



# Smarter Balanced Assessment Consortium

## Mathematics Grade 5 Threshold Achievement Level Descriptors (ALD)

**With Claims, Targets and Standards**

This document was created using a combination of:

- Smarter Balanced Assessment Consortium Initial Achievement Level Descriptors and College Content –Readiness Policy
- Smarter Balanced Assessment Consortium-Mathematics Summative Assessment Blueprint
- Smarter Balanced Assessment Consortium Claims, Targets, and Standard Alignment for Math – RCOE/KDS
- Content Specifications for the Summative Assessment of the Common Core State Standards for Mathematics

**Claim 1 Concepts and Procedures:** Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency.

| Targets  |  | Content Standards  | Threshold Achievement Level Descriptors (ALD) Students Entering Level (2, 3, or 4) will be able to...  | Item Types |    |
|--|--|--|--|------------|----|
|  |  |  |  | CAT        | PT |
| <b>PRIORITY CLUSTER</b>  | <b>Target E</b> Use equivalent fractions as a strategy to add and subtract fractions.  | <b>5.NF.1:</b> Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, $2/3 + 5/4 = 8/12 + 15/12 = 23/12$ . (In general, $a/b + c/d = (ad + bc)/bd$ .)  | <ul style="list-style-type: none"> <li><b>2</b> Add two fractions and/or mixed numbers with unlike denominators (denominators less than or equal to 6) in mathematical problems. Use benchmark fractions to estimate and assess the reasonableness of answers (denominators less than or equal to 6). Multiply a whole number by a mixed number. Know the effect that a fraction greater than or less than 1 has on a whole number when multiplied. Use visual models when multiplying two fractions between 0 Perform division of a whole number by any unit fraction. Understand that division of whole numbers can result in fractions.</li> <li><b>3</b> Subtract fractions and mixed numbers with unlike denominators in word problems. Use benchmark fractions and number sense of fractions to estimate and assess the reasonableness of answers. Multiply a mixed number by a mixed number. Use visual models when multiplying two fractions, including when one fraction is larger than 1. Interpret division of a whole number by any unit fraction.</li> <li><b>4</b> Use or create visual models when multiplying two fractions that are larger than 1.</li> </ul> | 5 - 6      | 0  |
|  |  | <b>5.NF.2:</b> Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result $2/5 + 1/2 = 3/7$ , by observing that $3/7 < 1/2$ .             |  |            |    |
|  | <b>Target I</b> Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.  | <b>5.MD.3:</b> Recognize volume as an attribute of solid figures and understand concepts of volume measurement.  |  |            |    |
|  |  | <b>5.MD.4:</b> Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.   |  |            |    |
| <b>Target F</b> Apply and extend previous understanding of multiplication and division to multiply and divide fractions. | <b>5.MD.5:</b> Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.   | <ul style="list-style-type: none"> <li><b>2</b> Understand the concept that the volume of a rectangular prism packed with unit cubes is related to the edge lengths.</li> <li><b>3</b> Use <math>V = lwh</math> and <math>V = Bh</math> to find the volume of rectangular prisms.</li> <li><b>4</b> Find the volume of a right rectangular prism after doubling the edge length of a side with a whole number measurement and compare it to the original.</li> </ul> | 4 - 5  |            |    |
|  | <b>5.NF.3:</b> Interpret a fraction as division of the numerator by the denominator ( $a/b = a \div b$ ). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret $3/4$ as the result of dividing 3 by 4, noting that $3/4$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $3/4$ . If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie? |  |  |            |    |
|  | <b>5.NF.4:</b> Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.  |  |  |            |    |

