Transitional Colorado Assessment Program (TCAP)
Assessment Framework
Mathematics – Grade 5

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 whole numbers, and commonly-used fractions and decimals (for example, 1/3, 3/4, 0.5, 0.75), and representing equivalent forms of the same number through the use of physical models, drawings, calculators, and computers.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Locate commonly used positive rational numbers including terminating decimals through hundredths, fractions (halves, 3rds, 4ths, eighths, and tenths), mixed numbers, ~~and percents~~ on a number line.	MA10-GR.3-S.1-GLE.2-EO.a.ii	Describe a fraction as a number on the number line; represent fractions on a number line diagram. (CCSS: 3.NF.2)	Percents are not explicitly referenced at 5th grade and below in the CAS.
	MA10-GR.4-S.1-GLE.1-EO.b.ii	Use decimal notation for fractions with denominators 10 or 100 (CCSS: 4.NF.6). For example, locate 0.62 on a number line diagram.	
b. Using concrete materials, demonstrate the equivalence of commonly-used fractions, terminating decimals, ~~and percents~~ (for example, 7/10 = 0.7 ~~= 70%)~~	MA10-GR.4-S.1-GLE.2-EO.a.i	Explain equivalence of fractions using drawings and models. (CCSS: 4.NF.1)	Percents are not explicitly referenced in the CAS at 5th grade and below.
	MA10-GR.4-S.1-GLE.2-EO.a.ii	Use the principle of fraction equivalence to recognize and generate equivalent fractions. (CCSS: 4.NF.1)	
	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)	
	MA10-GR.4-S.1-GLE.1-EO.b.ii	Use decimal notation for fractions with denominators 10 or 100. (CCSS: 4.NF.6)	
	MA10-GR.5-S.2-GLE.1-EO.d	Explain informally relationships between corresponding terms in the patterns. (CCSS: 5.OA.3)	
c. Demonstrate the meaning of square numbers using pictorial or concrete materials.	MA10-GR.4-S.2-GLE.1-EO.b	Apply concepts of squares, primes, composites, factors, and multiples to solve problems. (CCSS: 4.OA.4)	Using pictorial or concrete materials are part of the standard for mathematical practice, "Model with mathematics."

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 whole numbers and know place-value concepts and numeration through their relationships to counting, ordering, and grouping.		
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Read, write, and order positive rational numbers, including commonly-used fractions and terminating decimals through hundredths.	MA10-GR.5-S.1-GLE.1-EO.b	Read, write, and compare decimals to thousandths. (CCSS: 5.NBT.3)	Positive rational numbers do not include percents at 5th grade in the CAS.
	MA10-GR.4-S.1-GLE.2-EO.a (i-iii)	Use ideas of fraction equivalence and ordering to: (CCSS: 4.NF) i. Explain equivalence of fractions using drawings and models. (CCSS: 4.NF.1) ii. Use the principle of fraction equivalence to recognize and generate equivalent fractions. (CCSS: 4.NF.1) iii. Compare two fractions with different numerators and different, and justify the conclusions. (CCSS: 4.NF.2)	
	MA10-GR.4-S.1-GLE.1-EO.a.iii	Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. (CCSS: 4.NBT.2)	
b. Compare commonly-used proper fractions and terminating decimals.	MA10-GR.5-S.1-GLE.1-EO.b	Read, write, and compare decimals to thousandths. (CCSS: 5.NBT.3)	
	MA10-GR.4-S.1-GLE.2-EO.a.iii	Compare two fractions with different numerators and different denominators, and justify the conclusions. (CCSS: 4.NF.2)	
	MA10-GR.4-S.1-GLE.1-EO.b.ii	Use decimal notation for fractions with denominators 10 or 100 (For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters)	

