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## AK STAR Items: Student Performance by Content Standard and Item Type

## Purpose

The purpose of this report is to discuss student performance on AK STAR items by content standard and item type for each grade and subject. The question being investigated is “Which standards and item types are most represented by test questions that students struggle with the most?” To answer this question, NWEA employed the Expected Percent Correct (EPC) statistic within the context of the Item Response Theory (IRT) models used for the AK STAR program. The EPC statistic has been discussed at TAC meetings and is considered an appropriate method for answering the question being examined.

## Expected Percent Correct

Expected Percent Correct (EPC) is a statistic that represents the expected proportion of the maximum attainable score on an item for a given student population. For example, for a question scored as right or wrong, an EPC value of 40% means the student is expected to earn 0.4 point on that question. For a question worth up to 3 points, an EPC value of 40% means the student is expected to earn 40% of the total credit, or 1.2 points.

To calculate the EPC value for each item in this study, NWEA used item parameters (i.e., bank values such as difficulty and discrimination)—along with ability estimates for all students who took the adaptive tests during the Spring 2025 administration—based on the IRT models underlying the AK STAR assessments. Specifically, for each individual item of interest, the IRT model-based  $p$  values were first calculated using item parameters and ability estimates from each student in the target student population. Then these  $p$  values were averaged across these students and multiplied by 100 to produce an overall EPC value for that item.

Because the investigation question focuses on examining the relative difficulty of test questions by content standard and item type within a grade for each subject, a weighted average EPC value was calculated for test questions within a given group—either content standard or item type—based on the EPC values of individual items in that group. This weighting approach ensures that the influence of multiple-point items on the group-level EPC value is appropriately represented. The resulting weighted EPC values were used to compare and rank the relative difficulty of test questions across content standards or item types within a grade.

In simple terms, if it is known how skilled a student is and how hard each test question is, IRT models can use both pieces of information to estimate how likely that student would be to answer each question correctly—or to earn the maximum score on a multi-point question—even if the student did not actually see that question. An EPC value is simply the average of those expected chances, expressed as a percentage. Lower EPC values indicate that students are struggling with those items.

Empirical results are presented in Tables 1–4. Table 1 and Table 2 show the results by content standard for ELA and mathematics, respectively, and Table 3 and Table 4 show the results by item type for ELA and mathematics, respectively. In each table, only the three lowest EPC values for each content standard or item type that included more than two items are presented. The first column in each table (“Rank”) is broken down as “1” meaning most difficult, “2” meaning second most difficult, and “3” meaning third most difficult. The full set of difficulty results for all grades and subjects was provided to the Alaska Department of Education and Early Development in a separate excel file on January 15, 2026.

Following the tables, content summaries are provided for both ELA and mathematics. These summaries are intended to offer a concise outline of the results across the content standards and item types for each grade and subject.

## Empirical Results

**Table 1. ELA—Content Standard**

Rank	Grade	Standard	N_Item	Mean_EPC (%)
1	3	RL.3.2	3	27
2	3	RL.3.5	3	27
3	3	RI.3.9	6	30
1	4	L.4.2.d	3	18
2	4	W.4.2	3	29
3	4	L.4.5	5	31
1	5	W.5.1	3	34
2	5	RL.5.5	6	38
3	5	RL.5.3	5	39
1	6	RL.6.1	3	37
2	6	RI.6.7	3	37
3	6	RI.6.2	13	38
1	7	RI.7.5	4	33
2	7	RL.7.2	8	35
3	7	RI.7.2	10	36
1	8	RI.8.9	3	29
2	8	RL.8.6	5	30
3	8	RL.8.2	6	32
1	9	RL.9-10.3	4	26
2	9	RL.9-10.2	5	29
3	9	RI.9-10.2	22	34

Note. 1 = most difficult, 2 = second most difficult, and 3 = third most difficult