|                    |  |   |  |       |  |
|--------------------|--|---|--|-------|--|
|                    |  | <p><b>5.NF.5:</b> Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence <math>a/b = (n \times a)/(n \times b)</math> to the effect of multiplying <math>a/b</math> by 1.</p> <p><b>5.NF.6:</b> Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.</p> <p><b>5.NF.7:</b> Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.</p> | <p>by any unit fraction. Understand that division of whole numbers can result in fractions.</p> <ul style="list-style-type: none"> <li>• <b>3</b> Subtract fractions and mixed numbers with unlike denominators in word problems. Use benchmark fractions and number sense of fractions to estimate and assess the reasonableness of answers. Multiply a mixed number by a mixed number. Use visual models when multiplying two fractions, including when one fraction is larger than 1. Interpret division of a whole number by any unit fraction.</li> <li>• <b>4</b> Use or create visual models when multiplying two fractions that are larger than 1.</li> </ul>  |       |  |
|                    | <p><b>Target D</b> Perform operations with multi-digit whole numbers and with decimals to hundredths.</p>  | <p><b>5.NBT.5:</b> Fluently multiply multi-digit whole numbers using the standard algorithm.</p> <p><b>5.NBT.6:</b> Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</p> <p><b>5.NBT.7:</b> Add, subtract, multiply, and divide decimals to hundredths, 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 and explain the reasoning used.</p>   | <ul style="list-style-type: none"> <li>• <b>2</b> Understand that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right. Demonstrate accuracy in multiplying multi-digit whole numbers and in finding whole number quotients of whole numbers with up to four-digit dividends and two-digit divisors.</li> <li>• <b>3</b> Use whole number exponents to denote powers of 10; round decimals to the thousandths; and read, write, and compare decimals to the thousandths using base-ten numerals, number names, and expanded form, using <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> to record the results of the comparison. Fluently multiply multi-digit whole numbers and find whole number quotients of whole numbers with up to four-digit dividends and two-digit divisors. Perform the four operations on decimals to the hundredths. Relate a strategy to a written method and explain the reasoning used.</li> <li>• <b>4</b> Combine multiplying by powers of 10, comparing, and rounding to highlight essential understandings.</li> </ul> | 3 - 4 |  |
|                    | <p><b>Target C</b> Understand the place value system.</p>  | <p><b>5.NBT.1:</b> Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and <math>1/10</math> of what it represents in the place to its left.</p> <p><b>5.NBT.2:</b> Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.</p> <p><b>5.NBT.3:</b> Read, write, and compare decimals to thousandths.</p> <p><b>5.NBT.4:</b> Use place value understanding to round decimals to any place.</p>   |  |       |  |
| Supporting Cluster | <p><b>Target J</b> Graph points on the coordinate plane to solve real-world and mathematical problems.</p> | <p><b>5.G.1:</b> Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).</p> <p><b>5.G.2:</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.</p>  | <ul style="list-style-type: none"> <li>• <b>2</b> Graph whole number coordinate pairs on a coordinate plane with whole number increments of 2, 5, and 10. Classify two-dimensional figures into categories by their attributes or properties.</li> <li>• <b>3</b> Graph coordinate pairs where one term is a whole number and one is a fraction with a denominator of 2 or 4 on a coordinate plane with whole number axis increments. Classify two-dimensional figures into subcategories by their attributes or properties.</li> <li>• <b>4</b> Graph coordinate pairs where one term is a whole number and one is a fraction on a coordinate plane with fractional axis increments of <math>1/2</math>, <math>1/4</math>, or <math>1/10</math>.</li> </ul>   | 2-3   |  |

|  |   |   |                     |                 |
|--|---|---|---------------------|-----------------|
| <p><b>Target K</b> Classify two-dimensional figures into categories based on their properties.</p> | <p><b>5.G.3:</b> Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.</p>   |   |                     |                 |
| <p><b>Target A</b> Write and interpret numerical expressions.</p>                                  | <p><b>5.G.4:</b> Classify two-dimensional figures in a hierarchy based on properties.</p>   |   |                     |                 |
| <p><b>Target B</b> Analyze patterns and relationships.</p>   | <p><b>5.OA.1:</b> Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.</p> <p><b>5.OA.2:</b> Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation “add 8 and 7, then multiply by 2” as <math>2 \times (8 + 7)</math>. Recognize that <math>3 \times (18932 + 921)</math> is three times as large as <math>18932 + 921</math>, without having to calculate the indicated sum or product.</p>   | <ul style="list-style-type: none"> <li>• <b>2</b> Write numerical expressions having one set of parentheses, brackets, or braces. Graph whole number ordered pairs from two whole number numerical patterns on a coordinate plane.</li> <li>• <b>3</b> Write and interpret expressions with two different operations. Compare two related numerical patterns within sequences and tables.</li> <li>• <b>4</b> Compare two related numerical patterns and explain the relationship within sequences of ordered pairs that are rational numbers.</li> </ul> | 2                   |                 |
| <p><b>Target G</b> Convert like measurement units within a given measurement system.</p>           | <p><b>5.OA.3:</b> Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.</p>   | <ul style="list-style-type: none"> <li>• <b>2</b> Convert a whole number measurement to a decimal or fractional valued measurement within the same system (e.g., 30 in = ___ ft). Make a line plot and display data sets in whole and half units.</li> </ul>  |                     |                 |
| <p><b>Target H</b> Represent and interpret data.</p>   | <p><b>5.MD.1:</b> Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.</p> <p><b>5.MD.2:</b> Make a line plot to display a data set of measurements in fractions of a unit (<math>1/2</math>, <math>1/4</math>, <math>1/8</math>). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.</p> | <ul style="list-style-type: none"> <li>• <b>3</b> Convert from a smaller unit of measurement to a larger one, resulting in one decimal place (metric system) or a small denominator fraction (standard system). Make a line plot to display data sets in fractions of a unit (<math>1/2</math>, <math>1/4</math>, <math>1/8</math>). Solve one-step problems using information from line plots that require addition, subtraction, and multiplication of fractions.</li> <li>• <b>4</b> N/A</li> </ul>  |                     |                 |
| <p><b>Total Items for Claim #1</b></p>   |   |   | <p><b>17-20</b></p> | <p><b>0</b></p> |

