

Appendix E—2009-10 PAAP ALIGNMENT REPORT

**Alignment Analysis of Maine's
2009-2010 Personalized Alternate Assessment Portfolio
(PAAP) Alternate Grade Level Expectations for Reading,
Mathematics, and Science**

**Amy S. Burkam
Lothlorien Consulting, LLC**

March, 2010

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(PAAP) Alternate Grade Level Expectations for
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**Amy S. Burkam
Lothlorien Consulting, LLC
Wakefield, New Hampshire**

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This study was conducted for the State of Maine. Alignment Institutes were held January 12, 13, and 26 using protocols developed by WestEd to analyze the strength of alignment of the 2009-2010 Maine Alternate Grade Level Expectations (AGLEs) to the Grade Level Expectations (GLEs) for the general population. This report consists of a description of the criteria used to judge the alignment between the Maine AGLEs and GLEs for reading, mathematics, and science. Tables listing the results of reviewers' judgments about the alignment are included in this report.

Acknowledgements

Panel Members

Panelist	Institute	Institution	Position
Mary Ayotte	Language Arts	China Middle School	Grade 7 Language Arts Teacher
Danielle Gauthier	Language Arts	Sylvio J. Gilbert Elementary School	Grade 5 Teacher
Sheree Lynn Granger	Language Arts and Science	Sweetser	Special Education Teacher
Sue Nay	Language Arts	Freeport Middle School	Composite Room; Grade 6 Resource Room
Kelly Tobin	Language Arts	Dexter Regional High School	Special Education – Life Skills/Day Treatment Teacher
Mary Jo Badger	Mathematics	Presque Isle Middle School	Special Education Teacher
Deborah Howard	Mathematics	Baxter School for the Deaf	K-12 Deaf Education Teacher (all content areas)
Robyn Lessard	Mathematics	Ellsworth High School	Special Education Teacher
Tom Menendez	Mathematics	Monmouth Middle School	Mathematics and Writing Teacher
Gail Perry	Mathematics	China Middle School	Grade 7 Mathematics Teacher
Andrea Freed	Science	University of Maine Farmington	Assistant Professor of Science Education
Deborah Pelletier	Science	Acton Elementary School	Special Education Teacher

Guest Speaker	Institution	Title/Institution
Laurie A. Lemieux	Auburn School Department	Special Education Coordinator

Facilitator	Institution	Title/Institution
Amy Burkam	Lothlorien Consulting	Owner

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Dan Hupp, Director of Student Assessment and Sue Fossett, Alternate Assessment and Accommodations Coordinator from the Maine Department of Education were the main contacts for the Department and oversaw the coordination of the study.

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Alignment Analysis of Maine’s 2009-2010 Personalized Alternate Assessment Portfolio (PAAP) Alternate Grade Level Expectations for Reading, Mathematics, and Science

Executive Summary

In 2009, Maine adopted the *New England Common Assessment Program (NECAP) Grade Level Expectations* (GLEs) for mathematics and reading that articulate and define academic expectations for students. With the adoption of new academic standards, Maine created new Alternate Grade Level Expectations (AGLEs) for its Personalized Alternate Assessment Portfolio (PAAP) and began the process of building a new task bank to assess the new AGLEs. Maine did not adopt the NECAP GLEs for science and will continue to assess student progress against the Maine *Learning Results* (MLRs). However, to maintain consistency across content areas and to address issues identified in previous alignment studies, Maine developed new science AGLEs for the science portion of the PAAP.

The Maine Department of Education selected Lothlorien Consulting to conduct an independent study to determine the degree of alignment of the new PAAP AGLEs to the NECAP GLEs for math and reading and to the MLRs for science. For consistency and ease of interpretation, the methodology for this study was adapted from the methodology developed and implemented by WestEd to evaluate the alignment characteristics of the reading and mathematics PAAP in 2007 and the science PAAP in 2009. WestEd’s method was specifically tailored to address the unique design of Maine’s PAAP and incorporates the alignment criteria outlined in Webb’s NISE Research Monograph (Webb, 1997).

Each PAAP AGLE consists of up to eight Levels of Complexity (LoC). The LoC descriptors were created by “developmentally backing down” the NECAP GLEs/MLRs. The NECAP GLEs for mathematics and reading provide academic expectations for students in grades 2 through 7 and high school. The MLRs for science provide expectations for students in grade spans Pre-K through 2, 3 through 5, 6 through 8, and high school. LoCs 1 through 4 were backed down from the expectations for students in grades Pre-K/2 through 5; LoCs 5 and 6 were backed down from expectations for grades 6 through 7/8, and LoCs 7 and 8 were backed down from the expectations for high school students. Maine’s intention was to build a learning progression of gradually increasing complexity that could ultimately lead to attainment of the NECAP GLEs/MLRs.

The purpose of this study is to determine the degree of alignment between the PAAP LoC descriptors and the NECAP/MLR indicators for mathematics, reading, and science. Associated with this purpose is the question of whether the LoC descriptors for each AGLE are sufficiently linked and spiral appropriately. Maine’s intention was for the expectations described in the LoC descriptors to spiral downward in difficulty and complexity. To conduct this study, Maine educators were trained to evaluate the LoC descriptors against three alignment characteristics.

1. Strength of Alignment (LoC descriptors to subsequent LoC descriptors and LoC descriptors to NECAP/MLR indicators)

2. Appropriateness of Complexity (LoC descriptors compared to previous and subsequent LoC descriptors)
3. Depth of Knowledge (DoK)

This study involved the analysis of 118 LoCs for mathematics, 24 LoCs for reading, and 72 LoCs for science.

Overall Findings and Recommendations for Mathematics

Most (90%) Strength of Alignment relationships between the 2009-2010 PAAP LoC descriptors for mathematics and the NECAP GLEs were strong. Nine percent of the relationships were rated partial. One LoC descriptor was considered unrelated to the NECAP GLEs. The Department should verify the adequacy of the relationships that received partial ratings. For the single LoC that was considered unrelated to the GLEs, the Department should verify the finding and refine the skills and concepts specified by the LoC as necessary to ensure alignment to the GLEs.

The majority (99%) of Strength of Alignment relationships between LoC descriptors were rated strong. One pair of LoC descriptors relationship received a “partial” rating. The Department should consider revising the descriptors that received a “partial” rating to improve the alignment relationship.

Ninety three percent of the LoC descriptors were found to be appropriately more complex than the previous descriptor and less complex than the subsequent descriptor. Six descriptors were considered to be the same complexity as an adjacent LoC descriptor. One descriptor was considered less complex than the previous descriptor. The Department should confirm these findings and verify that the relationships are purposeful and intentional or revise the descriptors accordingly.

The LoC descriptors for mathematics represent a range of DoK levels from recognition to strategic thinking. The Department should verify that the DoK range for each LoC is purposeful and consistent with the intended distribution of cognitive complexity.

Overall Findings and Recommendations for Reading

The reading AGLEs demonstrated strong alignment with 100% of the Strength of Alignment relationships rated “strong.” All LoC descriptors were found to be strongly related to the subsequent and/or previous LoC. All LoC descriptors were considered strongly related to the corresponding NECAP GLEs.

Ninety five percent of the LoC descriptors were considered appropriately complex relative to the preceding and/or subsequent descriptor. One pair of descriptors appeared to have the same level of complexity. The Department should examine the descriptors found to be the same and make revisions as needed to ensure that the complexity level increases appropriately.

The cognitive complexity of the LoC descriptors for reading ranges from recognition to basic application. The State should confirm that the Depth of Knowledge range is consistent with the State’s intent for the cognitive complexity of the reading AGLEs.

Science

The majority (85%) of LoC descriptors were considered strongly related to the corresponding MLRs for science. Eight descriptors (11%) received “partial” ratings and three LoC descriptors were found to have no relationship to the MLRs. The Department should examine the language of the descriptors rated “partial” to determine if they can be revised to improve the alignment relationship. LoCs considered to have no relationship to the MLRs should be examined and revised as necessary to ensure appropriate links to the MLRs at the corresponding grade span.

Ninety eight percent of LoC descriptors were considered appropriately more complex than the previous descriptor and less complex than the subsequent descriptor. One pair of adjacent descriptors was considered to have the same complexity. The Department should examine the descriptors found to be the same and make revisions as needed to ensure that the complexity level increases appropriately.

The cognitive complexity of the LoC descriptors for science ranges from recognition to basic application. The Department should confirm that the Depth of Knowledge range is consistent with the intended cognitive complexity.

During their review of the science AGLEs, panelists noted issues unrelated to alignment. For example, the language in some descriptors seemed unclear or misleading. In one case, panelists questioned the accuracy of the science concept specified by the descriptor. The Department should review the comments on the coding forms in Appendix F and adjust the descriptors as necessary.

Alignment Analysis of Maine’s 2009-2010 Personalized Alternate Assessment Portfolio (PAAP) Alternate Grade Level Expectations for Reading, Mathematics, and Science

Amy S. Burkam
Lothlorien Consulting, LLC

I. Introduction

Overview

In a standards based education system, alignment between expectations for student learning and assessments used for accountability is critical. Alignment is the “degree to which expectations and assessments are in agreement and serve in conjunction with one another to guide the system toward students learning what is expected” (Webb, 1997). Close alignment between the standards and assessments helps educators focus on the desired content and ensures that students have a fair opportunity to demonstrate their knowledge and understanding.

The No Child Left Behind Act of 2001 stresses the importance of measuring the academic achievement of all students, including those with significant cognitive disabilities. Typically, alternate assessments based on alternate standards are designed for this population. “According to federal regulations [NCLB, 2002, 34 C.F.R. §200.1(d)], these assessments must be aligned to academic content standards, promote access to the general curriculum, and reflect the highest achievement standards possible, but differ in complexity from grade level achievement standards through a narrower range of the content and a different set of expectations” (Flowers, Wakeman, Browder, & Karvonen, 2007, p. 8).

To address the federal regulation, the Maine Personalized Alternate Assessment Portfolio (PAAP) was specifically designed to measure the performance of students whose cognitive disabilities limit their access to the general state assessment even with the use of accommodations. Prior to 2009, the PAAP included rubrics that outlined academic expectations for students with significant cognitive disabilities. The PAAP rubrics were developed to measure content expectations that were developmentally backed down from the expectations described in the Maine *Learning Results* (MLRs). Students demonstrated progress through performance tasks designed to measure the content and skills specified in the PAAP rubrics.

In 2009, Maine adopted the *New England Common Assessment Program (NECAP) Grade Level Expectations* (GLEs) for mathematics and reading that articulate and define academic expectations for students (Chapter 131: The Maine Federal, State, and Local Accountability Standards). The 2009-2010 school year is the first year Maine will assess the NECAP Grade Level Expectations for mathematics and reading as part of the accountability system to satisfy the requirements of the federal No Child Left Behind Act of 2001. With the adoption of new academic standards, Maine revised the design for the PAAP, created Alternate Grade Level

Expectations (AGLEs) to replace the PAAP rubrics, and began the process of building a new standardized task bank to measure the new AGLEs. Due to disparities between the NECAP and Maine accountability standards for science, Maine did not adopt the NECAP science GLEs and will continue to assess student progress against the MLRs. Although Maine’s science standards did not change, the PAAP science rubrics were replaced by AGLEs to maintain consistency across content areas and to address issues identified by a previous alignment study.

To ensure proper alignment of the new AGLEs to the NECAP mathematics and reading GLEs and to the MLRs for science, The Maine Department of Education (MDE) selected Amy S. Burkam of Lothlorien Consulting, LLC to conduct an independent alignment study. Ms. Burkam has 24 years of experience in large-scale assessment, including serving as the director of item and test development for an industry leader. She has designed and conducted numerous alignment studies for a variety of purposes. A brief biography of her experience is provided in Appendix A.

For consistency and ease of interpretation, the design and methodology for this study was adapted from those developed and employed by WestEd to evaluate the alignment characteristics of the Reading and Mathematics PAAP in 2007 and the Science PAAP in 2009. WestEd’s design was specifically tailored to address unique design features of Maine’s PAAP and incorporates the alignment criteria outlined in Webb’s NISE Research Monograph (Webb, 1997).

Design of the NECAP GLEs for Mathematics and Reading and the MLRs for Science

The NECAP GLEs for reading and mathematics describe the accountability expectations for students in grades 2 through 7 and high school. The reading GLEs are organized into six categories or content strands that articulate the “big ideas” of reading that can be readily assessed.

1. Vocabulary Strategies and Breadth of Vocabulary (R1-R3)
2. Initial Understanding of Literary Texts (R4)
3. Analysis and Interpretation of Literary Texts/Citing Evidence (R5)
4. Analysis and Interpretation of Literary Texts – Author’s Craft/Citing Evidence (R6)
5. Initial Understanding of Informational Text (R7)
6. Analysis and Interpretation of Informational Text/Citing Evidence (R8)

The NECAP mathematics GLEs are organized into four strands or broad categories of mathematics.