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	Use numbers to count, to measure, to label, and to indicate location.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Identify factors, multiples, and prime/composite numbers.	MA10-GR.4-S.2-GLE.1-EO.b	Apply concepts of squares, primes, composites, factors, and multiples to solve problems. (CCSS: 4.OA.4).	
b. Recognize equivalent representations for the same number and generate them by decomposing and composing numbers (for example, 36 can be represented as 30+6, 20+16, 9x4, 40-4, three dozen and/or the square of 6).	MA10-GR.5-S.1-GLE.1-EO.b.i	Read and write decimals to thousandths using base-ten numerals, number names, and expanded form. e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$. (CCSS: 5.NBT.3a)	
	MA10-GR.5-S.1-GLE.2-EO.d (i-ii)	Write and interpret numerical expressions. (CCSS: 5.OA) i. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. (CCSS: 5.OA.1) ii. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. (CCSS: 5.OA.2)	
	MA10-GR.4-S.1-GLE.1-EO.a.ii	Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. (CCSS: 4.NBT.2)	
	MA10-GR.4-S.2-GLE.1-EO.b	Apply concepts of squares, primes, composites, factors, and multiples to solve problems. (CCSS: 4.OA.4)	
c. Describe numbers by their characteristics (for example, even, odd, prime, square).	MA10-GR.4-S.2-GLE.1-EO.b	Apply concepts of squares, primes, composites, factors, and multiples to solve problems. (CCSS: 4.OA.4)	
	MA10-GR.2-S.1-GLE.2-EO.d.i	Determine whether a group of objects (up to 20) has an odd or even number of members. (CCSS: 2.OA.3)	

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 ration and proportion, in problem-solving situations.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Demonstrate the equivalent relationships among commonly used fractions, decimals, and percents using pictorial or concrete materials.	MA10-GR.5-S.1-GLE.1-EO.b.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)	There is nothing explicit about showing equivalent relationships between a decimal and a fraction in the CAS. Percents are not taught at 5th grade or below in CAS, however, they will continue to be assessed within this objective.

	MA10-GR.4-S.1-GLE.2-EO.a (i-iii)	Use ideas of fraction equivalence and ordering to: (CCSS: 4.NF)
		  i. Explain equivalence of fractions using drawings and models. (CCSS: 4.NF.1)
		  ii. Use the principle of fraction equivalence to recognize and generate equivalent fractions. (CCSS: 4.NF.1)
		  iii. Compare two fractions with different numerators and different denominators, and justify the conclusions. (CCSS: 4.NF.2)	

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, test, and explain conjectures about properties of whole numbers and commonly-used fractions and decimals.	MA10.GR.3-S.1-GLE.3-EO.b.ii (including footnote)	Interpret division as an unknown-factor problem. (CCSS: 3.OA.6) *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.) (CCSS: 3.OA.5)*	This part of the standard for mathematical practice, "Look for and make use of structure."
	MA10.GR.4-S.1-GLE.3-EO.a	Use place value understanding and properties of operations to perform multi-digit arithmetic. (CCSS: 4.NBT)	
	MA10.GR.4-S.1-GLE.2-EO.b	Build fractions from unit fractions by applying understandings of operations on whole numbers. (CCSS: 4.NF)	
	MA10.GR.5-S.1-GLE.2-EO.c.i	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)	
b. Use number properties (commutative, associative, identity) to evaluate numeric expressions ~~and solve equations~~.	MA10-GR.5-S.1-GLE.2-EO.d (i)	Write and interpret numerical expressions. (CCSS:5.OA) i. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. (CCSS: 5.OA.1)	Properties of operations are the same as number properties. There is no explicit reference to solve equations at 5th grade or below in the CAS.
	MA10-GR.5-S.1-GLE.2-EO.d.ii	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. (CCSS: 5.OA.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 6	Using 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 sums and differences of fractions and decimals using benchmarks (for example, 5/6 + 7/8 must be equal to an amount less than 2, since each fraction is less than 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)	
	MA10-GR.5-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-GR.5-S.1-GLE.1-EO.c	Use place value understanding to round decimals to any place. (CCSS: 5.NBT.4)	
	MA10.GR.5-S.1-GLE.2-EO.c	Add, subtract, multiply, and divide decimals to hundredths. (CCSS: 5.NBT.7)	
b. Use appropriate techniques to estimate, determine, and then justify the reasonableness of solutions to problems involving whole numbers.	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 (whole numbers).	MA10-GR.5-S.2-GLE.1-EO.a	Generate two numerical patterns using given rules. (CCSS: 5.OA.3)	Although the CAS does not explicitly reference geometric patterns, it will continue to be assessed within this objective.
	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)	
b. Recognize that a variable is used to represent an unknown quantity.	MA10-GR.4-S.2-GLE.1-EO.a.ii	Use a symbol to represent and find an unknown quantity in a problem situation. (CCSS: 4.OA.5)	
c. Identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers.	MA10-GR.5-S.1-GLE.2-EO.b.i	Use strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. (CCSS: 5.NBT.6)	
	MA10-GR.4-S.1-GLE.3-EO.a.iii	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. (CCSS: 4.NBT.6)	
	MA10-GR.3-S.1-GLE.3-EO.c.i	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations. (CCSS: 3.OA.7)	
	MA10-GR.2-S.1-GLE.1-EO.b.iii	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. (CCSS: 2.NBT.7)	