**Claim 2. Problem Solving and 4. Modeling and Data Analysis:** Students can solve a range of complex well posed problems in pure and applied mathematics, making productive use of knowledge and problem solving strategies. Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.

| Targets  |  | Content Standards   | Threshold Achievement Level Descriptors (ALD)<br>Students Entering Level (2, 3, or 4) will be able to...  | Item Types   |   | Total Items |
|--|--|---|---|--|---|-------------|
|  |  |   |   | CAT  | PT  |             |
| <b>Claim 2</b><br><br><b>Target A</b> Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace.<br><b>Target B</b> Select and use appropriate tools strategically.<br><b>Target C</b> Interpret results in the context of a situation.<br><b>Target D.</b> Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas). | <b>Claim 4</b><br><br><b>Target A:</b> Apply problems arising in everyday life, society, and the workplace.<br><b>Target B:</b> Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem.<br><b>Target C:</b> State logical assumptions being used.<br><b>Target D:</b> Interpret results in the context of a situation.<br><b>Target E:</b> Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon.<br><b>Target F:</b> Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or (formulas).<br><b>Target G*:</b> Identify, analyze, and synthesize relevant external resources to pose or solve problems. | <b>See content standards for Claim 1:<br/>Target D, E, F, G, I and J</b><br><br><b>See content standards for Claim 1:<br/>Target D, E, F, G, H, I and J</b> | <ul style="list-style-type: none"> <li><b>2</b> Select tools to solve a familiar and moderately scaffolded problem and apply them with partial accuracy.<br/><br/>Use the necessary elements given in a problem situation to solve a problem.<br/><br/>Apply mathematics to propose solutions by identifying important quantities and by locating missing information from relevant external resources.</li> <li><b>3</b> Use appropriate tools to accurately solve problems arising in everyday life, society, and the workplace.<br/><br/>Apply mathematics to solve problems by identifying important quantities and mapping their relationship and by stating and using logical assumptions.</li> <li><b>4</b> Analyze and interpret the context of an unfamiliar situation for problems of increasing complexity.<br/><br/>Begin to solve problems optimally.<br/><br/>Construct multiple plausible solutions and approaches.</li> </ul> | <b>Claim 2</b><br><br><b>Target A: 2</b><br><b>Target B, C, D: 1</b> | <b>Claim 2</b><br><br>1-2   | <b>8-10</b> |
|  |  |   |   | <b>Claim 4</b>   | <b>Claim 4</b><br><br><b>Target A, D: 1</b><br><b>Target B, E: 1</b><br><b>Target C, F: 1</b><br><b>Target G: 0</b> |             |

Claim 2: Problem Solving  
 Claim 4: Modeling and Data Analysis

**Claim 3 Communicating Reasoning:** Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.

| Targets                          |   | Content Standards   | Threshold Achievement Level Descriptors (ALD)<br>Students Entering Level (2, 3, or 4) will be able to...  | Item Types  |            | Total Items |
|----------------------------------|---|---|---|---|------------|-------------|
|                                  |   |   |   | CAT   | PT         |             |
| Claim 3: Communicating Reasoning | <p><b>Target A:</b> Test propositions or conjectures with specific examples.</p> <p><b>Target B.</b> Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures.</p> <p><b>Target C.</b> State logical assumptions being used.</p> <p><b>Target D.</b> Use the technique of breaking an argument into cases.</p> <p><b>Target E.</b> Distinguish correct logic or reasoning from that which is flawed and —if there is a flaw in the argument—explain what it is.</p> <p><b>Target F.</b> Base arguments on concrete references such as objects, drawings, diagrams, and actions.</p> | <p>See content standards for Claim 1: Target C (5.NBT.2), D, E, F, I, K</p> | <ul style="list-style-type: none"> <li>• <b>2</b> Find and identify the flaw in an argument.</li> <li>• <b>3</b> Use stated assumptions, definitions, and previously established results and examples to identify and repair a flawed argument.<br/><br/>Use previous information to support his or her own reasoning on a routine problem.</li> <li>• <b>4</b> Begin to construct chains of logic about abstract concepts autonomously.</li> </ul> | <p>Target A, D: 3<br/>Target B, E: 3<br/>Target C, F: 2</p> | <p>0-2</p> | <p>8-10</p> |