



Transitional Colorado Assessment Program (TCAP) Assessment Framework Mathematics – Grade 4

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, $\frac{1}{3}$, $\frac{3}{4}$, 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. Using concrete materials and visual representations, compare, order, and represent decimal fractions of tenths, hundreds, and commonly-used fractions with unlike denominators such as: halves, fourths, and tenths (for example, may use base-ten blocks, pictures, fraction strips, fraction circles).	MA10-GR.4-S.1-GLE.1-EO.b.ii	Use decimal notation for fractions with denominators 10 or 100. (CCSS: 4.NF.6)	Using visual representations are part of the standard for mathematical practice, "Model with mathematics."
	MA10-GR.4-S.1-GLE.1-EO.b.iii	Compare two decimals to hundredths by reasoning about their size. (CCSS: 4.NF.7)	
	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)	
b. Recognize different combinations of currency and coins for a set amount up to \$10.00.	MA10-GR.2-S.4-GLE.2-EO.c.ii	Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately. (CCSS: 2.MD.8)	

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 numerals and number words from 0 - 99,999.	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)	



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.	
b. Identify place value through 999,999.	MA10-GR.4-S.1-GLE.1-EO.a.i	Explain that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. (CCSS: 4.NBT.1)	
c. Generate equivalent representations for whole numbers up to 999,999 (for example; $87459 = 80,000 + 7,000 + 400 + 50 + 9$ or $36 = 30 + 6$ or 2 tens +16 ones).	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)	

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. Using a number line, a hundreds chart or other number chart, locate, label, or count from any number by 2s, 3s, 5s, 10s, or 100s.	MA10-GR.2-S.1-GLE.1-EO.a.iii	Skip-count by 5s, 10s, and 100s. (CCSS: 2.NBT.2)	The CAS do not explicitly refer to counting by 3's but students should have recall of all products of two one-digit numbers by the end of third grade.
	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 by pairing objects or counting them by 2s. (CCSS: 2.OA.3)	
	MA10-GR.3-S.1-GLE.3-EO.c.ii	Recall from memory all products of two one-digit numbers. (CCSS: 3.OA.7)	
	MA10-GR.2-S.4-GLE.2-EO.b.ii	Represent whole numbers as lengths from 0 on a number line diagram and represent whole-number sums and differences within 100 on a number line diagram. (CCSS: 2.MD.6)	
b. Locate and label halves, multiples of fourths, and thirds, between whole numbers 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)	



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				Develop, test, and explain conjectures about properties of whole numbers, and commonly-used fractions and decimals (for example, $\frac{1}{3}$, $\frac{3}{4}$, 0.5, 0.75).
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment	
a. Show division of whole numbers is not commutative (1-digit into 2-digits).	MA10-GR.3-S.1-GLE.3-EO.b.i	Apply properties of operations as strategies to multiply and divide. (CCSS: 3.OA.5)	The commutative property is a property of operations.	
b. Use number properties with any of the four basic operations (commutative, associative, properties of zero and one).	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)		

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 whole numbers, and commonly-used fractions and decimals (for example, $\frac{1}{3}$, $\frac{3}{4}$, 0.5, 0.75).
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment	
a. Use estimation strategies to determine the reasonableness of solutions involving the four basic operations.	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)		
b. Use estimation to round to the nearest dollar in context and determine reasonableness.	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)		
	MA10-GR.2-S.4-GLE.2-EO.c.ii	Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately. (CCSS: 2.MD.8)		



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		Reproduce, extend, create, and describe patterns and sequences using a variety of materials (for example, beans, toothpicks, pattern blocks, calculators, unifix cubes, colored tiles).	
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Reproduce, extend, create or describe patterns, using pictures, geometric shapes or numbers.	MA10-GR.4-S.2-GLE.1-EO.a	Generate and analyze patterns and identify apparent features of the pattern that were not explicit in the rule itself. (CCSS: 4.OA.5)	
	MA10-GR.4-S.2-GLE.1-EO.a.iii	Complete input/output tables. (CCSS: 4.OA.5)	
b. Determine the missing element in a pattern using pictures, geometric shapes, or numbers.	MA10-GR.4-S.2-GLE.1-EO.a.i	Use number relationships to find the missing number in a sequence.	Although the CAS do not explicitly reference geometric patterns, it will continue to be assessed within this objective.