1. Numbers and Operations (N&O)
2. Geometry and Measurement (G&M)
3. Functions and Algebra (F&A)
4. Data, Statistics, and Probability (DSP)

Indicators associated with each reading or mathematics category describe how the expectation is specified at a particular grade.

The Maine *Learning Results* for science provide expectations for students in grade spans Pre-K through 2, 3 through 5, 6 through 8, and high school. The science MLRs are organized into five standards.

- A. Unifying Themes
- B. The Skills and Traits of Scientific Inquiry and Technological Design
- C. The Scientific and Technological Enterprise
- D. The Physical Setting
- E. The Living Environment

Standards A, B, and C cut across the two content standards (D and E) and are not intended to be assessed separately. Essential concepts for each grade span are described by Performance Indicators associated with each standard. Descriptors under each Performance Indicator provide sample guidelines for instruction and assessment. Only Standards D and E and the associated Performance Indicators are part of the Maine Department of Education accountability regulation (Chapter 131: The Maine Federal, State, and Local Accountability Standards). The Performance Indicators for Standards D and E are grouped into the following content strands.

- D1 Universe and Solar System
- D2 Earth
- D3 Matter and Energy
- D4 Force and Motion
- E1 Biodiversity
- E2 Ecosystems
- E3 Cells
- E4 Heredity and Reproduction
- E5 Evolution

Design of the PAAP AGLEs

Each PAAP AGLE targets a corresponding content strand, substrand, or cluster of closely related content strands. All but two AGLEs consist of eight Levels of Complexity (LoCs) that describe increasingly complex skills and knowledge expected of students. Two mathematics AGLEs were deemed inappropriate for younger students and therefore include fewer than eight LoCs. Each LoC is accompanied by information that identifies the grade levels, based on chronological age, for which participation at that LoC is appropriate. LoCs one through four are considered appropriate for students in grades 2 through 7 and high school students. LoCs five and six are intended for students in grades 6 through 7 and high school students and LoCs seven and eight are for high school students. Tables 1, 2, and 3 show the relationships between the PAAP AGLEs and GLEs for each content area.

*Table 1: Relationship between the PAAP AGLEs for Mathematics and the
NECAP GLEs for Mathematics*

PAAP AGLE	PAAP Levels of Complexity	Corresponding NECAP GLE
A1 Numbers and Operations – Whole Numbers	LoCs 1–8	N&O–1
A2 Numbers and Operations – Fractions	LoCs 1–8	N&O–1
A3 Numbers and Operations – Decimals & Percents	LoCs 1–8	N&O–1&5
A4 Numbers and Operations – Magnitude of Numbers	LoCs 1–8	N&O–2
A5 Numbers and Operations – Understanding of Mathematical Operations, Calculations, and Solving Problems	LoCs 1–8	N&O–3&4
B1 Geometry and Measurement – Properties of 2- and 3-Dimensional Shapes and Apply Theorems	LoCs 1–8	G&M–1
	LoC 8	G&M–3
B2 Geometry and Measurement – Congruency and Similarities	LoCs 1–8	G&M–4
	LoCs 4–8	G&M–5
B3 Geometry and Measurement – Perimeter, Area, Volume, and Circumference	LoCs 1–8	G&M–6
B4 Geometry and Measurement – Measure and Converting between Units	LoCs 1–8	G&M–7
B5 Geometry and Measurement – Coordinate Plane (This AGLE only has LoCs 7 & 8)	LoCs 7 & 8	G&M–9
C1 Functions and Algebra – Patterns	LoCs 1–8	F&A–1
	LoCs 7 & 8	F&A–2
C2 Functions and Algebra – Equality and Algebraic Expressions	LoCs 7–8	F&A–3
	LoCs 1–8	F&A–4
D1 Data, Statistics, & Probability – Interpreting Data	LoCs 1–8	DSP–1
	LoC 8	DSP–3
D2 Data, Statistics, & Probability – Analyzing Data	LoCs 1–8	DSP–2
D3 Data, Statistics, & Probability – Counting Techniques (This AGLE only has LoCs 6- 8)	LoCs 1–8	DSP–4
D4 Data, Statistics, & Probability – Probability	LoCs 1–8	DSP–5

Table 2: Relationship between the PAAP AGLEs for Reading and the NECAP GLEs for Reading

PAAP AGLE	PAAP Levels of Complexity	Corresponding NECAP GLE
A1 Word Identification and Vocabulary Knowledge	LoCs 1–6	R1
	LoCs 3–8	R2
	LoCs 5–8	R3
A2 Literary Text	LoCs 1–8	R4
	LoCs 3–8	R5/6
A3 Informational Text	LoCs 1–8	R7
	LoCs 4–8	R8

Table 3: Relationship between the PAAP AGLEs for Science and the MLRs for Science

PAAP AGLE	PAAP Levels of Complexity	Corresponding MLR Performance Indicator
D1 Universe and Solar System	1-8	D1
D2 Earth	1-8	D2
D3 Matter and Energy	1-8	D3
D4 Force and Motion	1-8	D4
E1 Biodiversity	1-8	E1
E2 Ecosystems	1-8	E2
E3 Cells	1-8	E3
E4 Heredity and Reproduction	1-8	E4
E5 Evolution	1-8	E5

Note that reading has significantly fewer AGLEs than mathematics or science. This is because there are only six NECAP GLEs for reading and closely related GLEs were combined to create the AGLEs. Three reading GLEs related to literary texts were collapsed to form AGLE A2 and two GLEs related to informational text were combined to form AGLE A3. The NECAP Mathematics expectations include 24 GLEs and the MLRs for science include nine performance indicators.

Maine worked with its assessment contractor to create the AGLEs by “backing down” the academic expectations outlined by the NECAP GLEs for mathematics and reading and the MLRs for science. The process involved limiting the scope and depth of the academic content by identifying the skills and concepts that serve as underpinnings to achieving the GLEs. Initially, the contractor used the grade 5 GLEs to create LoC 8 for each AGLE. Using the LoC 8 expectations as a guideline and working backwards through the LoCs, the LoC descriptors were created to articulate a developmental continuum of alternate expectations. At each LoC, the intent was to link skills and understanding to the GLEs. After receiving feedback from the Maine Department of Education regarding the need to link the AGLEs to GLEs through grade 10, the contractor expanded the descriptors for LoCs 5 and 6 to include links to grades 6 through 8 and the descriptors for LoCs 7 and 8 to include links to the high school expectations. In the final version of the AGLEs used for this study, LoCs 1 through 4 were backed down from expectations for grades pre-K/2 through 5, LoCs 5 and 6 were backed down from expectations for grades 6 through 7/8, and LoCs 7 and 8 were backed down from the expectations for high school.

Alignment Institute

This alignment study relied on expert judgments made by Maine educators during one-day alignment institutes held in Augusta, Maine. Separate institutes were held for each content area. The institutes occurred on January 12, 2010 for reading, January 13, 2010 for mathematics, and January 26, 2010 for science.

The Maine Department of Education solicited Maine educators to participate in the institutes. The mathematics and reading panels included two content experts and three special education experts. The science panel consisted of one content expert and two special education experts. Brief biographies summarizing the qualifications of each participant are provided in Appendix A.

Participants were sent a packet of training materials to review prior to the institute. The training packet included the following documents.

- Maine's PAAP Alternate Grade Level Expectations
- NECAP Grade Level Expectations for reading or mathematics or the Maine *Learning Results* for science
- Directions for coding the AGLEs
- Practice worksheets for making judgments about each alignment relationship

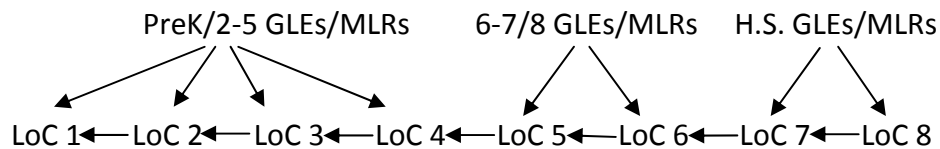
The practice worksheets provide examples of the specific alignment relationships rated by West Ed staff when conducting their alignment evaluation of the old PAAP rubrics. Training during the institute focused on calibrating participants to make judgments consistent with those made by WestEd staff for previous studies. This ensured that participants applied the alignment criteria as intended. Copies of the training materials are provided in Appendix B.

Guest speaker, Laurie Lemieux, the Special Education Coordinator in Lewiston, Maine provided training on the PAAP design and provided a history of the PAAP since its inception. She shared her experiences over the years administering the PAAP and provided insight into the cognitive abilities of students for whom the PAAP is appropriate. Ms. Lemieux has 23 years of experience working in the field of special education. She holds a Bachelors degree in French and communication and a Master's degree in special education. Ms. Lemieux has administered the PAAP to Maine students since the inception of the program. Ms. Lemieux also helped score the PAAP, participated in standard setting, and reviewed and pilot tested PAAP tasks.

II. Methodology

The 2009-2010 PAAP Alternative Grade Level Expectations consist of eight LoCs for each alternate expectation. The AGLEs are intended to align to the NECAP GLEs for mathematics and reading and the MLRs for science. LoCs 1 through 4 were backed down from the expectations for students in grades 2 through 5; LoCs 5 and 6 were backed down from the expectations for grades 6 and 7; and LoCs 7 and 8 were backed down from the expectations for grade 10. Figure 1 represents the structure of each PAAP AGLE and the intended relationship to the expectations for the general population. Each arrow represents an alignment relationship.

Figure 1: Alignment Relationships between the 2010 PAAP AGLEs and the NECAP/MLR Indicators



To understand and evaluate the correspondence of the PAAP AGLEs to NECAP/MLR indicators, this study examined three alignment characteristics.

1. Strength of Alignment
2. Appropriateness of Complexity
3. Depth of Knowledge

Strength of Alignment

Strength of Alignment applies to two relationships.

1. The relationship between one LoC and the subsequent LoC (horizontal arrows in Figure 1).
2. The relationship between the knowledge and skills specified by the PAAP LoC descriptor and the expectations described in the corresponding NECAP/MLR Indicators (vertical arrows in Figure 1).

Strength of Alignment was evaluated using the same criteria employed by WestEd in previous PAAP alignment studies. Institute participants determined if the skills and concepts specified by each LoC reflect the skills and concepts of the NECAP/MLR indicators and evaluated the relationship as “strong,” “partial,” or “no relationship.”

Table 4: Definitions for Evaluating Strength of Alignment (WestEd, 2007, 2009)

Code	Description
S (Strong)	The Level of Complexity descriptor reflects a central idea and/or fundamental or foundational skill or concept of the corresponding NECAP/MLR indicators or subsequent LoC.
P (Partial)	The Level of Complexity descriptor reflects a related, but not central idea and/or a related, but not fundamental or foundational skill or concept of the corresponding NECAP/MLR indicators or subsequent LoC.
N (No Relationship)	The Level of Complexity descriptor does not reflect an idea or skill that is central, fundamental, or foundational to the corresponding NECAP/MLR or subsequent LoC.

Each LoC includes one or more bulleted expectations for students. To evaluate the strength of alignment between the LoCs and NECAP/MLR indicators, participants first evaluated the strength of alignment for each bullet. After evaluating the alignment of each bullet under the LoC, participants assigned a rating to the LoC as a whole. Since the amount of knowledge or skill required to attain the bulleted expectations varies, it was not assumed that the rating for the LoC would always reflect the majority of ratings assigned to the bulleted expectations.

In addition to evaluating the relationships between the NECAP/MLR indicators and AGLEs shown in Figure 1, participants evaluated the alignment of the grade 6 through 7/8 indicators to LoCs 1 through 4 and the high school indicators to LoCs 1 through 6. Strong alignment relationships were not expected since LoCs 1 through 4 were backed down from the expectations for elementary grades and LoCs 5 and 6 were backed down from the middle school expectations. However, since LoCs 1 through 6 are appropriate for some older students who take the PAAP, partial relationships are desirable. These relationships are not considered critical to this study, but are provided to assist the Department with communications to the field regarding the selection of tasks for students.

