Mathematics Assessment

Mathematics Grade 3 Threshold Achievement Level Descriptors (ALD)

With Claims, Targets and Standards

This document aligns the Oregon Mathematics Assessment claims and targets with the Oregon mathematics standards. The claims and targets can be used to design classroom lessons and district assessments. In addition, the document serves as a guide in understanding the Oregon Mathematics Assessment reports.

CLAIMS AND TARGETS: Content claims are summary statements about the knowledge and skills students are expected to demonstrate on the assessment related to a particular aspect of the standards. Within each claim area, assessment targets were developed to ensure inclusion of standards, learning progressions, and the Depth of Knowledge levels.

DEPTH OF KNOWLEDGE: The DOK level assigned should reflect the level of work students are most commonly required to perform in order for the response to be deemed acceptable. The DOK level should reflect the complexity of the cognitive processes demanded by the task, rather than its difficulty. Ultimately the DOK level describes the kind of thinking required by a task, not whether or not the task is "difficult".

- **Level 1** requires students to receive or recite facts or to use simple skills or abilities.
- **Level 2** includes the engagement of some mental processing beyond recalling or reproducing a response. Includes conceptual understanding generally refers to the integration and application of concepts and other ideas within a content area. Procedural understanding denotes knowledge about skills and sequence of steps, when and how these should be used appropriately, and their efficient and accurate applications.
- **Level 3** requires strategic thinking. Students must be able to support their thinking. Includes, non-routine problem solving like in reading and determining author's purpose.
- **Level 4** requires extended thinking. Usually requires work over a period of time. They may also be asked to develop hypotheses and perform complex analyses of the connections among texts.

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**
PRIORITY CLUSTER	**Target B** Understand properties of multiplication and the relationship between multiplication and division. (DOK 1)	**3.OA.5**: Apply properties of operations as strategies to multiply and divide. 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.)	• **2** Use multiplication and division within 100 to solve one-step mathematical problems involving arrays. Determine the unknown number in a multiplication equation relating three whole numbers. Apply the Commutative property of multiplication to mathematical problems with one-digit factors. Recall from memory all products of two one-digit numbers. Solve one- and two-step problems using all four operations with one- and two-digit numbers. Identify patterns in the addition table. • **3** Select the appropriate operation to solve one-step problems involving equal groups and arrays. Use the properties of operations to multiply within the 10 by 10 multiplication table. Fluently multiply within 100. Solve two-step problems using addition and subtraction with numbers larger than 100 and solutions within 1,000. • **4** Use multiplication and division within 100 to solve one-step problems involving measurement quantities of two- or three-digit whole numbers. Apply strategies in multiplication. Use relevant ideas or procedures to multiply. Explain arithmetic patterns.	**3***	**0**
		3.OA.6: Understand division as an unknown-factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.			
	Target C Multiply and divide within 100. (DOK 1)	**3.OA.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.			
	Target I Geometric measurement: understand concepts of area and relate area to multiplication and to addition. (DOK 1, 2)	**3.MD.5** Recognize area as an attribute of plane figures and understand concepts of area measurement.	• **2** Tell and write time to the nearest minute and measure liquid volumes and masses of objects using metric units of liters, grams, and kilograms. Count unit squares to find the area of rectilinear figures. • **3** Estimate liquid volumes and masses of objects using standard units of grams, kilograms, and liters. Find the area of a rectilinear figure by multiplying side lengths and by decomposing a rectilinear figure into non-overlapping rectangles and adding them together. • **4** Solve one-step addition problems involving all time intervals from hours to minutes. Find the area of a rectilinear figure in a word problem.		
		3.MD.6 Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).			
		3.MD.7 Relate area to the operations of multiplication and addition.			

	Target I: continued	**3.OA.5** Apply properties of operations as strategies to multiply and divide. 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.)		**3***	0
		3.G.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 1/4 of the area of the shape.			
		3.MD.2: Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). 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.			
	Target G Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. (DOK 1, 2)	**3.MD.A** Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.			
		3.MD.A.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.			
		3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (L). 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.			

