Colorado Measures of Academic Success

CMAS Grade 3 Mathematics Frameworks

Concepts and skills explicitly identified in the Colorado Academic Standards (CAS) are the basis for the Colorado Measures of Academic Success (CMAS) assessment. CMAS Mathematics Frameworks list the percent representation and number of score points for each of the reporting categories and standards areas that appear on the summative assessments. They also specify the Evidence Outcomes that are included on the state assessments. The Prepared Graduate Statements in the CAS, or the Standards for Mathematical Practice (SMP), provide the basis for Subclaims C and D, Reasoning and Modeling tasks. These tasks are based on grade-level math standards and securely held knowledge from the previous grade level. Reasoning tasks engage in practices reflected in Prepared Graduate Statements SMP 3, Construct Viable Arguments and Critique the Reasoning of Others, and SMP 6, Attend to Precision. Modeling tasks engage in the practices reflected in SMP 4, Model with Mathematics. Each Content Standard is assessed in each grade level.

Reporting Category	Colorado Academic Standards Summative Assessment Framework-FINAL Math Grade 3	% of Score Points of Total Test	Points
Subclaim A	**Major Content**	**43-44**	**22**
	Number and Quantity **Grade Level Expectation: 3.NF.A. Number & Operations—Fractions: Develop understanding of fractions as numbers.** **Evidence Outcomes:** 1. Describe a fraction $\frac{1}{b}$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction $\frac{a}{b}$ as the quantity formed by a parts of size $\frac{1}{b}$. (CCSS: 3.NF.A.1) 2. Describe a fraction as a number on the number line; represent fractions on a number line diagram. (CCSS: 3.NF.A.2) a. Represent a fraction $\frac{1}{b}$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $\frac{1}{b}$ and that the endpoint of the part based at 0 locates the number $\frac{1}{b}$ on the number line. (CCSS: 3.NF.A.2.a) b. Represent a fraction $\frac{a}{b}$ on a number line diagram by marking off a lengths $\frac{1}{b}$ from 0. Recognize that the resulting interval has size $\frac{a}{b}$ and that its endpoint locates the number $\frac{a}{b}$ on the number line. (CCSS: 3.NF.A.2.b) 3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. (CCSS: 3.NF.A.3) a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. (CCSS: 3.NF.A.3.a) b. Recognize and generate simple equivalent fractions, e.g., $\frac{1}{2} = \frac{2}{4}$, $\frac{4}{6} = \frac{2}{3}$. Explain why the fractions are equivalent, e.g., by using a visual fraction model. (CCSS: 3.NF.A.3.b) c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form $3 = \frac{3}{1}$; recognize that $\frac{6}{1} = 6$; locate $\frac{4}{4}$ and 1 at the same point of a number line diagram.* (CCSS: 3.NF.A.3.c) d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model. (CCSS: 3.NF.A.3.d)		

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	Algebra and Functions		
	Grade Level Expectation: 3.OA.A. Operations & Algebraic Thinking: Represent and solve problems involving multiplication and division. **Evidence Outcomes:** 1. Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as* 5 × 7*.* (CCSS: 3.OA.A.1) 2. Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as* 56 ÷ 8*.* (CCSS: 3.OA.A.2) 3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. (see Appendix, Table 2) (CCSS: 3.OA.A.3) 4. Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations* 8 × ? = 48*,* 5 = _ ÷ 3*,* 6 × 6 =? (CCSS: 3.OA.A.4)		
	Grade Level Expectation: 3.OA.B. Operations & Algebraic Thinking: Apply properties of multiplication and the relationship between multiplication and division. **Evidence Outcomes:** 5. Apply properties of operations as strategies to multiply and divide. (Students need not use formal terms for these properties.) *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.B.5) 6. Interpret division as an unknown-factor problem. *For example, find* 32 ÷ 8 *by finding the number that makes* 32 *when multiplied by* 8*.* (CCSS: 3.OA.B.6)		
	Grade Level Expectation: 3.OA.C. Operations & Algebraic Thinking: Multiply and divide within 100. **Evidence Outcome:** 7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. (CCSS: 3.OA.C.7)		

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	Grade Level Expectation: 3.OA.D. Operations & Algebraic Thinking: Solve problems involving the four operations, and identify and explain patterns in arithmetic. **Evidence Outcomes:** 8. Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (This evidence outcome is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order of operations when there are no parentheses to specify a particular order.) (CCSS: 3.OA.D.8) 9. Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations. *For example, observe that* 4 *times a number is always even, and explain why* 4 *times a number can be decomposed into two equal addends.* (CCSS: 3.OA.D.9)		
	Data, Statistics, and Probability		
	Grade Level Expectation: 3.MD.A. Measurement & Data: Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. **Evidence Outcomes:** 1. Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. (CCSS: 3.MD.A.1) 2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). (This excludes compound units such as cm^3 and finding the geometric volume of a container.) Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (This excludes multiplicative comparison problems, such as problems involving notions of "times as much." See Appendix, Table 2.) (CCSS: 3.MD.A.2)		