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. Solve problems by representing and analyzing patterns using words, tables, and graphs.	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.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)	

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. Describe how a change in one quantity results in a change in another quantity.	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.d	Explain informally relationships between corresponding terms in the patterns. (CCSS: 5.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 4	Distinguish between linear and nonlinear functions through informal investigations.		
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Match a description of a situation with its continuous graph.			Not explicitly in the CAS at 5th grade or below.

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. Use tables, charts, concrete objects, or pictures to solve problems involving linear relationships and 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.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)

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. Differentiate between categorical and numerical data.			Not explicitly in the CAS at 5th grade or below.
b. Organize, construct, and interpret displays of data including tables, charts, pictographs, line plots, bar graphs, and line graphs.	MA10-GR.5-S.3-GLE.1-EO.a.i	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). (CCSS: 5.MD.2)	Line graphs are not in the CAS at 5th grade or below.
	MA10-GR.3-S.3-GLE.1-EO.a (i-ii)	Represent and interpret data. (CCSS: 3.MD) i. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. (CCSS: 3.MD.3) ii. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. (CCSS: 3.MD.3)	
c. Read, interpret, and draw conclusions from various displays of data.	MA10-GR.5-S.3-GLE.1-EO.a	Represent and interpret data. (CCSS: 5.MD)	This is part of the mathematical practices, "Construct viable arguments and critique the reasoning of others."
d. From a given scenario, choose the correct graph from possible graph representations.			Not explicitly in the CAS at 5th 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 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. Distinguish between the median and mode of a data set.			Not explicitly in the CAS at 5th grade or below. However, this assessment objective will continue to be assessed.
b. Determine the range of a set of data.			Not explicitly in the CAS at 5th 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 data and draw conclusions based on data displays such as tables, charts, line graphs, bar graphs, pictographs, and line plots.	MA10-GR.5-S.3-GLE.1-EO.a	Represent and interpret data. (CCSS: 5.MD)	Line graphs are not referenced in the CAS at 5th grade or below.
	MA10-GR.3-S.3-GLE.1-EO.a (i-ii)	Represent and interpret data. (CCSS: 3.MD) i. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. (CCSS: 3.MD.3) ii. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. (CCSS: 3.MD.3)	