**Table 2. Mathematics—Content Standard**

Rank	Grade	Standard	N_Item	Mean_EPC (%)
1	3	3.MD.9.c	4	17
2	3	3.NF.3.a	4	26
3	3	3.OA.8	12	28
1	4	4.NF.7	5	20
2	4	4.MD.9	5	21
3	4	4.NF.5	6	24
1	5	5.MD.7	8	27
2	5	5.NBT.6	11	30
3	5	5.G.3	7	33
1	6	6.EE.3	4	11
2	6	6.G.1	10	25
3	6	6.NS.6.b	3	26

Rank	Grade	Standard	N_Item	Mean_EPC (%)
1	7	7.RP.3	13	23
2	7	7.G.6	9	24
3	7	7.G.5	7	25
1	8	8.EE.7.a	9	22
2	8	8.NS.1	5	23
3	8	8.F.4	14	24
1	9	N-RN.1	4	13
2	9	A-CED.3	9	16
3	9	F-IF.7.a	4	18

Note. 1 = most difficult, 2 = second most difficult, and 3 = third most difficult

**Table 3. ELA—Item Type**

Rank	Grade	Item Type	N_Item	Mean_EPC (%)
1	3	Multiple-Choice Multiple-Select	25	30
2	3	Select in Passage	16	36
3	3	Drag and Drop/Click and Pop	8	37
1	4	Multiple-Choice Multiple-Select	18	30
2	4	Multipart	22	39
3	4	Drag and Drop/Click and Pop	14	44
1	5	Constructed Response	3	34
2	5	Multiple-Choice Multiple-Select	19	38
3	5	Drag and Drop/Click and Pop	7	40
1	6	Multiple-Choice Multiple-Select	16	35
2	6	Drag and Drop/Click and Pop	14	41
3	6	Select in Passage	25	45
1	7	Text Entry	3	37
2	7	Multiple-Choice Multiple-Select	19	37
3	7	Select in Passage	24	43
1	8	Multipart	22	40
2	8	Multiple-Choice Multiple-Select	16	40
3	8	Drag and Drop/Click and Pop	10	42
1	9	Drag and Drop/Click and Pop	10	30
2	9	Multiple-Choice Multiple-Select	23	36
3	9	Select in Passage	12	41

Note. 1 = most difficult, 2 = second most difficult, and 3 = third most difficult

**Table 4. Mathematics—Item Type**

Rank	Grade	Item Type	N_Item	Mean_EPC (%)
1	3	Multipart	4	11
2	3	Selectable Text	6	23
3	3	Drag and Drop/Click and Pop	6	28
1	4	Multipart	5	17
2	4	Drag and Drop/Click and Pop	4	18

Rank	Grade	Item Type	N_Item	Mean_EPC (%)
3	4	Selectable Text	5	20
1	5	Constructed Response	3	21
2	5	Multipart	3	29
3	5	Multiple-Choice Multiple-Select	22	30
1	6	Multipart	4	16
2	6	Multiple-Choice Multiple-Select	18	21
3	6	Text Entry OR Numeric Entry	41	32
1	7	Multipart	6	15
2	7	Multiple-Choice Multiple-Select	16	22
3	7	Text Entry OR Numeric Entry	44	28
1	8	Multipart	4	13
2	8	Multiple-Choice Multiple-Select	19	24
3	8	Text Entry OR Numeric Entry	34	24
1	9	Multipart	5	11
2	9	Multiple-Choice Multiple-Select	10	18
3	9	Drag and Drop/Click and Pop	15	22

Note. 1 = most difficult, 2 = second most difficult, and 3 = third most difficult

## Content Summary

### ELA

In ELA, for both literary and informational texts, EPC values suggest that Standard 2 appears to be challenging for students.

In the case of RL.2 for literary texts, this standard encompasses summarizing a text, identifying an author's purpose, and includes theme starting in grade 4. In the case of RI.2 for informational texts, this standard encompasses summarizing a text, identifying central ideas, and analyzing the development of central ideas over the course of a text.