Appropriateness of Complexity

Appropriateness of complexity is the degree to which the content and skills specified by an LoC descriptor are suitably complex relative to the preceding and subsequent LoC descriptors (horizontal arrows shown in Figure 1). Maine’s intention was for the expectations described in the AGLE LoC descriptors to spiral downward in difficulty and complexity. Participants compared the LoC descriptors and rated each descriptor as “higher,” “lower,” or the “same” complexity as the previous and subsequent descriptor. Evaluation of relative complexity was based on “key aspects of the descriptor, including the specific skill(s), the nature of the application of the skill(s), and the number of elements or parts included in the descriptor.” (WestEd, 2009)

Depth of Knowledge

Depth of knowledge (DoK) is the cognitive complexity of a task or standard. DoK is not a function of difficulty, but relates to the cognitive processes required to successfully complete a task or demonstrate mastery of a standard. To determine the DoK of each LoC, participants first determined the DoK for each bullet associated with the LoC. After evaluating the DoK of each bullet under the LoC, participants assigned a DoK rating to the LoC as a whole. Participants applied the following DoK definitions developed by WestEd.

Table 5: Depth of Knowledge Definitions (WestEd, 2007, 2009)

DoK Level	Definition
Recognition (RN)	Requires students to recognize or have an awareness of letters, words, symbols, or objects.
Recall (R)	Requires students to recall a fact, information, or procedure.
Basic Application (BA)	Requires students to use a skill or concept (e.g., information, conceptual knowledge, procedures).
Strategic Thinking (S)	Requires students to reason or develop a plan or sequence of steps.
Extended Thinking (E)	Requires students to conduct an investigation or process multiple condition/elements of a problem or task.

Since neither the NECAP nor the science MEA assesses extended thinking, the PAAP was not expected to include AGLEs that require extended thinking.

Process

Judgments were made using a consensus process. First, participants independently rated the LoCs for the first AGLE against the first alignment criterion (strength of alignment between one LoC and the subsequent LoC), discussed their ratings, and resolved differences. The facilitator solicited the input and ideas of all participants and encouraged discussion until the group reached consensus for each rating. Second, participants independently evaluated the first AGLE against the second alignment criterion (strength of alignment between each LoC and the corresponding NECAP Performance Indicators), discussed each rating, and reached agreement. Participants followed the same process to evaluate the remaining alignment relationships (Depth of Knowledge and Appropriateness of Complexity) for the first AGLE. This process was repeated for each AGLE.

One member of the alignment team was responsible for recording each judgment on a data collection form and the facilitator recorded each judgment electronically. The facilitator and the alignment team verified that both the electronic and paper forms accurately reflected all decisions. Copies of the completed data collection forms are provided in Appendices D, E, and F.

During the alignment process, the facilitator noted the conversations about ratings for use as examples in this report. The rationales for selected ratings appear in the Findings section.

As needed, participants established decision rules to inform and guide their judgments. Decision rules ensure accurate and consistent application of the alignment criteria and facilitate the consensus process. One decision rule for evaluating Strength of Alignment was created and applied to all content areas. Additionally, participants in the mathematics institute were instructed to apply the Depth of Knowledge decision rules previously established by West Ed staff. The decision rules are listed in the next section of this report.

Decision Rules

1. Some NECAP indicators are dropped at the upper grades with the expectation that students mastered that particular content at the earlier grades. When the corresponding NECAP Indicator is assessed at some, but not all grades within the grade span, participants evaluated the Strength of Alignment for the applicable grades and indicated in the “comments” section of the coding form the grades levels that do not assess the indicator. When the corresponding Indicator is not assessed at any grade within a grade span, panelists applied the Strength of Alignment definitions to the other Indicators for that category or strand to determine if the skills and concepts specified by the AGLE are prerequisite to mastering the GLE content. If the skills and concepts are prerequisite, the alignment relationship was considered “Partial.”

The following Depth of Knowledge decision rules for mathematics were made by WestEd staff when conducting the 2007 PAAP Alignment Study. Panelists for this study also applied these rules.

Recognition

2. Matching two objects that are the same is “Recognition.”
3. Identifying two different sets of objects with the same number of objects in each set is “Recognition.”
4. Identifying objects or quantities by name or label is “Recognition.”

Recall

5. Reading a number line or tool (e.g., thermometer, clock) is “Recall.”
6. Recognizing place value or representing numbers in words, numerals, or special notations (e.g., expanded form, scientific notation) is “Recall.”
7. Identifying whether one object, quantity, or number is equal to/greater than/less than another object, quantity, or number is “Recall.” NOTE: At the recall level, objects to be compared are similar in shape or composition (e.g., both are two-dimensional), quantities to be compared use the same unit of measure, and numbers to be compared are written in the same form (e.g., compare a stack of cubes to another stack of cubes, an object weighed in ounces to another object weighed in ounces, a fraction to another fraction).

8. If 3 or more objects or values are compared to determine which is the least or greatest of a set, and the comparisons do not require conversion of units, denominators, etc. the item is rated “Recall.”
9. Recognizing simple number facts is “Recall.” (e.g., At grade 2, simple number facts include using only number 0 through 10 to find sums or differences less than or equal to 10. At grade 3, students classify items as odd or even and skip-count by 2s, 5s, and 10s up to 100.)

Basic Application

10. Measuring an object or quantity (e.g., length, temperature, weight) is “Basic Application.”
11. Ordering three or more numbers/quantities is “Basic Application,” unless the values represent “benchmark” numbers at or below grade level (which would be “Recall”).

For AGLEs/tasks involving patterns:

12. Matching or copying a pattern that matches a given pattern (or “creating” a given pattern using pattern blocks or cards that match the elements of the pattern) is “Recall.”
13. Extending a pattern or finding missing terms is “Basic Application.”
14. Identifying a rule or pattern based on a given repeating pattern with two or more components (e.g., AB, ABC, ABBCC) is “Basic Application.”
15. Generating the description or rule for a given repeating pattern with two or more components is “Strategic Thinking.”

For AGLEs/tasks involving probability:

16. Expressing probability of an event using words (e.g., “likely,” “impossible,” “certain”) given the sample space of two possible outcomes is “Recall.”
17. Expressing the probability of a simple event, given the number in the sample space and the number of favorable events, as a fraction not necessarily in simplest terms, is “Recall.”
18. Expressing probability of an event using words (e.g., “likely,” “impossible,” “certain”) or appropriate notation (e.g., ration, fraction, percent) given the sample space with more than two possible outcomes and the number of favorable outcomes or rule for determining that number is rated “Basic Application.”

III. Findings

Summary Analyses for Mathematics

Strength of Alignment

Alignment of LoC Descriptors to Subsequent LoC Descriptors

To determine the degree of consistency among the LoCs for each AGLE, panelists compared each LoC to the subsequent LoC and rated the relationship as “strong,” “partial,” or “no relationship.” Table 6 shows the results of this analysis.

Table 6: Strength of Alignment of Mathematics LoCs to the Subsequent LoC

LoC 1-8	Strong	Partial	Strong or Partial	No	Total
Number	101	1	102	0	102
Percent	99%	1%	100%	0%	100%

Participants evaluated the strength of alignment between 102 pairs of LoC descriptors and rated all 102 (100%) as strong or partial. For example, LoC 2 for AGLE B4 requires students to compare “two items based on weight or capacity by identifying, for example, which is heavier/lighter or which has more/less.” LoC 3 for AGLE B4 requires students to estimate and measure length, temperature, weight, time, or capacity. Participants rated the Strength of Alignment between LoC 2 for AGLE B4 and LoC 3 for AGLE B4 as strong because comparing the weight or capacity of two items is fundamental to estimating weight or capacity. The single partial rating applied to the relationship between LoC 1 and LoC 2 for AGLE A5. “Matching a set of 2–4 objects with an equivalent set of 2–4 objects” was only partially related to “adding and subtracting whole numbers (sums up to 6 and the corresponding subtraction counterparts) using manipulatives.” All LoC descriptors met the strength of alignment criterion of strong or partial relationships.

Alignment of LoC Descriptors to NECAP GLE Indicators

To determine the relationship of the PAAP AGLEs to the corresponding NECAP GLEs, participants compared each LoC to the NECAP indicators for the corresponding grade span and rated the relationship as “strong,” “partial,” or “no relationship.” Table 7 shows the results of this analysis for LoCs 1 through 4.

Table 7: Strength of Alignment of Mathematics LoCs 1-4 to the NECAP Indicators for Grades 2-5

LoC 1-4	Strong	Partial	Strong or Partial	No	Total
Number	55	0	55	1	56
Percent	98%	0%	98%	2%	100%

Participants found 55 of the 56 (98%) relationships to be strong. This finding suggests that the concepts and skills required by LoCs 1 through 4 address a central, fundamental, or foundational skill of the corresponding NECAP indicators for grades 2 through 5. For example, LoC 1 for AGLE C1 requires students to “copy simple repeating patterns.” This descriptor was considered strongly related to the NECAP GLE indicators for grades 2 through 5 shown below.

Grade 2: Identifies and extends to specific cases a variety of patterns (linear and non-numeric) represented in models, tables, or sequences by extending the pattern to the next element, or finding a missing element (e.g., 2, 4, 6, ____, 10).

Grade 3: Identifies and extends to specific cases a variety of patterns (linear and nonnumeric) represented in models, tables, or sequences by extending the pattern to the next one, two, or three elements, or finding missing elements.

Grade 4: Identifies and extends to specific cases a variety of patterns (linear and nonlinear) represented in models, tables or sequences; and writes a rule in words or symbols to find the next case.

Grade 5: Identifies and extends to specific cases a variety of patterns (linear and nonlinear) represented in models, tables, sequences, or in problem situations; and writes a rule in words or symbols for finding specific cases of a linear relationship.

One LoC descriptor was found to have no relationship to the corresponding NECAP indicators. LoC 1 for AGLE A5, which requires students to “match a set of 2–4 objects with an equivalent set of 2–4 objects,” was considered unrelated to the NECAP indicators specifying how students at grades 2 through 5 will “demonstrate conceptual understanding of mathematical operations.”

Table 8 shows the results of the analysis of the alignment relationship of LoCs 5 and 6 to the NECAP GLEs for grades 6 and 7.

Table 8: Strength of Alignment of Mathematics LoCs 5-6 to NECAP Indicators for Grades 6-7

LoC 5-6	Strong	Partial	Strong or Partial	No	Total
Number	25	5	30	0	30
Percent	83%	17%	100%	0%	100%

Participants evaluated 30 LoC descriptors and found 25 (83%) to be strongly related to the NECAP indicators. For example, LoC 6 for AGLE D2 states that students use “‘most frequent,’ (mode) ‘least frequent,’ ‘largest/greatest,’ or ‘smallest/fewest’ to analyze data or solve problems.” This descriptor is fundamental to the portion of the grade 6 and 7 NECAP indicators

that require students to use measures of central tendency to solve problems or analyze situations. The corresponding NECAP indicators for grades 6 and 7 are listed below.

Grade 6: Analyzes patterns, trends or distributions in data in a variety of contexts by determining or using measures of central tendency (mean, median, or mode) or dispersion (range) to analyze situations, or to solve problems.

Grade 7: Analyzes patterns, trends, or distributions in data in a variety of contexts by solving problems using measures of central tendency (mean, median, or mode), dispersion (range or variation), or outliers to analyze situations to determine their effect on mean, median, or mode; and evaluates the sample from which the statistics were developed (bias).

Five (17%) of the descriptors for LoCs 5 and 6 were rated “partial” for strength of alignment to the NECAP GLE indicators. For example LoC 5 for AGLE B1 states that students will “identify circles, triangles, squares, rectangles, and/or parallelograms.” This was considered related, but not fundamental to the GLE indicators for grades 6 and 7 listed below.

Grade 6: Uses properties or attributes of angles (right, acute, or obtuse) or sides (number of congruent sides, parallelism, or perpendicularity) to identify, describe, classify, or distinguish among different types of triangles (right, acute, obtuse, equiangular, scalene, isosceles, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).

Grade 7: Uses properties of angle relationships resulting from two or three intersecting lines (adjacent angles, vertical angles, straight angles, or angle relationships formed by two non-parallel lines cut by a transversal), or two parallel lines cut by a transversal to solve problems.

Table 9 shows the results of the analysis of the alignment relationship of LoCs 7 and 8 to the NECAP GLEs for grade 10.

Table 9: Strength of Alignment of Mathematics LoCs 7-8 to NECAP Indicators for Grade 10

LoC 7-8	Strong	Partial	Strong or Partial	No	Total
Number	26	6	32	0	32
Percent	81%	19%	100%	0%	100%

Participants evaluated the alignment of 32 LoC descriptors and considered 26 (81%) strongly related to the corresponding NECAP indicators for grade 10. For example, LoC 8 for AGLE C2 requires students to “demonstrate conceptual understanding of equality and algebraic expressions by representing unknown quantities with letters to write linear algebraic expressions involving any two of the four operations or evaluating linear algebraic and showing equivalence between two expressions using models or different representations of expressions by solving one-step linear equations.” This is fundamental and represents a logical learning progression to the corresponding NECAP indicator for grade 10, which states that students will “demonstrate conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-

solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.