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. ~~Describe how data collection methods affect the nature of the data set.~~			Not referenced in the CAS at 5th grade or below.
b. Make convincing arguments based on data analysis.			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.		
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Describe events such as likely or unlikely and explain the degree of likelihood using words, such as certain, equally likely, and impossible.			Not explicitly in the CAS at 5th grade or below. However, this assessment objective will continue to be assessed.
b. ~~Use zero to represent the probability of an impossible event and one to represent the probability of a certain event.~~			Not explicitly in the CAS at 5th grade or below.
c. ~~Use common fractions to represent the probability of events that are neither certain nor impossible.~~			Not explicitly in the CAS at 5th 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 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 one chance device, such as a number cube or a spinner, design a fair game and an unfair game, and explain why they are fair and unfair.				Not explicitly in the CAS at 5th grade or below. However, this assessment objective will continue to be assessed.
b. ~~Make predications based on data obtained from simple probability experiments.~~				Not explicitly in the CAS at 5th 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 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. Solve problems using strategies for finding all possible combinations and/or arrangements.	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)		Although finding possible combinations and/or arrangements is not part of the CAS explicitly, combination and/or arrangement problems are contextual examples of multiplication and it will continue to be assessed within this objective.

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.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. ~~Represent a three-dimensional shape in two dimensions (for example, recognize a three dimensional figure from its net).~~			Not explicitly in the CAS at 5th grade or below.

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	Classify two dimensional figures into categories based on their properties. (CCSS: 5.G)	
	MA10-GR.4-S.4-GLE.2-EO.b	Identify points, line segments, angles, and perpendicular and parallel lines in two-dimensional figures. (CCSS: 4.G.1)	
	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.4-S.4-GLE.2-EO.a	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. (CCSS: 4.G.1)	
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-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)	This is part of the standard for mathematical practice, "Construct viable arguments and critique the reasoning of others." Students will need to be familiar with the term "congruence".

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.	

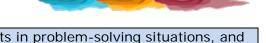| Standard 4	Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems.		
Benchmark 4	Solve problems using coordinate geometry.		
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Given a coordinate graph, read coordinate pairs in quadrant one.	MA10-GR.5-S.4-GLE.2-EO.a	Graph points on the coordinate plane to solve real-world and mathematical problems. (CCSS: 5.G)	
b. Choose the coordinate graph, which represents a given data set.	MA10-GR.5-S.4-GLE.2-EO.b	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (CCSS: 5.G.2)	
c. Use maps and grids to locate points, create paths ~~and measure distances within a coordinate system.~~	MA10-GR.5-S.4-GLE.2-EO.b	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (CCSS: 5.G.2)	The CAS at 5th grade and below does not explicitly mention finding distances on a coordinate system.

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	Solve real world and mathematical problems involving perimeters of polygons. (CCSS: 3.MD.8)	
b. Solve problems involving the area of rectangles and squares.	MA10-GR.4-S.4-GLE.1-EO.a.v	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. (CCSS: 4.MD.3)	

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. ~~Predict and describe the results of flipping, sliding, or turning a two-dimensional shape.~~			
b. Show lines of symmetry for geometrical shapes.	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 the length of common objects.	MA10-GR.2-S.4-GLE.2-EO.a.iii	Estimate lengths using units of inches, feet, centimeters, and meters. (CCSS: 2.MD.3)	
c. Estimate the perimeter of polygons.	MA10-GR.3-S.4-GLE.2-EO.c.i	Find the perimeter given the side lengths. (CCSS: 3.MD.8)	
	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)	
d. Estimate the measures of angles (for example, 90°, less than 90°, more than 90°).	MA10-GR.4-S.4-GLE.1-EO.b.ii	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. (CCSS: 4.MD.6)	
e. Describe angles as acute, obtuse and right.	MA10-GR.4-S.4-GLE.2-EO.a	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. (CCSS: 4.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 2	Estimate, make, and use direct and indirect measurements to describe and make comparisons.
No objectives assessed at this level.	

