Alaska Measures of Progress Mathematics Summative Assessment Framework

The Alaska Mathematics Standards is a set of specific, rigorous expectations that build students' skills across grades in mathematics content as well as mathematical practices. The standards are designed to develop a logical progression of mathematical fluency, conceptual understanding, and real-world applications.

Building on the Alaska Mathematics Standards, test development for the AMP assessment is focusing item development on broader skills and strategies rather than individual standards and discrete skills—a method more reflective of both the holistic approaches teachers use to teach and the ways students learn. This document includes information about the content emphases and the item specifications of AMP. While documents such as these are typically created for the teams of test developers and content specialists who write and review test questions, they can also provide helpful information for teachers. The Summative Assessment Framework combines test development documents and adapts the information for use by educators. The Framework provides an overview of the assessment for each grade, using tables to identify accompanying Claims and thoroughly define Targets, including statements of the evidence required.

AMP

The Alaska Measures of Progress assessment is a computer-based assessment for grades 3-10 aligned to the Alaska English Language Arts and Mathematics Standards (adopted in 2012).

The Summative Assessment Framework

The AMP Summative Assessment Framework shows the percentage and relative emphasis for Claims and Targets for the summative assessments. The AMP Summative Assessment Frameworks for both Mathematics and English Language Arts (ELA) do three very specific things:

1. Organize the standards around big ideas (Claims). A Claim is a broad statement that outlines the outcomes that demonstrate mastery of the standards.
2. Describe the specific skills required of students in order to be successful on AMP through Targets. Targets are groups of related standards.
3. Create a content emphasis to form a bridge between standards, assessment, and instruction. This bridge can help educators analyze how a lesson or unit engages a student's cognitive process and what level of cognitive rigor (Depth of Knowledge) it requires.

Claims and Targets

Claims are broad statements about student mastery of the standards.

Targets are groups of related standards that can be measured.

Claims

The Claims are the broadest categories of knowledge, skills, and abilities that can have inferences drawn about them. These broad statements outline outcomes that demonstrate mastery of the standards. In Mathematics, the Claims follow the pattern of the Clusters, the boldfaced items in the Alaska Mathematics Standards.

There are four Claims in Mathematics that will be assessed by AMP:

Claim 1: Concepts and Procedures (65-70%)**.** Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency.

Claim 2: Problem Solving (8-12%). Students can solve a range of complex, well-posed problems in pure and applied mathematics, making productive use of knowledge and problem solving strategies.

Claim 3: Communicating and Reasoning (8-12%). Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.

Claim 4: Modeling and Data Analysis (8-12%). Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.

In Claims 2, 3, and 4, students will focus on deeper problem-solving strategies and mathematical practices.

Targets

Targets (or Assessment Targets) break the Claims down into groups of similar standards. Each Target within a Claim is followed by evidence statements, which outline the skills students need to master. Arranging standards into Targets more accurately reflects how students learn and teachers teach. For example, students who are solving a division word problem will need to draw on their previous understanding of multiplication and incorporate Mathematical Practice 6 (Attend to precision) to accurately solve the problem. The Claims are built from Targets, which are drawn from groups of the Alaska Standards. In addition, groupings of standards are given for each Target.

Although the numbered standards are listed with the Targets and Claims, the test blueprint cannot be derived by counting up the number of times a particular standard is listed. There are cases where part of a standard is in one Target, and another part of the

Blueprint

A test blueprint is used by test creators to ensure that multiple forms of the test cover the same content in the same proportions.

standard is in another Target. **While not all Targets will be equally emphasized in the test, all of the content described by the standards is important.** Some of the content in a Target may also be reflected in another Target, or the content in a Target in the current grade may be a critical foundation skill for success in subsequent grades. Thus, attempts to pattern instruction on the perceived or actual numbers of items in a test may not adequately serve students' needs.

Evidence Statements

Specific, observable activities that provide students an opportunity to show mastery of a Target.

Assessing at the Target level, rather than the individual standard level, makes it possible to highlight student understanding through a more meaningful and holistic grouping. Individual standards, while important, are impossible to sufficiently measure with limited testing time. By assessing at the Target level, it is possible to highlight student understanding of the connected material contained in the standards through this meaningful grouping.

Targets are drawn from one or more of the numbered standards and are accompanied by descriptions of evidence required, or evidence statements. These evidence statements are used to guide item writers in creating test questions that will give students the opportunity to demonstrate mastery of that Target. For example, for Grade 3, Target F: Develop understanding of fractions as numbers, one evidence statement is, "The student expresses whole numbers as fractions and recognizes fractions equal to whole numbers" (Grade 3, Claim 1, Target F, Evidence Statement 5).

High School Claim 1 Targets - Rationale

The Alaska Mathematics Standards are organized into conceptual categories, which means there are no specific grades associated with any standard within a grade cluster. In order to measure student growth, the assessment needs to have vertical alignment. For this reason, some Targets appear in both grades 9 and 10. In an effort to distinguish the differences between the expectations of these Targets in the two grades, each Target in Claim 1 contains a clarifying focus statement that describes how the Target will be measured differently in the two grades.

Vertical alignment between grades 9 and 10 requires that each test focus largely on algebra, but also include geometry and statistics. However, Claims 2, 3, and 4 for grade 10 will emphasize geometry.