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 and other relationships using tables, graphs, and open sentences.	
a. Display numbers in tables or graphs, to show patterns.	MA10-GR.4-S.2-GLE.1-EO.a.iii	Complete input/output tables. (CCSS: 4.OA.5)	Although the CAS do not explicitly reference using graphs to display algebraic patterns, it will continue to be assessed within this objective.
	MA10-GR.4-S.2-GLE.1-EO.a	Generate and analyze patterns and identify apparent features of the pattern that were not explicit in the rule itself. (CCSS: 4.OA.5)	
b. Describe patterns given in tables and graphs.	MA10-GR.4-S.2-GLE.1-EO.a.iii	Complete input/output tables. (CCSS: 4.OA.5)	Although the CAS do not explicitly reference using graphs to display algebraic patterns, it will continue to be assessed within this objective.
	MA10-GR.4-S.2-GLE.1-EO.a	Generate and analyze patterns and identify apparent features of the pattern that were not explicit in the rule itself. (CCSS: 4.OA.5)	



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			
Recognize when a pattern exists and use that information to solve a problem.			
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Identify a rule using addition, subtraction, or multiplication and solve a problem using the rule (for example, function boxes, input/output boxes, T charts).	MA10-GR.4-S.2-GLE.1-EO.a	Generate and analyze patterns and identify apparent features of the pattern that were not explicit in the rule itself. (CCSS: 4.OA.5)	
	MA10-GR.4-S.2-GLE.1-EO.a.iii	Complete input/output tables. (CCSS: 4.OA.5)	

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			
Observe and explain how a change in one quantity can produce a change in another (for example, the relationship between the number of bicycles and the number of wheels).			
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Using whole numbers, determine how the change in one quantity affects the change in another by addition, subtraction, or multiplication (for example, Maria is making ladybugs. For 1 ladybug she needs 6 black dots, for 2 ladybugs she needs 12 dots. How many black dots will she need for 4 ladybugs?).	MA10-GR.4-S.2-GLE.1-EO.a	Generate and analyze patterns and identify apparent features of the pattern that were not explicit in the rule itself. (CCSS: 4.OA.5)	Although the CAS do not explicitly reference relating change in one quantity to change in another quantity, it will continue to be assessed within this objective.
	MA10-GR.4-S.2-GLE.1-EO.a.iii	Complete input/output tables. (CCSS: 4.OA.5)	



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				Construct, read, and interpret displays of data including tables, charts, pictographs, and bar graphs.
Assessment Objective	CAS Alignment Code	CAS Expectation Text		Comment
a. Organize, construct, read and interpret a table, line plot, bar graph and/or pictograph from given data.	MA10-GR.4-S.3-GLE.1-EO.a	Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). (CCSS: 4.MD.4)		
	MA10-GR.3-S.3-GLE.1-EO.a	Represent and interpret data. (CCSS: 3.MD)		
	MA10-GR.3-S.3-GLE.1-EO.a.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 2				Interpret data using the concepts of largest, smallest, most often, and middle.
a. Draw conclusions from a given data display.	MA10-GR.3-S.3-GLE.1-EO.a	Represent and interpret data. (CCSS: 3.MD)		This is part of the mathematical practices, “Construct viable arguments and critique the reasoning of others.”
b. Find the median, mode, the smallest and the largest element in a set of data.				Not explicitly in the CAS at 4 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		Generate, analyze, and make predictions based on data obtained from surveys and chance devices.	
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Predict the outcomes of flipping a coin, spinning a spinner with four congruent sectors and/or a number cube.			Although probability is not explicitly in the CAS for 4 th grade or below, it will continue to be assessed within this objective.
b. Determine and support which outcomes are most likely, least likely or equally likely when using a chance device.			Although probability is not explicitly in the CAS for 4 th grade or 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 4		Solve problems using various strategies for making combinations (for example, determining the number of different outfits that can be made using two blouses and three skirts).	
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Given pictures, describe all possible combinations of matching the elements of two sets.	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 problems are contextual examples of multiplication and 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			
Recognize shapes and their relationships (for example, symmetry, congruence) using a variety of materials (for example, pasta, boxes, pattern blocks).			
a. Identify and give examples of congruency.	MA10-GR.3-S.4-GLE.1-EO.a	Reason with shapes and their attributes. (CCSS: 3.G)	Although congruency is not explicitly in the CAS for 4 th grade or below, it will continue to be assessed within this assessment objective.
b. Identify one line of symmetry for a given shape.	MA10-GR.4-S.4-GLE.2-EO.d	Identify a line of symmetry for a two-dimensional figure. (CCSS: 4.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 2			
Identify, describe, draw, compare, classify, and build physical models of geometric figures.			
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Identify, classify, and compare 2-dimensional shapes and use vocabulary to describe the attributes (for example, number of sides, vertices, angles, parallel sides).	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. Identify parallel, and intersecting lines and right angles.	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)	
c. Identify 2- and 3-dimensional figures; such as, trapezoids, parallelograms, rhombuses and other polygons.	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.K-S.4-GLE.1-EO.a	Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).	
d. Recognize common attributes of squares and rectangles.	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)	