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	Grade Level Expectation: 3.MD.C. Measurement & Data: Geometric measurement: Use concepts of area and relate area to multiplication and to addition. **Evidence Outcomes:** 1. Recognize area as an attribute of plane figures and understand concepts of area measurement. (CCSS: 3.MD.C.5) a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. (CCSS: 3.MD.C.5.a) b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units. (CCSS: 3.MD.C.5.b) 2. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). (CCSS: 3.MD.C.6) 3. Use concepts of area and relate area to the operations of multiplication and addition. (CCSS: 3.MD.C.7) a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. (CCSS: 3.MD.C.7.a) b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. (CCSS: 3.MD.C.7.b) c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning. (CCSS: 3.MD.C.7.c) d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real-world problems. (CCSS: 3.MD.C.7.d)		

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Subclaim B	**Supporting Content**	**18**	**9**
	Number and Quantity		
	Grade Level Expectation: 3.NBT.A Number & Operations in Base Ten: Use place value understanding and properties of operations to perform multi-digit arithmetic. A range of algorithms may be used. **Evidence Outcomes:** 1. Use place value understanding to round whole numbers to the nearest 10 or 100. (CCSS: 3.NBT.A.1) 2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. (CCSS: 3.NBT.A.2) 3. Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations. (CCSS: 3.NBT.A.3)		
	Data, Statistics, and Probability		
	Grade Level Expectation: 3.MD.B. Measurement & Data: Represent and interpret data. **Evidence Outcomes:** 1. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent* 5 *pets.* (CCSS: 3.MD.B.3) 2. 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.B.4)		
	Grade Level Expectation: 3.MD.D. Measurement & Data: Geometric measurement: Recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. **Evidence Outcome:** 1. Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. (CCSS: 3.MD.D.8)		

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	Geometry **Grade Level Expectation: 3.G.A. Geometry: Reason with shapes and their attributes.** **Evidence Outcomes:** 1. Explain that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. (CCSS: 3.G.A.1) 2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into* 4 *parts with equal area, and describe the area of each part as* $\frac{1}{4}$ *of the area of the shape.* (CCSS: 3.G.A.2)		
Subclaim C	**Expressing Mathematical Reasoning**	**20-22**	**10-11**
	Base explanations/reasoning on the properties of operations. Content Scope: Knowledge and skills articulated in 3.OA.5, 3.OA.9, 3.MD.7		
	Base explanations/reasoning on concrete referents such as diagrams (whether provided in the prompt or constructed by the student in their response). Content Scope: Knowledge and skills articulated in 3.OA.6, 3.MD.5, 3.MD.6, 3.MD.7		
	Distinguish correct explanation/reasoning from that which is flawed, and – if there is a flaw in the argument – present corrected reasoning. (For example, some flawed 'student' reasoning is presented and the task is to correct and improve it.) Content Scope: Knowledge and skills articulated in 3.OA.5, 3.OA.6, 3.OA.8, 3.NF.3b, 3.NF.3d, 3.MD.7, 3.OA.9, 2.NBT		
	Present solutions to two-step problems in the form of valid chains of reasoning, using symbols such as equals signs appropriately (for example, rubrics award less than full credit for the presence of nonsense statements such as 1 + 4 = 5 + 7 = 12, even if the final answer is correct), or identify or describe errors in solutions to two-step problems and present corrected solutions. Content Scope: Knowledge and skills articulated in 3.OA.8, 3.MD.7b, 3.MD.7d		
	Base explanations/reasoning on a number line diagram (whether provided in the prompt or constructed by the student in their response). Content scope: Knowledge and skills articulated in 3.NF.2, 3.MD.1		

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Subclaim D	**Modeling and Application**	**18**	**9**
	Solve multi-step contextual word problems with degree of difficulty appropriate to Grade 3, requiring application of knowledge and skills articulated in Sub-Claim A Evidence Statements.		
	Solve multi-step contextual problems with degree of difficulty appropriate to Grade 3, requiring application of knowledge and skills articulated in 2.OA.A, 2.OA.B, 2.NBT, and/or 2.MD.B.		
	Total	**100**	**50-51**