Summarizing and the identification of theme can be very challenging for students. In the case of a summary, students may struggle to decide which details are and are not worthy of inclusion. They may also struggle to discern the difference between summarization and retelling of a story. Theme can also be challenging for readers of all levels and ages, particularly those who tend to be more literal. Students can frequently understand the events of a literary text without being able to identify its theme.

When it comes to an author's purpose, if there is satire or irony involved, a student may be thrown off by these techniques as they attempt to determine the author's purpose. It may lead to the student feeling uncertain about how to respond.

Based on EPC values, the item types that appear the most challenging to the most ELA students are:

- Multiple-Choice Multiple-Select
- Drag and Drop/Click and Pop

For a multiple-choice item in which students need to select multiple responses, it is likely not surprising to learn that these items are challenging for students. In short, this item type asks students to pick at

least two correct answers from a range of five or more answer choices. Students also likely do not have as much experience with this item type as they do with a traditional multiple-choice item, which only has one correct answer. Adding variables, quite simply, can add complexity.

A Drag and Drop (or Click and Pop) item asks a student to manipulate item components; e.g., they may be asked to drag answer choices into a table. There are typically more than two components for students to manipulate. As with a Multiple-Choice Multiple-Select item, this adds complexity. Additionally, students will not have had as much exposure to this item type as they would a traditional multiple-choice item.

For both of these item types, students may benefit from more practice and exposure to similar items. Students may use the AK STAR Practice Tests if greater familiarity is desired.

### *Math*

#### Standard

##### **Grades 3–5: Foundational Number Sense, Fractions, and Measurement Challenges**

Across elementary grades, the lowest EPC values consistently appear in topics involving fractions, measurement, and multi-step problem solving. This indicates that conceptual understanding of quantities and fractional reasoning is not yet secure and demonstrates ongoing gaps in the transition from whole-number reasoning to rational-number reasoning.

##### **Grades 6–8: Expressions & Equations, Geometry Applications, and Rational Number Understanding**

In grades 6–8, the EPC data show that students are performing lower with algebraic manipulation, geometric applications, and advanced number systems. Algebraic reasoning and geometric applications show the lowest EPC values, suggesting that students have difficulty transferring arithmetic thinking into generalized algebraic and geometric contexts.

##### **Grade 9: Algebra I—Rational Exponents, Modeling Constraints, and Graph Interpretation**

In grade 9, the lowest EPC values indicate that there could be gaps in students' foundational algebra and function analysis. Students in grade 9 may need support in conceptual understanding of rational exponents, function graph interpretation, and applying algebra in modeling contexts.

As students strengthen their understanding of fractions and measurement in earlier grades, they are better positioned to extend these foundations into the more abstract concepts of algebra, geometry, and functions in later grades.

#### Item Type

EPC values suggest that students in grades 5–9 found the Multiple-Choice Multi-Select item type challenging. This type of item is designed to assess students' ability to identify multiple correct representations, values, expressions, or equations that are equivalent, among other related competencies.

Students need to understand that there are two different multiple-choice item types: single-select and multi-select. Reading the directive closely and paying attention to the details of what is being asked of them is a crucial step in order for students to answer the items correctly.

Across grades 3 through 9, EPC values suggest that students find the multipart (constructed response) items challenging. These items require students to demonstrate not only computational accuracy but also the ability to provide clear explanations, justified reasoning, and coherent communication of their mathematical thinking. To be successful, students must have regular opportunities to develop and refine their ability to craft clear, concise, and accurate written explanations that use complete sentences and effectively articulate their reasoning processes. Although students may present correct computations or appropriate models, they may still lose points if their responses lack a coherent, accurate, and fully developed explanation or justification. This underscores a potential need for ongoing instructional support focused on strengthening students' written mathematical communication skills.

For both of these item types, students may benefit from more practice and exposure to similar items. Students may use the AK STAR Practice Tests if greater familiarity is desired.



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