep ratio and percent problems. (CCSS: 7.RP.3)	
	MA10-GR.7-S.2-GLE.2-EO.c	Solve real-world and mathematical problems involving the four operations with rational numbers. (CCSS: 7.NS.3)	
	MA10-GR.7-S.2-GLE.2-EO.b	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. (CCSS: 7.EE.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 8th grade. The concepts from these objectives are reflected in the table below.

Grade 8 Mathematics	Relevant Assessment Objective(s)
Stem and leaf plots	3.1a
Three-dimensional figures	4.2a