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.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)	
	MA10-GR.4-S.4-GLE.1-EO.a.ii	Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (CCSS: 4.MD.1)	
	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)	
b. Select the appropriate scale for a given problem (for example, using the appropriate scale when setting up a graph).	MA10-GR.3-S.3-GLE.1-EO.a.i	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. (CCSS: 3.MD.3)	The CAS does not explicitly indicate students should select an appropriate scale but it is implied when drawing a scaled bar graph or representing measurement quantities.
	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)	

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. Find the perimeter and area of rectangles and squares, using appropriate units.	MA10-GR.4-S.4-GLE.1-EO.a.v	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. (CCSS: 4.MD.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 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)	
b. Demonstrate how change in one of the dimensions of a rectangle affects its area (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.		
Assessment Objective	**CAS Alignment Code**	**CAS Expectation Text**	**Comment**
a. Select and use the appropriate unit and tool to measure to the degree of accuracy required in a particular problem.	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)	This is part of the standard for mathematical practices, "Use appropriate tool strategically" and "Attend to precision".
	MA10-GR.4-S.4-GLE.1-EO.a.iii	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. (CCSS: 4.MD.2)	
	MA10-GR.2-S.4-GLE.2-EO.a.i	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. (CCSS: 2.MD.1)	
b. Measure the sides of rectangles, squares, and triangles to the nearest 1/4 inch and nearest centimeter.	MA10-GR.3-S.3-GLE.1-EO.a.iii	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters. (CCSS: 3.MD.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 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.~~			Not explicitly in the CAS at 5th grade or below.

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 the conceptual meaning of the four basic arithmetic operations (addition, subtraction, multiplication, and division).	MA10-GR.2-S.1-GLE.1-EO.b.iii	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. (CCSS: 2.NBT.7)	Using pictures and diagrams is part of the standard for mathematical practice, "Model with mathematics."
	MA10-GR.3-S.1-GLE.3-EO.a.iii	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities. (CCSS: 3.OA.3)	
	MA10-GR.4-S.1-GLE.3-EO.a.iv	Illustrate and explain multiplication and division calculation by using equations, rectangular arrays, and/or area models. (CCSS: 4.NBT.6)	
b. Use and explain strategies to add, subtract, multiply and divide whole numbers in problem-solving situations.	MA10-GR.4-S.1-GLE.3-EO.b	Use the four operations with whole numbers to solve problems. (CCSS: 4.OA)	
	MA10-GR.5-S.1-GLE.2-EO.b	Find whole-number quotients of whole numbers. (CCSS: 5.NBT.6)	

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.		
c. Demonstrate proficiency of addition, subtraction, multiplication and division of whole numbers in problem-solving situations.	MA10-GR.4-S.1-GLE.3-EO.b	Use the four operations with whole numbers to solve problems. (CCSS: 4.OA)	
d. Use and explain strategies to add and subtract commonly–used fractions with like denominators 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.3b)	
e. Use and explain strategies to add and subtract commonly-used decimals in problem-solving situations.	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)	

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. Determine from real-world problems whether an estimated or exact answer is acceptable.			This is part of the standard for mathematical practice, "Attend to precision".
b. Use and explain a variety of estimation techniques to solve problems.	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. Determine whether information given in a problem-solving situation is sufficient, insufficient, or extraneous.			This is part of the standard for mathematical practice, "Make sense of problems and persevere in solving them".
b. Given a real-world problem, use an appropriate method (mental arithmetic, estimation, paper-and-pencil, calculator) to correctly solve the problem.			This is part of the standard for mathematical practice, "Use appropriate tools strategically".

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.		
c. ~~Given a math sentence, using any one of the four operations with whole numbers, create and illustrate a real-world problem.~~			Not explicitly in the CAS at 5th grade or below.
d. In a problem-solving situation, determine whether the results are reasonable and justify those results with correct computations.	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)	

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 with the TCAP in 5th grade. The concepts from these objectives are reflected in the table below.

Grade 5 Mathematics	Relevant Assessment Objective(s)
Percents	1.4a
Geometric patterns	2.1a
Median and mode	3.2a
Probability	3.5a; 3.6a
Congruence	4.2b

Errata

3/21/12, 4.6.a struck through.