Six (19%) of the LoC descriptors were partially related to the NECAP GLE indicators for grade 10. Four of the six LoC descriptors corresponded to NECAP GLEs that are not assessed at grade 10 and therefore do not include indicators. For example, two LoCs corresponded to the NECAP GLE that requires students to demonstrate conceptual understanding of rational numbers with respect to whole numbers. Participants judged the LoCs to be essential to attaining other NECAP GLEs, but since conceptual understanding of whole numbers is not assessed at grade 10, the relationship was deemed “partial” (see Decision Rules).

In summary, the Strength of Alignment between the PAAP LoC descriptors and the NECAP AGLE indicators for mathematics appears to be quite acceptable. Ninety nine percent of the alignment relationships were strong or partial. One PAAP descriptor for LoC 1 was found to have no relationship to the corresponding NECAP GLE.

Strength of Alignment of LoCs 1-4 to NECAP GLEs at Grades 6 and 7 and LoCs 1-6 to NECAP Grade 10 GLEs

Panelists evaluated the alignment of the grade 6 and 7 indicators to LoCs 1 through 4 and the high school indicators to LoCs 1 through 6. Strong alignment relationships were not expected since LoCs 1 through 4 were developed to align to expectations for elementary grades and LoCs 5 and 6 were developed to align to middle school expectations. These relationships are not critical to this study, but are provided to assist the Department with communications to the field regarding the selection of tasks for students. Tables 10 and 11 summarize the results of this analysis.

Table 10: Strength of Alignment of Mathematics LoCs 1-4 to NECAP Indicators for Grades 6-7 (LoCs 1-4 are intended to align to grades 2-5)

LoC	Strong		Partial		Strong or Partial		No Relationship		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	14%	11	79%	13	93%	1	7%	14	100%
2	3	21%	11	79%	14	100%	0	0%	14	100%
3	10	71%	4	29%	14	100%	0	0%	14	100%
4	10	71%	4	29%	14	100%	0	0%	14	100%
1-4	25	45%	30	54%	55	98%	1	2%	56	100%

*Table 11: Strength of Alignment of Mathematics LoCs 1-6 to NECAP Indicators for Grade 10
(LoCs 1-4 are intended to align to grades 2-5 and LoCs 5-6 are intended to align to grades 6-7)*

LoC	Strong		Partial		Strong or Partial		No Relationship		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	1	7%	12	86%	13	93%	1	7%	14	100%
2	2	14%	12	86%	14	100%	0	0%	14	100%
3	4	29%	10	71%	14	100%	0	0%	14	100%
4	7	50%	7	50%	14	100%	0	0%	14	100%
5	8	53%	7	47%	15	100%	0	0%	15	100%
6	10	67%	5	33%	15	100%	0	0%	15	100%
1-6	32	37%	53	62%	85	99%	1	1%	86	100%

With the exception of one LoC, all have strong or partial alignment relationships to the GLEs for grades 6, 7, and 10. The single LoC found to have “no relationship” is the same LoC that did not align to the GLEs at grades 2 through 5. As expected, there is a positive correlation between level of complexity and strength of the alignment. When compared to the NECAP GLEs for grades 6 and 7, only two (14%) of the LoC 1 descriptors were strongly related while 10 (71%) of the LoC 4 descriptors were strongly related. Similarly, one (7%) LoC 1 descriptor showed strong alignment to the grade 10 NECAP GLEs and 10 (67%) LoC 6 descriptors showed strong alignment. These findings suggest that both the NECAP GLEs and the PAAP AGLEs articulate a logical learning progression from early childhood to the high school expectations.

Appropriateness of Complexity

When the PAAP AGLEs were created by “backing down” the NECAP GLEs, the intent was to create a learning progression of gradually increasing complexity that could ultimately lead to attainment of the NECAP GLEs. As described earlier, this alignment characteristic was evaluated by comparing each LoC descriptor to the previous and subsequent descriptors. The descriptors for LoCs 1 through 8 were rated as “higher,” “lower,” or the “same” complexity as the previous and subsequent descriptors. Note that if LoC 1 is lower in complexity than LoC 2, then LoC 2 must be higher than LoC 1. Data are provided for both relationships because panelists were asked to make both comparisons. Tables 12 and 13 show the results of this analysis.

*Table 12: Complexity of Mathematics LoCs in Relationship to Previous LoC
(Expected to be Higher)*

Loc 1-8	Higher	Lower	Same	Total
Number	95	1	6	102
Percent	93%	1%	6%	100%

Table 13: Complexity of Mathematics LoCs in Relationship to Subsequent LoC
(Expected to be Lower)

Loc 1-8	Higher	Lower	Same	Total
Number	1	95	6	102
Percent	1%	93%	6%	100%

Participants evaluated 102 LoCs and found the majority, 95 (93%), appropriately more complex (higher) than the previous LoC and less complex (lower) than the subsequent LoC. For example, LoC 7 for AGLE B5 requires students to “locate and/or plot points in the first quadrant of the coordinate plane.” LoC 8 for AGLE B5 requires students to “do two or more of the following:

- locate and/or plot points in the coordinate plane,
- identify parallel and/or perpendicular lines, and/or
- find the midpoint of a line segment.”

Since LoC 8 requires more skills than LoC 7, panelists considered LoC 8 more complex. Also, panelists noted that both LoCs include locating or plotting points, but LoC 7 limits the task to the first quadrant of the coordinate plane (positive integers).

Participants found one LoC that was lower than the previous and higher than the subsequent LoC. LoC 4 for AGLE B1 requires students to “identify and classify two-dimensional shapes as circles, triangles, squares, or rectangles.” LoC 5 for AGLE B1 requires students to “identify circles, triangles, squares, rectangles, and/or parallelograms.” LoC 4 requires both identification and classification. LoC 5 requires identification only, a skill panelists considered to be lower in complexity than classification. The addition of parallelograms to LoC 5 is insufficient to consider LoC 5 more complex than LoC 4. Note that identifying parallelograms is not necessarily a requirement of LoC 5 due to the use of “and/or.”

Six LoCs were found to be the same complexity as the previous LoC. For example, LoC 1 for AGLE B3 requires students to “compare two items based on length.” LoC 2 for AGLE B3 states that students will “do one or more of the following:

- compare two items based on length and/or
- compare two containers based on capacity.”

The first bullet under LoC 2 is the same as the expectation for LoC 1. Since a student must only “do one or more of the following” for LoC 2, expectations for LoC 1 and 2 will sometimes be identical. In this instance, LoC 2 does not increase in skill level and complexity as intended.

Depth of Knowledge

The third alignment criterion applied in this study was depth of knowledge or cognitive complexity. Participants applied definitions for five cognitive levels: *recognition*, *recall*, *basic application*, *strategic thinking*, and *extended thinking* (WestEd, 2007) and rated each LoC as one of the five levels. Table 14 shows the distribution of LoC descriptors at each of the five depth of knowledge levels.

Table 14: Depth of Knowledge Ratings for Mathematics LoCs

LoC 1-8	Total	Recognition	Recall	Basic Application	Strategic Thinking	Extended Thinking
Number	118	16	41	57	4	0
Percent	100%	14%	35%	48%	3%	0%

Participants rated 118 LoCs across the five depth of knowledge levels. The ratings ranged from recognition to strategic thinking with no descriptors rated as extended thinking. Recognition requires students to identify shapes or match objects or quantities by name. Sixteen (14%) of the LoCs were rated at the recognition level. For example, LoC 2 for AGLE A3 requires students to “identify coins (penny, nickel, dime, or quarter).” To demonstrate mastery of this expectation, student use recognition skills to identify coins.

Forty-one (35%) of the LoC descriptors were rated at the recall level. The recall level requires students to remember a fact, information, or procedure. For example, LoC 3 for AGLE A5 states that students will “add and subtract whole numbers (sums up to 10 and the corresponding subtraction counterparts) and show or explain strategies for such problems.” This expectation requires student to remember addition and subtraction facts in routine situations, which is at the recall depth of knowledge level.

Basic application requires using or applying knowledge or skills. Most descriptors, 57 (48%), were rated at the basic application level. LoC 6 for AGLE B2 asks students to

- identify congruent figures from flips and slides (reflections or translations) AND
- identify and compare similar figures.

This LoC requires students to apply principles of transformational geometry.

Four descriptors (3%) were rated at the strategic thinking level because they require students to reason or develop a plan or sequence of steps. LoC 7 for AGLE D1 was rated at the strategic thinking level because it requires students to “analyze data presented in a table/chart, frequency chart, bar graph, circle graph, or line graph to formulate or justify conclusions, make predictions, or solve problems.”

Table 15 shows the distribution of depth of knowledge ratings by LoC.

Table 15: Depth of Knowledge Ratings for Mathematics by LoC

LoC	Statistic	Recognition	Recall	Basic Application	Strategic Thinking	Total
1	Number	8	6	0	0	14
	Percent	57%	43%	0%	0%	100%
2	Number	5	8	1	0	14
	Percent	36%	57%	7%	0%	100%
3	Number	1	10	3	0	14
	Percent	7%	71%	21%	0%	100%
4	Number	1	8	5	0	14
	Percent	7%	57%	36%	0%	100%
5	Number	1	3	11	0	15
	Percent	7%	20%	73%	0%	100%
6	Number	0	3	12	0	15
	Percent	0%	20%	80%	0%	100%
7	Number	0	2	12	2	16
	Percent	0%	12%	75%	12%	100%
8	Number	0	1	13	2	16
	Percent	0%	6%	81%	12%	100%

Table 15 reveals a pattern in the distribution of depth of knowledge ratings. The depth of knowledge required to demonstrate mastery of an expectation increases with the Levels of Complexity. For example, the percent of LoCs rated at the basic application level increases from zero percent at LoC 1 to 81 percent at LoC 8. Similarly, 57 percent of the descriptors at LoC 1 were rated at the recognition level and zero percent of the descriptors for LoCs 6 through 8 were rated at the recognition level. This finding is consistent with the premise that the LoC descriptors spiral upwards in complexity.

Summary Analyses for Reading

Strength of Alignment

Alignment of LoC Descriptors to Subsequent LoC Descriptors

To determine the degree of consistency among the LoCs for each AGLE, panelists compared each LoC to the subsequent LoC and rated the relationship as “strong,” “partial,” or “no relationship.” Table 16 shows the results of this analysis.

Table 16: Strength of Alignment of Reading LoCs to the Subsequent LoC

LoC 1-8	Strong	Partial	Strong or Partial	No	Total
Number	21	0	21	0	21
Percent	100%	0%	100%	0%	100%

Participants evaluated the strength of alignment between 21 pairs of LoC descriptors and rated all 21 (100%) as “strong.” For example, LoC 4 for AGLE A1 requires “doing one or more of the following:

- using phonemic awareness and/or
- using word parts or phonics to decode words,

AND

- using context clues to determine the meaning of words.”

LoC 5 for AGLE A1 requires “doing one or more of the following:

- using phonemic awareness and/or
- using word parts or phonics to decode words,

AND

doing one or more of the following:

- using context clues to determine the meaning of words and/or
- identifying unfamiliar vocabulary by using suffixes or base words,

AND

doing one or more of the following:

- identifying synonyms,
- identifying antonyms, and/or
- categorizing words.”

LoC 5 includes many of the same skills required by LoC 4 but also includes additional skills (e.g., synonyms, antonyms, and categories of words) that build on the LoC 4 skills.

Alignment of LoC Descriptors to NECAP GLE Indicators

To determine the relationship of the PAAP AGLEs to the corresponding NECAP GLEs, participants compared each LoC to the NECAP indicators for the corresponding grade span and rated the relationship as “strong,” “partial,” or “no relationship.” Tables 17, 18, and 19 show the results of this analysis.

Table 17: Strength of Alignment of Reading LoCs 1-4 to the NECAP Indicators for Grades 2-5

LoC 1-4	Strong	Partial	Strong or Partial	No	Total
Number	12	0	12	0	12
Percent	100%	0%	100%	0%	100%

Table 18: Strength of Alignment of Reading LoCs 5-6 to NECAP Indicators for Grades 6-7

LoC 5-6	Strong	Partial	Strong or Partial	No	Total
Number	6	0	6	0	6
Percent	100%	0%	100%	0%	100%

Table 19: Strength of Alignment of Reading LoCs 7-8 to NECAP Indicators for Grade 10

LoC 7-8	Strong	Partial	Strong or Partial	No	Total
Number	6	0	6	0	6
Percent	100%	0%	100%	0%	100%

Participants compared 24 LoC descriptors to the NECAP indicators at the corresponding grade spans and rated 100% of the relationships as strong. Each LoC descriptor tapped a fundamental or foundational skill of the NECAP indicators. For example, Table 20 compares the requirements specified by LoC 6 for AGLE A2 with the corresponding NECAP indicators for grades 6 and 7. Participants found the skills for LoC 6 to be strongly related to and/or foundational to the skills required by the NECAP indicators for grades 6 and 7.