PRIORITY CLUSTER	**Target D** Solve problems involving the four operations, and identify and explain patterns in arithmetic. (DOK 2)	**3.OA.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. **3.OA.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.	• **2** Use multiplication and division within 100 to solve one-step mathematical problems involving arrays. Determine the unknown number in a multiplication equation relating three whole numbers. Apply the Commutative property of multiplication to mathematical problems with one-digit factors. Recall from memory all products of two one-digit numbers. Solve one- and two-step problems using all four operations with one- and two-digit numbers. Identify patterns in the addition table. • **3** Select the appropriate operation to solve one-step problems involving equal groups and arrays. Use the properties of operations to multiply within the 10 by 10 multiplication table. Fluently multiply within 100. Solve two-step problems using addition and subtraction with numbers larger than 100 and solutions within 1,000. • **4** Use multiplication and division within 100 to solve one-step problems involving measurement quantities of two- or three-digit whole numbers. Apply strategies in multiplication. Use relevant ideas or procedures to multiply. Explain arithmetic patterns.	**3**	0
	Target F Develop understanding of fractions as numbers. (DOK 1, 2)	**3.NF.1:** Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. **3.NF.2**: Understand a fraction as a number on the number line; represent fractions on a number line diagram. **3.NF.3**: Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.	• **2** Identify a fraction on a number line. • **3** Represent a fraction on a number line with partitioning. • **4** Represent a fraction approximately on a number line with no partitioning.		
	Target A Represent and solve problems involving multiplication and division. (DOK 1, 2)	**3.OA.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. **3.OA.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. **3.OA.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. **3.OA.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 = ?.	• **2** Use multiplication and division within 100 to solve one-step mathematical problems involving arrays. Determine the unknown number in a multiplication equation relating three whole numbers. Apply the Commutative property of multiplication to mathematical problems with one-digit factors. Recall from memory all products of two one-digit numbers. Solve one- and two-step problems using all four operations with one- and two-digit numbers. Identify patterns in the addition table.	**1****	

	Target A : continued		• **3** Select the appropriate operation to solve one-step problems involving equal groups and arrays. Use the properties of operations to multiply within the 10 by 10 multiplication table. Fluently multiply within 100. Solve two-step problems using addition and subtraction with numbers larger than 100 and solutions within 1,000. • **4** Use multiplication and division within 100 to solve one-step problems involving measurement quantities of two- or three-digit whole numbers. Apply strategies in multiplication. Use relevant ideas or procedures to multiply. Explain arithmetic patterns.	1**	0
Supporting Cluster	**Target E** Use place value understanding and properties of operations to perform multi-digit arithmetic. (DOK 1)	**3.NBT.1**: Use place value understanding to round whole numbers to the nearest 10 or 100. **3.NBT.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. **3.NBT.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.	• **2** Round whole numbers to the nearest 10 or 100. • **3** Fluently add within 1,000, using strategies or algorithms based on place value understanding, properties of arithmetic, and/or the relationship between addition and subtraction. • **4** Use multiple strategies to fluently add within 1,000.	**2**	0
	Target J Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. (DOK 1)	**3.MD.8**: 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.	• **2** Generate measurement data by measuring lengths using rulers marked with half-inch intervals. Solve mathematical problems involving perimeters of polygons, including finding an unknown side length given the perimeter. • **3** Generate measurement data by measuring length using rulers marked with quarter-inch intervals and represent the data on a line plot marked with quarter-inch intervals. Solve word problems involving perimeters of polygons. • **4** N/A		
	Target K Reason with shapes and their attributes. (DOK 1, 2)	**3.G.1**: Understand 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. **3.G.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 1/4 of the area of the shape.	• **2** Partition shapes into parts with equal areas. • **3** Draw examples of quadrilaterals that do not belong to given subcategories by reasoning about their attributes. • **4** N/A		