Relative Emphasis

The focus, coherence, and rigor of the Alaska Standards are captured through the emphases of High, Medium, or Low on particular Targets, as shown on the Summative Assessment Framework. Relative Emphasis is related to the frequency with which items aligned to that Target would appear on an item-adaptive test. It should NOT be interpreted as a basis for making curricular

decisions. Targets with a Low Relative Emphasis should be considered important for instruction because they may include skills associated with Medium or High Targets in the same grade, or they may be important building blocks and are key to success in later grades. For example, in Grade 3, Target E: Use place value understanding and properties of operations to perform multi-digit arithmetic has Low Relative Emphasis. The place value skills in Target E are important to accurately compute problems in Targets having a high emphasis, such as Target D: Solve problems involving the four operations, and identify and explain patterns in arithmetic.

Depth of Knowledge

The Summative Assessment Framework also identifies the cognitive rigor expected of students for the Targets by providing a Depth of Knowledge (DOK) level. DOK offers a common language to understand "rigor," or cognitive demand, in assessments, as well as curricular units, lessons, and tasks. By using DOK, tasks can be categorized according to the complexity of thinking required to successfully complete them. The categories are defined below:

DOK

Depth of Knowledge is a way to categorize the cognitive complexity of a content standard, a Target, or a test question.

DOK 1: Recall & Reproduction
Tasks at this level require recall of facts or rote application of simple procedures. A Mathematics example is learning multiplication facts.

DOK 2: Skills and Concepts
Tasks at this level require more than one mental step and expect students to apply knowledge to compare, organize, summarize, or predict. A Mathematics example is extending a pattern.

DOK 3: Strategic Thinking
Tasks at this level require the use of planning and evidence to support more abstract thinking. A Mathematics example is analyzing and drawing conclusions from data, citing evidence to support the conclusions.

DOK 4: Extended Thinking
Tasks at this level involve the synthesis of information from multiple sources, often over an extended period of time, or the transfer of knowledge from one domain to solve problems in another.

The DOK in the Framework is provided as a general reference for the projected maximum DOK of items on AMP. Typically, machine-scorable items are DOK 1, 2, or 3 as supported by the content being measured and by the context of the problem. DOK 4 is generally reserved for performance tasks.

The maximum DOK of items is typically determined by the depth of cognitive complexity suggested by the content standards. **While this is the maximum DOK for summative test items, it should not be interpreted as a limit to the Depth of Knowledge for instructional activities.** When assessments are used in a high-stakes environment, it would be unfair to include items that tap into higher levels of DOK than indicated by the state's content standards. Similarly, in order to accurately measure achievement for all students, some items will be included at lower DOK levels than indicated by the state's content standards.

For example, if a standard said, "Students will be able to jump over a three-foot-high obstacle," mastery could be measured by determining if students were successful in jumping over something three feet high. Students who were unsuccessful at three feet could have their performance measured by including obstacles of lower heights, to provide information for possible remediation. However, when receiving instruction for this activity, the students should practice jumping over obstacles at different heights, starting off with lower heights and building up to heights greater than three feet. Furthermore, it would be unfair to have the actual test be to jump over something five feet high, since the expectation of the standard is three feet.

AMP Items

Machine-scorable items on AMP include traditional multiple choice, multi-select multiple choice, and technology-enhanced items (i.e., highlighting, drag and drop, graphs).

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How to Read This Document: This document is organized by grade. An excerpt from Grade 3 is provided as an example.

Claim: a short description of the Claim that summarizes its main topic

Target: Targets in Mathematics are drawn from the Clusters in the Alaska Standards. Targets describe an overall theme of a group of related standards.

Grade: the grade level the Framework describes.

%: the proportion of the machine-scorable part of the assessment that will be drawn from each Claim

Grade 3 Mathematics

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

Focus	Target	Standards	Goal DOK	Relative Emphasis/ Comments	%
Not used in this grade.	A. Represent and solve problems involving multiplication and division. **Evidence Required:** 1. The student uses multiplication and division up to 100 to solve straightforward one-step word problems in situations involving equal groups, arrays, and measurement quantities such as length, liquid volume, and masses of objects. 2. The student determines an unknown whole number in a multiplication or division equation relating three whole numbers with single-digit factors up to 100.	3.OA.1, 3.OA.2, 3.OA.3, 3.OA.4	2	High	60-65%

Relative Emphasis: categorizes Targets as High, Medium, or Low emphasis for item development. However, this should not be interpreted as a reflection of or suggestion for a pattern of emphasis for instruction.

Focus: in grades 9 and 10, the Conceptual Category from the Alaska Standards that is the primary source of the Target. The Focus provides another connection between the Alaska Standards and the Targets.

Standards: a list of the standards which are addressed by the Target.

Goal DOK: the maximum Depth of Knowledge for assessment suggested by the Target and its associated standards

Grade: the grade level the Framework describes.

Claim: a short description of the Claim that summarizes its main topic.

Focus: in grades 9 and 10, the Conceptual Category from the Alaska Standards that is the primary source of the Target. The Focus provides another connection between the Alaska Standards and the Targets.

Target: Targets in Mathematics are drawn from the Clusters in the Alaska Standards. Targets describe an overall theme of a group of related standards.

- Targets are followed by statements of Evidence Required, describing the types of things a student could do to demonstrate mastery of the skills that contribute to the indicated Target. Items may address more than one Evidence requirement.

Standards: a list of the standards which are addressed by the Target. The references to the standards show how the Target is connected to the Alaska Standards.

Goal DOK: the maximum Depth of Knowledge for assessment suggested by the Target and its associated standards.

Relative Emphasis: categorizes Targets as High, Medium, or Low emphasis for item development. However, this should not be interpreted as a reflection of or suggestion for a pattern of emphasis for instruction.

- The Relative Emphasis column may also include comments about the tested content specific to the machine-scorable part of the assessment.

%: the proportion of the machine-scorable part of the assessment that will be drawn from each Claim. Again, this should not be interpreted as a reflection of or suggestion for a pattern of emphasis for instruction.