Table 20: Specifications for LoC 6 for Reading AGLE A2 Compared to Corresponding NECAP Indicators

LoC 6 for AGLE A2	NECAP Indicators for Grades 6/7
doing two or more of the following:	
identifying or describing characters or setting,	Identifying or describing character(s), setting, problem/solution, or plot, as appropriate to text; or identifying any significant changes in character or setting over time; or identifying rising action, climax, or falling action
identifying or describing problem, solution, events, or plot, and/or	
paraphrasing or summarizing,	Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text
AND doing one or more of the following:	
making logical predictions,	Explaining or supporting logical predictions
describing main characters' characteristics or personality traits,	Describing characters' traits, motivation, or interactions, citing thoughts, words, or actions that reveal characters' traits, motivations, or their changes over time
providing examples from text that reveal characters' personality traits,	
making basic inferences, and/or	Making inferences about cause/effect (e.g., explaining how an event gives rise to the next), internal or external conflicts (e.g., person versus self, person versus person, person versus nature/society/fate), or the relationship among elements within text
identifying author's basic message.	Identifying author's message or theme

Strength of Alignment of LoCs 1-4 to NECAP GLEs at Grades 6 and 7 and LoCs 1-6 to NECAP Grade 10 GLEs

Panelists evaluated the alignment of the grade 6 through 7 indicators to LoCs 1 through 4 and the high school indicators to LoCs 1 through 6. Strong alignment relationships were not expected since LoCs 1 through 4 were developed to align to expectations for elementary grades and LoCs 5 and 6 were developed to align to middle school expectations. These relationships are not essential to this study, but are provided to assist the Department with communications to the field regarding the selection of tasks for students. Tables 21 and 22 summarize the results of this analysis.

*Table 21: Strength of Alignment of Reading LoCs 1-4 to NECAP Indicators for Grades 6-7
(LoCs 1-4 are intended to align to grades 2-5)*

LoC	Strong		Partial		Strong or Partial		No Relationship		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	1	33%	2	67%	3	100%	0	0%	3	100%
2	2	67%	1	33%	3	100%	0	0%	3	100%
3	2	67%	1	33%	3	100%	0	0%	3	100%
4	2	67%	1	33%	3	100%	0	0%	3	100%
1-6	7	58%	5	42%	12	100%	0	0%	12	100%

*Table 22: Strength of Alignment of Reading LoCs 1-6 to NECAP Indicators for Grade 10
(LoCs 1-4 are intended to align to grades 2-5 and LoCs 5-6 are intended to align to grades 6-7)*

LoC	Strong		Partial		Strong or Partial		No Relationship		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	1	33%	2	67%	3	100%	0	0%	3	100%
2	2	67%	1	33%	3	100%	0	0%	3	100%
3	2	67%	1	33%	3	100%	0	0%	3	100%
4	2	67%	1	33%	3	100%	0	0%	3	100%
5	3	100%	0	0%	3	100%	0	0%	3	100%
6	3	100%	0	0%	3	100%	0	0%	3	100%
1-6	13	72%	5	28%	18	100%	0	0%	18	100%

All of the alignment relationships were found to be strong or partial, with the majority (58% for grades 6 and 7 and 72% for grade 10) rated as “strong.” For example, LoC 5 for AGLE A2 specifies a variety of skills including making logical predictions, identifying characteristics or personality traits of main characters, and making basic inferences. Participants considered these skills to be strongly related to the grade 10 NECAP expectations that require students to “explain and support logical predictions,” “cite thoughts, words, or actions that reveal character traits, motivations, or changes over time,” and make inferences about cause/effect, internal or external conflicts, or the relationship among elements within text.” One example of a partial relationship is the alignment of LoC 3 for AGLE 1 to the NECAP middle and high school expectations. LoC 3 requires students to use phonemic awareness, word parts or phonics to

decode words, and context clues to determine the meaning of words. Since the corresponding NECAP GLE (word identification skills) is dropped at the upper grades, the relationship could be partial, at best. Participants determined that the LoC descriptor was partially related to the vocabulary NECAP GLE that requires students to use “strategies to unlock meaning.”

Appropriateness of Complexity

When the NECAP GLEs were “backed down” to create the PAAP AGLEs, the intent was to create a learning progression of gradually increasing complexity that could ultimately lead to attainment of the NECAP GLEs. As described earlier, this alignment characteristic was evaluated by comparing each LoC descriptor to the previous and subsequent descriptors. LoC descriptors were rated as higher, lower, or the same complexity as the previous and subsequent descriptors. Note that if LoC 1 is lower in complexity than LoC 2, then LoC 2 must be higher than LoC 1. Data are provided for both relationships. Tables 23 and 24 show the results of this analysis.

Table 23: Complexity of Reading LoCs in Relationship to Previous LoC (Expected to be Higher)

Loc 1-8	Higher	Lower	Same	Total
Number	20	0	1	21
Percent	95%	0%	5%	100%

Table 24: Complexity of Reading LoCs in Relationship to Subsequent LoC (Expected to be Lower)

Loc 1-8	Higher	Lower	Same	Total
Number	0	20	1	21
Percent	5%	95%	5%	100%

Participants compared 21 LoC descriptors to the previous and/or subsequent LoCs and judged the majority, 20 (95%) to be appropriately higher in complexity than the previous descriptors and lower in complexity than the subsequent descriptor. Table 25 shows one such comparison.

Table 25: Example of Descriptor that is Appropriately Lower in Complexity than the Subsequent Descriptor

Level of Complexity 5	Level of Complexity 6
<p>doing two or more of the following:</p> <ul style="list-style-type: none"> • obtaining information from simple table of contents or glossary, • obtaining information from simple charts, graphs, diagrams, or illustrations, and/or • using explicitly stated information to answer questions, AND <p>doing one or more of the following:</p> <ul style="list-style-type: none"> • connecting information within a text, • recognizing generalizations, • making basic inferences or drawing basic conclusions, and/or • inferring cause or effect when signal words are present. 	<p>doing two or more of the following:</p> <ul style="list-style-type: none"> • obtaining information from table of contents, glossary, transition words, bold or italicized text, or headings, • obtaining information from graphic organizers, charts, graphs, or illustrations, and/or • answering questions related to explicitly stated information, AND <p>doing two or more of the following:</p> <ul style="list-style-type: none"> • connecting information within a text, • recognizing generalizations about a text, • making inferences, including cause/effect, • drawing basic conclusions, • forming judgments or opinions, and/or • distinguishing fact from opinion.

While many requirements for LoCs 5 and 6 are nearly identical, LoC 6 includes more choices and requires an additional task for the second set of bullets. Thus, panelists considered LoC 6 more complex than LoC 5.

Raters found the descriptors for LoCs 3 and 4 for AGLE A1 to be identical. Both descriptors state that students will “apply word identification and decoding skills by doing one or more of the following:

- using phonemic awareness and/or
- using word parts or phonics to decode words, and
- using context clues to determine the meaning of words.”

Since the expectations for LoCs 3 and 4 are identical, LoC 4 does not increase in skill level and complexity as intended.

Depth of Knowledge

Participants applied definitions for five cognitive levels: *recognition*, *recall*, *basic application*, *strategic thinking*, and *extended thinking* (WestEd 2007) and rated the level of each LoC. Table 26 shows the distribution of LoC descriptors across the five depth of knowledge levels.

Table 26: Depth of Knowledge Ratings for Reading LoCs

LoC 1-8	Total	Recognition	Recall	Basic Application	Strategic Thinking	Extended Thinking
Number	24	3	5	16	0	0
Percent	100%	12%	21%	67%	0%	0%

Participants evaluated the knowledge and skills required of 24 LoC descriptors and assigned a depth of knowledge level to each descriptor. This was accomplished by first assigning a depth of knowledge level to each bulleted statement for the descriptor and then assigning an overall rating to the descriptor. The overall ratings for the LoC descriptors ranged from recognition to application, with no descriptors rated as strategic or extended thinking. However, some of the bulleted statements that define the LoC descriptors were rated at the strategic thinking level (see rating sheets in Appendix E).

Recognition requires students to demonstrate an awareness of letters, words, symbols, or objects. Three (12%) of the LoCs were rated at the recognition level. For example, LoC 1 for AGLE A1 requires students to “identify signs, symbols, gestures, objects, and/or pictures to show understanding of words.” To demonstrate mastery of this expectation, students must use recognition skills to show understanding of words.

Five (21%) of the LoC descriptors were rated at the recall level. The recall level requires students to remember a fact, information, or procedure. One example of a descriptor at the recall level is LoC 3 for AGLE A3, which requires students to

- “identify settings or characters and/or
- retell a story using relevant details and put events in proper sequence, and
- answer questions about information from the text.”

Participants rated the first two bullets at the recall level and the last bullet at the basic application level. The LoC was given an overall rating at the recall level.

Participants rated the majority of LoCs (67%) at the basic application level, which requires students to use or apply a skill. For example, LoC 6 for AGLE A1 requires skills such as applying word identification/decoding strategies; using knowledge of sounds, syllable types, or word patterns such as prefixes or suffixes to decode words; identifying unfamiliar vocabulary by using affixes or base words; using context clues to determine meaning; and using a dictionary or glossary to determine the meaning of words. Each task for this descriptor requires students to apply knowledge or skills in a particular situation.

Table 27 shows the distribution of depth of knowledge ratings by LoCs.

Table 27: Depth of Knowledge Ratings for Reading by LoC

LoC	Statistic	Recognition	Recall	Basic Application	Strategic Thinking	Total
1	Number	3	0	0	0	3
	Percent	100%	0%	0%	0%	100%
2	Number	0	3	0	0	3
	Percent	0%	100%	0%	0%	100%
3	Number	0	2	1	0	3
	Percent	0%	67%	33%	0%	100%
4	Number	0	0	3	0	3
	Percent	0%	0%	100%	0%	100%
5	Number	0	0	3	0	3
	Percent	0%	0%	100%	0%	100%
6	Number	0	0	3	0	3
	Percent	0%	0%	100%	0%	100%
7	Number	0	0	3	0	3
	Percent	0%	0%	100%	0%	100%
8	Number	0	0	3	0	3
	Percent	0%	0%	100%	0%	100%

Table 27 reveals a pattern of increasing cognitive complexity from LoC 1 through LoC 4. At LoC 1, all of the descriptors were rated at the recognition level. At LoC 2, all of the descriptors require skills at the recall level. From LoC 4 and on, all of the descriptors require skills at the basic application level. The cognitive complexity required by the LoCs reaches a “ceiling” at LoC 4. The findings from another alignment study revealed that five of the six (83%) NECAP GLEs for high school reading are at Webb’s DoK level 2 and one GLE is at DoK level 3 (Burkam, 2009). Webb’s DoK level 2 is comparable to basic application because it requires “students to apply skills and concepts that are covered in level 1” (Webb, 1997). Webb’s DoK level 3 requires reasoning and planning and thus is similar to strategic thinking. Given that only one high school expectation for NECAP was found to require strategic thinking, it was not expected that the AGLE LoCs would require strategic thinking skills.

Summary Analyses for Science

Strength of Alignment

Alignment of LoC Descriptors to Subsequent LoC Descriptors

To determine the degree of consistency among the LoC descriptors for each AGLE, participants compared each LoC to the subsequent LoC and rated the relationship as “strong,” “partial,” or “no relationship.” Table 28 shows the results of this analysis.

Table 28: Strength of Alignment of Science LoCs to the Subsequent LoC

LoC 1-8	Strong	Partial	Strong or Partial	No	Total
Number	63	0	63	0	63
Percent	100%	0%	100%	0%	100%

Participants evaluated the strength of alignment between 63 pairs of LoC descriptors and rated all 63 (100%) as “strong.” For example, LoC 6 for AGLE E5 requires students to explain “how fossils are used to help us understand the past.” Understanding the role of fossils is fundamental to LoC 7, which requires students to present “explanations that help us understand similarities and differences among and between past and present organisms.”

Alignment of LoC Descriptors to the MLR Performance Indicators

To determine the relationship of the PAAP AGLEs to the corresponding MLR Performance Indicators, participants compared each LoC to the Performance Indicators for the corresponding grade span and rated the relationship as “strong,” “partial,” or “no relationship.” Table 29 shows the results of this analysis for LoCs 1 through 4.

Table 29: Strength of Alignment of Science LoCs 1-4 to the MLR Performance Indicators for PreK-5

LoC 1-4	Strong	Partial	Strong or Partial	No	Total
Number	33	1	34	2	36
Percent	92%	3%	94%	6%	100%

Panelists found 33 of the 36 (92%) relationships to be strong. For example, “demonstrating understanding of how given objects move” (LoC 4 for AGLE D4) was considered strongly related to “summarizing how various forces affect the motion of objects.”