Supporting Cluster	**Target H** Represent and interpret data. (DOK 2, 3)	**3.MD.3:** 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. **3.MD.4:** 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.	• **2** Generate measurement data by measuring lengths using rulers marked with half-inch intervals. Solve mathematical problems involving perimeters of polygons, including finding an unknown side length given the perimeter. • **3** Generate measurement data by measuring length using rulers marked with quarter-inch intervals and represent the data on a line plot marked with quarter-inch intervals. • **4** Solve word problems involving perimeters of polygons. • 4 N/A	**1**	0
			Total Items for Claim #1	**10**	**0**

* Indicates three items total in Math CAT for Targets B, C, I, and G.
** Indicates one item total in Math CAT for Target A.

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) Students Entering Level (2, 3, or 4) will be able to…	Item Types		Total Items
				CAT	PT	
Claim 2: Problem Solving **Claim 4: Modeling and Data Analysis**	**Claim 2** **Target A** Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. (DOK 2, 3) **Target B** Select and use appropriate tools strategically. (DOK 1, 2, 3) **Target C** Interpret results in the context of a situation. (DOK 1, 2, 3) **Target D**. Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas. (DOK 1, 2, 3)	**See content standards for Claim 1:** **Target A, D, E, G, H, I, J**	• **2** Select tools to solve a familiar and moderately scaffolded problem and apply them with partial accuracy. Use the necessary elements given in a problem situation to solve a problem. Apply mathematics to propose solutions by identifying important quantities and by locating missing information from relevant external resources. • **3** Use appropriate tools to accurately solve problems arising in everyday life, society, and the workplace. Apply mathematics to solve problems by identifying important quantities and mapping their relationship and by stating and using logical assumptions. • **4** Analyze and interpret the context of an unfamiliar situation for problems of increasing complexity. Begin to solve problems optimally. Construct multiple plausible solutions and approaches.	**Target A:** 0-1 **Target B, C, D:** 0-1	1 - 2	**5-7**
	Claim 4 **Target A**: Apply problems arising in everyday life, society, and the workplace. (DOK 2, 3) **Target B:** Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. (DOK 2, 3, 4) **Target C:** State logical assumptions being used. (DOK 1, 2, 3) **Target D:** Interpret results in the context of a situation. (DOK 2, 3) **Target E:** Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. (DOK 2, 3, 4) **Target F:** Identify important quantities I a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or (formulas). (DOK 1, 2, 3) **Target G*:** Identify, analyze, and synthesize relevant external resources to pose or solve problems. (DOK 3, 4)	**See content standards for Claim 1:** **Target A, D, G, I, J**		**Target A, D:** 0-1 **Target B, E:** 0-1 **Target C, F:** **0**-1 **Target G:** 0	1 - 3	

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) Students Entering Level (2, 3, or 4) will be able to…**	**Item Types**		**Total Items**
				CAT	**PT**	
Claim 3: Communicating Reasoning	**Claim 3** **Target A:** Test propositions or conjectures with specific examples. (DOK 2, 3) **Target B.** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. (DOK 2, 3, 4) **Target C.** State logical assumptions being used. (DOK 2, 3) **Target D.** Use the technique of breaking an argument into cases. (DOK 2, 3) **Target E.** Distinguish correct logic or reasoning from that which is flawed and —if there is a flaw in the argument—explain what it is. (DOK 2, 3, 4) **Target F.** Base arguments on concrete references such as objects, drawings, diagrams, and actions. (DOK 2, 3)	**See content standards for Claim 1: Target B, F, G, 3.MD.7**	• **2** Find and identify the flaw in an argument. • **3** Use stated assumptions, definitions, and previously established results and examples to identify and repair a flawed argument. Use previous information to support his or her own reasoning on a routine problem. • **4** Begin to construct chains of logic about abstract concepts autonomously. .	**Target A, D:** 1-2 **Target B, E:** 1-2 **Target C, F:** 1	**0 - 2**	**4 - 6**