Standard 4				Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems.
Benchmark 3				Relate geometric ideas to measurement and number sense.
Assessment Objective	CAS Alignment Code	CAS Expectation Text		Comment
a. Solve for perimeter and area of rectangles and squares using a drawing on a grid.	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 4				Solve problems using geometric relationships and spatial reasoning (for example, using rectangular coordinates to locate objects, constructing models of three-dimensional objects).
Assessment Objective	CAS Alignment Code	CAS Expectation Text		Comment
a. Locate objects on a coordinate grid (1st quadrant only) and label ordered pairs.				This objective is not explicitly referenced in the CAS for 4 th 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 5				Recognize geometry in their world (for example, in art and in nature).
<i>No objectives assessed at this level.</i>				



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	Know, use, describe and estimate measure of length, perimeter, capacity, weight, time, and temperature.		
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Tell time in hours and minutes, including a.m. and p.m. using both analog and digital displays.	MA10-GR.3-S.4-GLE.3-EO.a.i	Tell and write time to the nearest minute. (CCSS: 3.MD.1)	
b. Choose the appropriate tool to measure familiar objects in situations that contain length, weight, capacity, time and-temperature.	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)	Choosing an appropriate tool is part of the mathematical practices, "Use appropriate tools strategically."
	MA10-GR.2-S.4-GLE.2-EO.c	Solve problems time and money. (CCSS: 2.MD)	
	MA10-GR.3-S.4-GLE.3-EO.a.iv	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). (CCSS: 3.MD.2)	Although temperature is not referenced in the CAS, it will continue to be assessed within this objective.



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			
Compare and order objects according to measurable attributes (for example, longest to shortest, lightest to heaviest).			
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Compare objects according to measurable attributes of length, area, volume, capacity, weight, and/or temperature in-US customary and/or metric units.	MA10-GR.2-S.4-GLE.2-EO.a.iv	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit. (CCSS: 2.MD.4)	Although temperature and volume are not in the CAS, they will continue to be assessed within this objective. Comparison of measurements is not explicit but representing quantities on number line diagrams suggests knowledge of comparison.
	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.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.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 3			
Demonstrate the process of measuring and explaining the concepts related to units of measurement			
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Measure and determine perimeter of polygons to the nearest half inch or centimeter.	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)	Determining the perimeter to the nearest half inch or centimeter is part of the standard for mathematical practice "Attend to precision."
b. Determine the areas of squares and rectangles on a grid.	MA10-GR.3-S.4-GLE.2-EO.a.ii	Find area of rectangles with whole number side lengths using a variety of methods (CCSS: 3.MD.7a)	CAS footnote gives example of tiling and arrays.