One (3%) LoC descriptor was considered partially related to the corresponding MLR Performance Indicator. LoC 1 for AGLE E2 requires students to identify “pictures or descriptions of given animals or plants.” This was considered related, but not fundamental or central to the

MLR Performance Indicator, which states that “students describe ways organisms depend upon, interact within, and change the living and non-living environment as well as ways the environment affects organisms.”

Two descriptors (6%) were rated as having no relationship to the MLR Performance Indicators. LoCs 1 and 2 for AGLE E3 (identifying given parts of the human body and matching animals and/or plants to their parts) were found to have no clear relationship to “describing how living things are made up of one or more cells and the ways cells help organisms meet their basic needs.”

Table 30 shows the results of the analysis of alignment relationships of LoCs 5 and 6 to the MLRs for grades 6 through 8.

Table 30: Strength of Alignment of Science LoCs 5-6 to the MLR Performance Indicators for Grades 6-8

LoC 5-6	Strong	Partial	Strong or Partial	No	Total
Number	14	3	17	1	18
Percent	78%	17%	94%	6%	100%

Fourteen (78%) of the alignment relationships for LoCs 5 and 6 were rated strong. For example, identifying living things that receive their genetic information from one parent versus those that receive genetic information from two parents (LoC 6 for AGLE E4) was considered fundamental to “describing the general characteristics and mechanisms of reproduction and heredity in organisms, including humans, and ways in which organisms are affected by their genetic traits.”

Three (17%) LoCs were given partial ratings, suggesting that the skills and concepts specified in the LoCs are related, but not fundamental to the Performance Indicators. “Identifying different climates and describing the seasons” (LoC 5 for AGLE D2) was considered partially aligned to “describing the various cycles, physical and biological forces and processes, position in space, energy transformations, and human actions that affect the short-term and long-term changes to the Earth.” Knowing about climate and seasons is related, but not fundamental to understanding concepts such as the relationship between Earth’s tilt and seasonal changes.

One (4%) LoC descriptor was found to have no relationship to the MLR Performance Indicators. “Drawing or describing things seen when using a microscope or viewing an image of something seen through a microscope” (LoC 5 for AGLE E3) was considered unrelated to “describing the hierarchy of organization and function in organisms, and the similarities and differences in structure, function, and needs among and within organisms.”

Table 31 shows the alignment relationships of LoCs 7 and 8 to the MLRs for high school.

Table 31: Strength of Alignment of Science LoCs 7-8 to the MLR Performance Indicators for Grades 9-Diploma

LoC 7-8	Strong	Partial	Strong or Partial	No	Total
Number	14	4	18	0	18
Percent	78%	22%	100%	0%	100%

Participants compared 18 LoC descriptors to the MLR Performance Indicators for high school and rated 14 (78%) of the relationships as strong. These LoC descriptors tapped a fundamental or foundational skill of the MLR Performance Indicators. For example, LoC 8 for AGLE E2 requires students to explain “things that can limit how many plants and animals can survive in an area.” This is central to the MLR Performance Indicator descriptor at high school, which requires students to “explain the concept of carrying capacity and list factors that determine the amount of life that any environment can support.”

Four (22%) of the LoC descriptors were assigned a “partial” rating. For abstract concepts such as theories about the origin of the universe, panelists found the LoCs to be related, but somewhat removed from the sophisticated high school content. LoC 7 for AGLE D1 requires students to place the planets in order relative to the Sun and identify the orbits of the Moon and selected planets. The corresponding Performance Indicator requires students to explain various aspects of theories on the formation and development of the universe.

In summary, 69 out of 72 (96%) LoCs were considered strongly or partially related to the MLR Performance Indicator at the corresponding grade span. Three LoCs were considered unrelated to the MLRs.

Strength of Alignment of LoCs 1-4 to the MLR Performance Indicators at Grades 6-8 and LoCs 1-6 to MLR Performance Indicators at Grades 9-Diploma

Panelists evaluated the alignment of the grade 6 through 8 indicators to LoCs 1 through 4 and the high school indicators to LoCs 1 through 6. Strong alignment relationships were not expected since LoCs 1 through 4 were developed to align to expectations for elementary grades and LoCs 5 and 6 were developed to align to middle school expectations. These relationships are not critical to this study, but are provided to assist the Department with communications to the field regarding the selection of tasks for students. Tables 32 and 33 summarize the results of this analysis.

Table 32: Strength of Alignment of Science LoCs 1-4 to MLR Indicators for Grades 6-8
(LoCs 1-4 are intended to align to grades Pre-K-5)

LoC	Strong		Partial		Strong or Partial		No Relationship		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	1	11%	5	56%	6	67%	3	33%	9	100%
2	1	11%	7	78%	8	89%	1	11%	9	100%
3	4	44%	4	44%	8	89%	1	11%	9	100%
4	6	67%	2	22%	8	89%	1	11%	9	100%
1-4	12	33%	18	50%	30	83%	6	17%	36	100%

Table 33: Strength of Alignment of Sciences LoCs 1-6 to NECAP Indicators for Grade 10
(LoCs 1-4 are intended to align to grades 2-5 and LoCs 5-6 are intended to align to grades 6-7)

LoC	Strong		Partial		Strong or Partial		No Relationship		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	0	0%	1	11%	1	11%	8	89%	9	100%
2	0	0%	2	22%	2	22%	7	78%	9	100%
3	0	0%	4	44%	4	44%	5	56%	9	100%
4	1	11%	6	67%	7	78%	2	22%	9	100%
5	0	0%	7	78%	7	78%	2	22%	9	100%
6	2	22%	7	78%	9	100%	0	0%	9	100%
1-6	3	6%	27	50%	30	56%	24	44%	54	100%

When LoCs 1 through 4 were compared to the MLR Performance Indicators for grades 6 through 8, six (17%) LoCs described concepts or skills unrelated to the content specified by the Performance Indicators. Comparison of the descriptors for LoC 1 through 6 to the MLRs for high school revealed 24 (44%) descriptors with no relationship to the corresponding MLR Performance Indicator. The majority of unrelated descriptors were at LoCs 1 and 2.

Appropriateness of Complexity

When the MLR Performance Indicators were “backed down” to create the PAAP AGLEs, the intent was to create a learning progression of gradually increasing complexity that could ultimately lead to attainment of the MLRs. As described earlier, this alignment characteristic was evaluated by comparing each LoC descriptor to the previous and subsequent descriptors. LoC descriptors were rated as higher, lower, or the same complexity as the previous and subsequent descriptors. Note that if LoC 1 is lower in complexity than LoC 2, then LoC 2 must be higher than LoC 1. Data are provided for both relationships. Tables 34 and 35 show the results of this analysis.

Table 34: Complexity of Science LoCs in Relationship to Previous LoC (Expected to be Higher)

Loc 1-8	Higher	Lower	Same	Total
Number	62	0	1	63
Percent	98%	0%	2%	100%

Table 35: Complexity of Science LoCs in Relationship to Subsequent LoC (Expected to be Lower)

Loc 1-8	Higher	Lower	Same	Total
Number	0	62	1	63
Percent	0%	98%	2%	100%

Participants compared 63 LoC descriptors to the previous and/or subsequent LoCs and judged the majority, 62 (98%) to be appropriately higher in complexity than the previous descriptor and lower in complexity than the subsequent descriptor. For example, LoC 2 for AGLE D3 requires students to “identify which object in a group has a specific physical property.” LoC 3 for AGLE D3 requires students to “sort objects into groups using one or more physical properties.” Sorting objects based on properties involves more than simply identifying which object possesses a particular property and is therefore considered more complex.

One pair of LoC descriptors were considered to have the same complexity. LoC 4 for AGLE D2 requires students to match weather to its effects on Earth’s surface (erosion or weathering) and to its effects on people and their environments. LoC 5 requires students to identify different climates and describe the seasons. Panelists considered LoC 5 to have the same complexity as LoC 4.

Depth of Knowledge

Participants applied definitions for five cognitive levels: *recognition*, *recall*, *basic application*, *strategic thinking*, and *extended thinking* (WestEd, 2007) and rated the level of each LoC descriptor. Table 36 shows the distribution of LoC descriptors across the five depth of knowledge levels.

Table 36: Depth of Knowledge Ratings for Science LoCs

LoC 1-8	Total	Recognition	Recall	Basic Application	Strategic Thinking	Extended Thinking
Number	72	16	45	11	0	0
Percent	100%	22%	63%	15%	0%	0%

Participants evaluated the knowledge and skills required of 72 LoC descriptors and assigned a depth of knowledge level to each descriptor. This was accomplished by first assigning a depth of knowledge level to each bulleted statement associated with the descriptor and then assigning an overall rating to the descriptor. The overall ratings for the LoC descriptors ranged from recognition to application, with no descriptors rated as strategic or extended thinking.

Recognition requires students to demonstrate an awareness of letters, words, symbols, or objects. Sixteen (22%) of the LoCs were rated at the recognition level. For example, LoC 1 for AGLE D1 requires students to “identify night and day.” To demonstrate mastery of this expectation, students must use recognition skills to distinguish day and night.

Forty five (63%) of the LoC descriptors were rated at the recall level. The recall level requires students to remember a fact, information, or procedure. Two examples of descriptors rated at the recall level are “identifying the different forms that water can take in weather” and “identifying structures and/or processes that help given organisms stay alive.”

Participants rated 11 LoCs (15%) at the basic application level, which requires students to use or apply a skill. For example, LoC 6 for AGLE D3 requires

- “comparing the properties of original materials and their properties after undergoing chemical or physical change and
- observing and drawing conclusions about how the weight of an object compares to the sum of the weights of its parts.”

Each task for this descriptor requires students to apply knowledge of physical properties.

Table 37 shows the distribution of depth of knowledge ratings by LoCs.

Table 37: Depth of Knowledge Ratings for Science by LoC

LoC	Statistic	Recognition	Recall	Basic Application	Strategic Thinking	Total
1	Number	9	0	0	0	9
	Percent	100%	0%	0%	0%	100%
2	Number	6	3	0	0	9
	Percent	67%	33%	0%	0%	100%
3	Number	1	8	0	0	9
	Percent	11%	89%	0%	0%	100%
4	Number	0	7	2	0	9
	Percent	0%	78%	22%	%	100%
5	Number	0	8	1	0	9
	Percent	0%	89%	11%	0%	100%
6	Number	0	8	1	0	9
	Percent	0%	89%	11%	0%	100%
7	Number	0	7	2	0	9
	Percent	0%	78%	22%	0%	100%
8	Number	0	4	5	0	9
	Percent	0%	44%	56%	0%	100%

Table 37 reveals a pattern in the distribution of depth of knowledge ratings. The depth of knowledge required to demonstrate mastery of an expectation generally increases with the

Levels of Complexity. At LoC 1, all of the descriptors are at the recognition level. At LoC 3, all but one of the descriptors require skills at the recall level. By LoC 8, more than half of the descriptors require skills at the basic application level. This pattern is consistent with the finding that the LoCs increase in complexity.

IV. Conclusions and Recommendations

NCLB requires states to ensure that alternate assessments for students with significant cognitive disabilities are aligned to content standards. Maine created Alternate Grade Level Expectations (ALGEs) that articulate expectations for students whose disabilities limit access to the general statewide assessment, even with the use of modifications. The purpose of this study is to determine the alignment characteristics of Maine's AGLEs for mathematics, reading, and science to the grade level expectations for the general population.

The conclusions and recommendations from the analyses presented in this report are summarized in separate sections for each content area.

Mathematics

Strength of Alignment

This study examined two Strength of Alignment relationships: alignment of each LoC descriptor to the subsequent descriptor and alignment of each LoC descriptor to the corresponding NECAP GLE indicators. The criterion for Strength of Alignment is met if all relationships are strong or partial. Overall, the mathematics AGLEs demonstrated strong alignment for both relationships. One relationship, LoC 1 for AGLE 5 to the NECAP GLE indicators, failed to meet the Strength of Alignment criterion.

- The overall alignment of LoC descriptors to subsequent descriptors was very strong, with 99% (101) of descriptors rated "strong" and 1% (1) rated "partial."
- With the exception of one LoC, the overall alignment of the descriptors for LoCs 1 through 4 to the NECAP GLEs for grades 2 through 5 was strong, with 98% (55) rated "strong." One descriptor was rated "no relationship."
- The overall alignment of the descriptors for LoCs 5 and 6 to NECAP GLEs for grades 6 and 7 was strong, with 83% (25) rated "strong" and 17% (5) rated "partial."
- The alignment of LoCs 7 and 8 to NECAP GLEs for grade 10 was strong, with 81% (26) descriptors rated "strong" and 19% (6) rated "partial."

Recommendations

1. Examine the language of the descriptors rated "partial" to determine if the descriptors can be revised to improve the alignment relationship.
2. Consider revising the descriptor for AGLE A5 LoC 1 to improve the strength of alignment relationship to AGLE A5 LoC 2 ("partial" rating).
3. Consider revising the descriptor for AGLE A5 LoC 1 (same descriptor identified above) to better align to the NECAP GLEs ("no relationship" rating).

Appropriateness of Complexity

Most LoC descriptors were appropriately complex relative to the previous and subsequent descriptors.

- Ninety three percent (95) of LoC descriptors were considered appropriately more complex than the previous descriptor.
 - Six percent (6) descriptors were considered to have the same level of complexity as the previous descriptor.
 - One descriptor was considered lower in complexity than the previous descriptor.
- Ninety three percent (95) of LoC descriptors were considered appropriately less complex than the subsequent descriptor.
 - Six percent (6) descriptors were considered to have the same level of complexity as the subsequent descriptor.
 - One descriptor was considered higher in complexity than the subsequent descriptor.

Recommendations

1. Examine the relationship between LoC 4 and 5 for AGLE B1 and make any necessary adjustments to ensure that LoC 5 is appropriately more complex than LoC 4.
2. Examine the descriptors for the six LoCs that were rated as having the same complexity as previous or subsequent descriptors and revise the descriptors to ensure that complexity increases with each LoC. In most cases, this will require examining all possible combinations of choices within each LoC and verifying that the same combination cannot be used to satisfy the requirement for the previous or subsequent descriptor.

Depth of Knowledge

The LoC descriptors for mathematics represent a range of cognitive complexity from recognition to strategic thinking.

- Recognition 16 (14%)
- Recall 41 (35%)
- Basic Application 57 (48%)
- Strategic Thinking 4 (3%)

Expectations requiring recognition or recall skills are more prevalent in LoCs 1 through 4 and expectations requiring basic application or strategic thinking are most abundant in LoCs 5 through 8. The cognitive complexity required to reach the expectations increases with each LoC descriptor.

Recommendations

The MDE should confirm that the Depth of Knowledge range is purposeful and consistent with the agency's intent for the PAAP mathematics AGLEs. One approach is to compare the range for the AGLEs to the DoK range associated with the NECAP GLEs. The cognitive complexity of the AGLEs should be skewed to lower DoK levels than the NECAP GLEs (Flowers, Wakeman, Browder, & Karvonen, 2007).

Reading

Strength of Alignment

For this study, *Strength of Alignment* included two relationships: alignment of each LoC descriptor to the subsequent descriptor and alignment of each LoC descriptor to the corresponding NECAP GLE indicators. The reading AGLEs demonstrated strong alignment with 100% of relationships rated "strong."

- All LoC descriptors (21) were found to be strongly related to the subsequent LoC descriptor.
- All 12 descriptors for LoCs 1 through 4 were rated "strong" in relation to the corresponding NECAP GLEs for grades 2 through 5.
- All 6 descriptors for LoCs 5 and 6 were rated "strong" in relation to the corresponding NECAP GLEs for grades 6 and 7.
- All 6 descriptors for LoCs 7 and 8 were found to be strongly related to the corresponding NECAP GLEs for grade 10.

Appropriateness of Complexity

Maine's intent was to create a learning progression of gradually increasing complexity from one LoC to the next. This characteristic was measured by comparing each LoC descriptor to the previous and subsequent descriptor. With the exception of one pair of LoC descriptors, all were appropriately complex.

- Ninety five percent (20) of descriptors were considered to be more complex than the previous LoC descriptor.
- Ninety five percent (20) of descriptors were rated as being less complex than the subsequent LoC descriptor.
- One pair of adjacent descriptors was considered to be of the same complexity.

Recommendation

Examine LoCs 3 and 4 for AGLE A1 and revise as necessary to ensure that LoC 4 is appropriately more complex than LoC 3.

Depth of Knowledge

The cognitive complexity of the LoC descriptors for reading ranges from recognition to basic application.

- Recognition 3 (12%)
- Recall 5 (21%)
- Basic Application 16 (67%)
- Strategic Thinking 0 (0%)

Expectations requiring recognition skills appear only at LoC 1 and expectations requiring recall skills are limited to LoCs 2 and 3. The cognitive complexity required by the reading LoCs reaches a “ceiling” at LoC 4. Although strategic thinking skills are not represented at the LoC level, some subtasks that define the descriptors at LoCs 6, 7, and 8 require strategic thinking skills (see participant rating sheets provided in Appendix E).

The MDE should confirm that the Depth of Knowledge range is consistent with the agency’s intent of the PAAP AGLEs for reading. One approach is to compare the range for the AGLEs to the DoK range associated with the NECAP GLEs with the expectation that the DoK levels for the AGLEs will be skewed to lower DoK levels than the NECAP GLEs (Flowers, Wakeman, Browder, & Karvonen, 2007).

Science

Strength of Alignment refers to two relationships: 1) alignment of each LoC descriptor to the subsequent descriptor, and 2) alignment of each LoC descriptor to the corresponding MLR Performance Indicator. The criterion for strength of alignment is met if all relationships are strong or partial. All of the science LoC descriptors were considered strongly related to the subsequent descriptor. When compared to the MLR Performance Indicators for the corresponding grade span (LoCs 1 through 4 to grades Pre-K through 5, LoCs 5 and 6 to grades 6 through 8, and LoC 7 and 8 to high school), most science AGLEs demonstrated strong alignment. Three LoC descriptors were found to have no relationship to the MLRs.

- All (100%) of the LoC descriptors were strongly related to the subsequent descriptors.
- Generally, the alignment of the descriptors for LoCs 1 through 4 to the MLR Performance Indicators grades Pre-K through 5 was strong, with 92% (33) rated “strong” and 3% (1) rated “partial.” Two descriptors were rated “no relationship.”
- Overall, the alignment of the descriptors for LoCs 5 and 6 to the MLRs for grades 6 through 8 was acceptable, with 78% (14) rated “strong” and 17% (3) rated “partial.” One LoC was found to have no relationship to the MLRs.
- The alignment of LoCs 7 and 8 to the MLRs for high school was strong, with 78% (14) descriptors rated “strong” and 22% (4) rated “partial.”

Recommendations

1. Examine the language of the descriptors rated Partial to determine if they can be revised to improve the alignment relationship.
2. Verify the findings for the LoC descriptors identified as having no relationship to the MLRs (LoCs 1 and 2 for AGLE E3 to the MLRs for Pre-K through 5 and LoC5 for AGLE E3 to the MLRs for grades 6 through 8). Revise the LoC descriptors to ensure alignment.

Appropriateness of Complexity

Most LoC descriptors were appropriately complex relative to the previous and subsequent descriptors.

- Ninety eight percent (62) of LoC descriptors were considered appropriately more complex than the previous descriptor and less complex than the subsequent descriptor.
- One pair of adjacent descriptors was considered to have the same complexity.

Recommendations

Ensure that the descriptor for LoC 4 in AGLE D2 is appropriately less complex than the descriptor for LoC 5.

Depth of Knowledge

The cognitive complexity of the LoC descriptors for science ranges from recognition to basic application.

- Recognition 16 (22%)
- Recall 45 (61%)
- Basic Application 11 (15%)
- Strategic Thinking 0 (0%)

Generally, the depth of knowledge level increases with the levels of complexity. The MDE should confirm that the Depth of Knowledge range is consistent with the agency's intentions. One approach is to compare the range for the AGLEs to the DoK range associated with the MLRs. The cognitive complexity of the AGLEs should be skewed to lower DoK levels than the MLRs (Flowers, Wakeman, Browder, & Karvonen, 2007).

General Recommendations for Science

During their review of the science AGLEs, panelists noted issues unrelated to alignment. For example, the language in some descriptors seemed unclear or misleading. In one case, panelists questioned the accuracy of the science concept specified by the descriptor. The Department should review the comments on the coding forms in Appendix F and adjust the descriptors as necessary.

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APPENDIX A

Qualifications and Biographies of Facilitator, Guest Speaker, and Institute Participants

Qualifications and Biographies of Facilitator, Guest Speaker and Institute Participants

Facilitator

Assessment specialist, Amy S. Burkam of Lothlorien Consulting, LLC conducted this study and facilitated the Alignment Institutes. A former high school science teacher, Ms. Burkam has worked in large scale assessment since 1985 when she joined the staff at Measured Progress, formerly Advanced Systems in Measurement and Evaluation, Inc. During her 22 year tenure with Measured Progress, she worked as a test developer for K-12 mathematics and science, managed and directed multiple statewide assessment programs, and directed the Curriculum and Assessment division. In her role as Curriculum and Assessment director, Ms. Burkam supervised and coordinated all aspects of item and test development. In 2007, Ms. Burkam established a private consulting firm that provides services to state departments of education, assessment companies, districts, and schools. Services include providing management and leadership for item and test development initiatives; designing and conducting alignment studies; working with educators to develop content standards, item banks, assessments, and performance standards; facilitating meetings; and reviewing and editing K-12 assessment items.

Since 2007, Ms. Burkam designed and conducted the following alignment studies.

- Alignment Analysis of the New England Common Assessment Program Expectations for Reading and Mathematics and a Form of the SAT Test of Reasoning
- Alignment Analysis of the Maine Science *Learning Results* and the Science Portion of Maine's 2009 Comprehensive Assessment System for Grades 5, 8, and 11
- Alignment Analysis of the Maine High School Mathematics *Learning Results* and a Form of the May 2009 SAT Mathematics Assessment
- Alignment Analysis of the Maine High School Reading *Learning Results* and a Form of the May 2009 SAT Reading Assessment
- Alignment Analysis of the Maine High School Mathematics *Learning Results* and a Form of the May 2008 SAT Mathematics
- Crosswalks between the Massachusetts and Tennessee reading and mathematics content standards to predict the degree of alignment between a Massachusetts item bank and the Tennessee standards
- Crosswalks between the Maine *Learning Results* for mathematics, reading, and science and the New England Common Assessment Program (NECAP) Grade Level Expectations to predict the degree of alignment between the NECAP assessment and Maine's *Learning Results*

Guest Speaker

Guest speaker, Laurie A. Lemieux is currently the Special Education Coordinator for the Auburn School Department in Auburn, Maine. Ms. Lemieux has 23 year of experience working in the field of special education. She holds a Bachelors degree in French and communication and a Master's degree in special education. Ms. Lemieux has administered the PAAP to Maine students since the inception of the program. Ms. Lemieux also helped score the PAAP, participated in standard setting, and reviewed and pilot tested PAAP tasks.

Mathematics Institute Participants

Mary Jo Badger is a special education teacher at Presque Isle Middle School. She has 21 years of experience in education, 13 of which are in the area of special education. Ms. Badger holds a Bachelors degree from the University of Farmington in Maine. She has participated in PAAP scoring and workshops to review PAAP tasks. For eight years, she served as a table leader for PAAP scoring workshops.

Deborah Howard teaches all content areas K-12 at the Governor Baxter School for the Deaf. She has 25 years of experience as a special educator and holds a Bachelors degree in communication disorders and a Master's degree in communication disorders/deaf education, evaluation, and assessment.

Robyn Lessard is currently employed as a special education teacher at Ellsworth High School. Her work history includes two years as a Life Skills Ed Tech, two years as the director of children's services for a non-profit section 24 agency, and two years as a regular education teacher at the middle school level. Ms. Lessard holds a Bachelors degree in education with a concentration in secondary English.

Tom Menendez is a mathematics teacher at Monmouth Middle School with 20 years of experience in math education. Mr. Menendez holds a Bachelors degree from Villanova University in Pennsylvania and an MBA from National University in San Diego, California. He has participated in a variety of state sponsored assessment workshops including scoring MEA writing assessments, drafting questions for the grade 4 MEA mathematic assessment, and standard setting for the grade 8 MEA.

Gail Perry is currently employed as a grade 7 mathematics teacher at the China Middle School in China, Maine. Ms. Perry's 35 years of experience as a mathematic educator include 15 years as a grade 5 teacher and 19 years teaching gifted and talented students in grades 6, 7, and 8. Over the years, Ms. Perry has worked on a variety of statewide initiatives including the Maine Assessment Portfolio Project, Maine Math and Science Alliance – LAS Task Project, the Development Task Force for the original Maine GLEs, the Academy of Math Leadership AML Projects, and the ACCESS-IT Project sponsored by EDC.