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		Use the approximate measures of familiar objects (for example, the width of your finger, the temperature of a room, the weight of a gallon of milk) to develop a sense of measurement.	
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Relate units of measurement of length, area, volume, capacity, weight, and/or temperature in US customary and/or metric units to everyday objects or situations (for example, yard to a stride, liter to a quart).	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)	Although temperature is not in the CAS, it will continue to be assessed within this objective.

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		Select and use appropriate standard and non-standard units of measurement in problem-solving situations.	
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Choose appropriate units of measure for length, area, volume, capacity, weight, temperature, and/or time to solve problems.	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)	Although temperature is not in the CAS, it will continue to be assessed within this objective.



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			
Demonstrate conceptual meanings for the four basic arithmetic operations of addition, subtraction, multiplication, and division.			
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Demonstrate the conceptual meaning (using pictures, words, diagrams, or numbers) of addition, subtraction, multiplication, and division of whole numbers.	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.	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.	
	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)	

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			
Add and subtract commonly-used fractions and decimals using physical models (for example, $\frac{1}{3}$, $\frac{3}{4}$, 0.5, 0.75).			
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Using pictures, demonstrate addition and subtraction of commonly used fractions with the same denominators where sums/ differences are equal or less than a whole ($\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{10}$).	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)	
	MA10-GR.4-S.1-GLE.2-EO.b.i.1	Compose and decompose fractions as sums and differences of fractions with the same denominator in more than one way and justify with visual models. (CCSS: 4.NF.3b)	



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	Add and subtract commonly-used fractions and decimals using physical models (for example, $\frac{1}{3}$, $\frac{3}{4}$, 0.5, 0.75).		
b. Using money notation, add and subtract decimals in which sums and differences should not exceed \$100.00.	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)	

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	Demonstrate fluency with basic addition, subtraction, multiplication, and division facts without the use of a calculator.		
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Demonstrate understanding of basic multiplication and division facts.	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.ii	Recall from memory all products of two one-digit numbers. (CCSS: 3.OA.7)	
b. Continue to demonstrate proficiency of basic addition and subtraction facts.	MA10-GR.2-S.1-GLE.2-EO.c	Know from memory all sums of two one-digit numbers. (CCSS: 2.OA.2)	
c. Use a multiplication facts table to locate all the factors for a particular product (for example, for a product of six: 1, 6, 2, and 3 are all factors).	MA10-GR.4-S.2-GLE.1-EO.b.i	Find all factor pairs for a whole number in the range 1–100. (CCSS: 4.OA.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		Construct, use, and explain procedures to compute and estimate with whole numbers.	
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Use reasonable estimation techniques before performing basic math operations (for example, front-end estimation, estimation by rounding, friendly numbers, compatible numbers, flexible rounding, clustering).	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)	
	MA10-GR.3-S.1-GLE.3-EO.c.ii.	Recall from memory all products of two one-digit numbers. (CCSS: 3.OA.7)	
b. Using paper and pencil, demonstrate the four basic operations of whole numbers including: addition; subtraction; multiplication of 2 or 3-digit numbers by a 1-digit number; division of 2-digit number by a 1-digit divisor.	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 5	Select and use appropriate methods for computing with whole numbers in problem-solving situations from among mental arithmetic, estimation, paper-and-pencil, calculator, and computer methods.		
Assessment Objective	CAS Alignment Code	CAS Expectation Text	Comment
a. Given a real-world problem-solving situation, use an appropriate operation (any four basic math operation) and an appropriate method (paper-pencil, mental math, estimation, calculator, computer) to solve the problem.	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)	
b. Determine from a real-world problem whether an estimated or exact sum, difference, product, or quotient is acceptable.	MA10-GR.3-S.1-GLE.3-EO.d.iii	Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (CCSS: 3.OA.8)	

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 4th grade. The concepts from these objectives are reflected in the table below.

Grade 4 Mathematics	Relevant Assessment Objective(s)
Geometric patterns	2.1b
Using graphs to display algebraic patterns	2.2a; 2.2b
How change in one quantity affects change in another	2.4a
Probability	3.3a; 3.3b
Combinations and arrangements of elements of sets	3.4a
Congruence	4.1a
Temperature	5.1b; 5.2a; 5.4a; 5.5a