Reading Institute Participants

Mary Ayotte is currently employed as a seventh grade language arts teacher at the China Middle School in China, Maine. Ms. Ayotte holds a Bachelors degree with a concentration in English and has 17 years of experience as a language art teacher.

Danielle Gauthier is a fifth grade teacher at Sylvio J. Gilbert Elementary School in Augusta, Maine. She holds a Bachelor of Science degree in elementary education and Master's degree in literacy instruction. Ms. Gauthier has five years of experience as an elementary educator.

Sherree Lynn Granger is a special education teacher at Sweetser, a behavioral health organization in Saco, Maine. Ms. Granger holds a Bachelors degree from UMass in Amherst and a Master's degree from the College of St. Joseph in Rutland, Vermont. She has 13 years of experience as a special educator and has participated in a variety of state workshops including standard setting, item review, bias and sensitivity review, and scoring.

Sue Nay is currently employed as a composite room and half-time 6th grade resource room teacher at the Freeport Middle School in Freeport, Maine. Ms. Nay has 30 years of experience in special education and holds degrees in TMR, EMR, and elementary education. She has taught special needs students from pre-school through high school. Ms. Nay has participated in a variety of state-sponsored workshops and her experiences include scoring the PAAP, standard setting, and reviewing tasks.

Kelly Tobin works as a special education/life skills/day treatment teacher at Dexter Regional High School. Ms. Tobin holds a Bachelors degree from the University of Maine in Farmington and has 12 years of experience as a special educator.

Science Institute Participants

Andrea Freed is an assistant professor of science education at the University of Maine in Farmington. She has 21 years of experience in her field and holds a Bachelors degree in botany, a Master's degree in science education, and a Ph.D. in curriculum and instruction for science and multicultural education. Dr. Freed has assisted the Maine Department of Education with science test item development since 2004. She also assisted the Washington State Department of Education with science item development and served on the bias review committee.

Sherree Lynn Granger is a special education teacher at Sweetser, a behavioral health organization in Saco, Maine. Ms. Granger holds a Bachelors degree from UMass in Amherst and a Master's degree from the College of St. Joseph in Rutland, Vermont. She has 13 years of experience as a special educator and has participated in a variety of state workshops including standard setting, item review, bias and sensitivity review, and scoring.

Deborah Pelletier is a special education teacher at Acton Elementary School in Acton, Maine. Ms. Pelletier has eight years of experience in her field and holds a Master's degree in curriculum, instruction, and design in special education.

APPENDIX B

Training Materials

Maine PAAP Alignment Study (Mathematics)
Directions for Coding Alternate Grade Level Expectations

NOTE: Before reading this document, please review the PAAP Alternate Grade Level Expectations and the NECAP Grade Level Expectations.

During the Institute, you will work with other Maine educators to evaluate Maine’s Alternate Grade Level Expectations against three alignment criteria:

1. Strength of Alignment;
2. Depth of Knowledge; and
3. Appropriateness of Complexity.

Strength of Alignment

Strength of alignment is the relationship between the knowledge and skills specified by the PAAP Level of Complexity (LoC) descriptor and the expectations described in the corresponding NECAP GLE Indicators. During the Institute, you will be asked to determine if the skills and concepts specified by an LoC descriptor reflect the skills and concepts of the NECAP indicators and identify the relationship as “Strong,” “Partial,” or “No Relationship.”

Table 1: Link to NECAP GLE (Strength of Alignment)

Code	Description
S (Strong)	The AGLE/Level of Complexity descriptor reflects a central idea and/or fundamental or foundational skill or concept of the corresponding NECAP indicators or GLEs.
P (Partial)	The AGLE/Level of Complexity descriptor reflects a related, but not central idea and/or a related, but not fundamental or foundational skill or concept of the corresponding NECAP indicators or GLEs.
N (No Relationship)	The AGLE/Level of Complexity descriptor does not reflect an idea or skill that is central, fundamental, or foundational to the corresponding NECAP indicators or GLEs.

Practice applying these definitions by completing the Practice Coding Form on the next page. Compare each AGLE with the GLE in the same row and evaluate the relationship between them. During the Institute, we will discuss the ratings.

**Practice Coding Form
Strength of Alignment**

AGLE	GLE	Strength of Alignment
Students can, given a variety of shapes, match two of them to given models or pictures.	Students can describe/demonstrate differences between circles and squares.	
Student can describe/demonstrate the differences between triangles and rectangles based on the number and lengths of sides.	Student can describe, model, and classify shapes and figures using applicable properties.	
Student can use the patterns of numbers, geometry, and a variety of graphs to solve a problem.	Student can translate situations into number sentences.	
Student can demonstrate knowledge of the meaning decimals and integers and how they are used.	Student demonstrates understanding of divisibility rules.	
Student can compare two items or events based on length, temperature, or weight, by identifying, for example, which is longer/shorter, hotter/cooler, or heavier/lighter.	Student can solve and justify solutions to real life problems involving the measurement of time, length, area, perimeter, weight, temperature, mass, capacity, and volume.	
Student can copy a simple pattern with two components.	Student can use the patterns of numbers, geometry, and a variety of graphs to solve a problem.	
Student can compare relationships between objects/quantities such as longer/shorter, taller/shorter, more/less, etc.	Student can use language and numeric symbols to express numerical and other relations.	
Student can use language and numeric symbols to express numerical and other relations.	Student can find replacements for variables that make a simple number sentence true.	
Student can compare relationships between objects/quantities such as longer/shorter, taller/shorter, more/less, etc.	Student can find replacements for variables that make a simple number sentence true.	

Depth of Knowledge (DoK)

Depth of knowledge (DoK) is the cognitive complexity of a task or standard.

Table 2: *Depth of Knowledge Definitions (Developed by WestEd)*

DoK Level	Definition
Recognition (RN)	Requires students to recognize or have an awareness of letters, words, symbols, or objects.
Recall (R)	Requires students to recall a fact, information, or procedure.
Basic Application (BA)	Requires students to use a skill or concept (e.g., information, conceptual knowledge, procedures).
Strategic Thinking (S)	Requires students to reason or develop a plan or sequence of steps.
Extended Thinking (E)	Requires students to conduct an investigation or process multiple condition/elements of a problem or task.

Depth of Knowledge Decision Rules for Math (WestEd, 2007)

Recognition

1. Matching two objects that are the same is "Recognition."
2. Identifying two different sets of objects with the same number of objects in each set is "Recognition."
3. Identifying objects or quantities by name or label is "Recognition."

Recall

4. Reading a number line or tool (e.g., thermometer, clock) is "Recall."
5. Recognizing place value or representing numbers in words, numerals, or special notations (e.g., expanded form, scientific notation) is "Recall."
6. Identifying whether one object, quantity, or number is equal to/greater than/less than another object, quantity, or number is "Recall." NOTE: At the recall level, objects to be compared are similar in shape or composition (e.g., both are two-dimensional), quantities to be compared use the same unit of measure, and numbers to be compared are written in the same form. (e.g., compare a stack of cubes to another stack of cubes, an object weighed in ounces to another object weighed in ounces, a fraction to another fraction)
7. If 3 or more objects or values are compared to determine which is the least or greatest of a set, and the comparisons do not require conversion of units, denominators, etc. the item is rated "Recall."

Basic Application

8. Measuring an object or quantity (e.g., length, temperature, weight) is "Basic Application."
9. Ordering three or more numbers/quantities is "Basic Application," unless the values represent "benchmark" numbers at or below grade level (which would be "Recall").

10. Recognizing simple number facts is “Recall.” (e.g., At grade 2, simple number facts include using only number 0 through 10 to find sums or differences less than or equal to 10. At grade 3, students classify items as odd or even and skip-count by 2s, 5s, and 10s up to 100.)

For AGLEs/tasks involving patterns:

11. Matching or copying a pattern that matches a given pattern (or “creating” a given pattern using pattern blocks or cards that match the elements of the pattern) is “Recall.”
12. Extending a pattern or finding missing terms is “Basic Application.”
13. Identifying a rule or pattern based on a given repeating pattern with two or more components (e.g., AB, ABC, ABBCC) is “Basic Application.”
14. Generating the description or rule for a given repeating pattern with two or more components is “Strategic Thinking.”

For AGLEs/tasks involving probability:

15. Expressing probability of an event using words (e.g., “likely,” “impossible,” “certain”) given the sample space of two possible outcomes is “Recall.”
16. Expressing the probability of a simple event, given the number in the sample space and the number of favorable events, as a fraction not necessarily in simplest terms, is “Recall.”
17. Expressing probability of an event using words (e.g., “likely,” “impossible,” “certain”) or appropriate notation (e.g., ration, fraction, percent) given the sample space with more than two possible outcomes and the number of favorable outcomes or rule for determining that number is rated “Basic Application.”

Use the form on the next page to practice applying the Depth of Knowledge definitions.

Appropriateness of Complexity

Appropriateness of complexity is the degree to which the content and skills in an LoC descriptor are appropriately complex relative to the preceding and subsequent LoC descriptors. During the Institute, you will be asked to compare each LoC descriptor to the previous and subsequent descriptors. You will rate each descriptor as **Higher** (H), **Lower** (L), or the **Same** (S) complexity as the previous and subsequent descriptor.

Directions: To determine the relative complexity, consider the following aspects of the LoCs.

- the specific skill(s)
- the nature of the application of the skill(s)
- the number of elements or parts included in the descriptor

Use the form on the next page to practice evaluating the complexity of LoC descriptors. Evaluate the first eight AGLEs listed on the form.

**Depth of Knowledge and Appropriateness of Complexity
Practice Coding Form
(Complete only the unshaded cells.)**

	AGLE	DoK	Complexity	
			Prev	Next
1	Student matches coins (penny, nickel, dime, or quarter) to the coin's picture or a coin of the same value.			
2	Student matches coins (penny, nickel, dime, and quarter) to the coin's name given orally or in writing.			
3	Student identifies the penny, nickel, dime, and quarter, and gives the value of two of them.			
4	Student identifies and gives the value of the penny, nickel, dime, and quarter.			
5	Student identifies monetary values written with decimal points.			
6	Student demonstrates understanding of the meaning of decimals through hundredths <u>or</u> money.			
7	Student demonstrates understanding of the meaning of decimals through hundredths in money contexts only.			
8	Student demonstrates knowledge of the meaning of decimals and integers and an understanding of how they may be used.			
9	Student identifies a number to 100.			
10	Student reads (identifies) and compares using $>$, $<$, and $=$, whole numbers up to 1,000			
11	Student reads (identifies) and compare using $>$, $<$, and $=$, whole numbers up to 1000; and either order, or classifies whole numbers as odd or even, for whole numbers up to 1,000.			
12	Student compares relationships between objects/quantities such as longer/shorter, more/less, etc.			
13	Student uses language and numeric symbols to express numerical and other relationships.			
14	Student uses symbolic representation to explain situations.			
15	Student selects from 2 choices the shape that matches a given model or picture.			
16	Given a variety of shapes, student matches two of them to given models or pictures.			
17	Student identifies circles, squares, and triangles.			
18	Student describes/demonstrates differences between circles and squares.			
19	Student describes/demonstrates the differences between triangles and rectangles based on number and length of sides.			
20	Student uses properties/attributes limited to number of sides to identify, and distinguish between triangles and rectangles and lengths of sides to identify squares as special rectangles.			

Maine PAAP Alignment Study (Reading)
Directions for Coding Alternate Grade Level Expectations

NOTE: Before reading this document, please review the PAAP Alternate Grade Level Expectations and the NECAP Grade Level Expectations.

During the Institute, you will work with other Maine educators to evaluate Maine’s Alternate Grade Level Expectations against three alignment criteria:

1. Strength of Alignment
2. Depth of Knowledge
3. Appropriateness of Complexity

Strength of Alignment

Strength of alignment is the relationship between the knowledge and skills specified by the PAAP Level of Complexity (LoC) descriptor and the expectations described in the corresponding NECAP GLE Indicators. During the Institute, you will be asked to determine if the skills and concepts specified by an LoC descriptor reflect the skills and concepts of the NECAP indicators and identify the relationship as “Strong,” “Partial,” or “No Relationship.”

Table 1: Link to NECAP GLE (Strength of Alignment)

Code	Description
S (Strong)	The AGLE/Level of Complexity descriptor reflects a central idea and/or fundamental or foundational skill or concept of the corresponding NECAP indicators or GLEs.
P (Partial)	The AGLE/Level of Complexity descriptor reflects a related, but not central idea and/or a related, but not fundamental or foundational skill or concept of the corresponding NECAP indicators or GLEs.
N (No Relationship)	The AGLE/Level of Complexity descriptor does not reflect an idea or skill that is central, fundamental, or foundational to the corresponding NECAP indicators or GLEs.

Practice applying these definitions by completing the Practice Coding Form on the next page. Compare each AGLE with the GLE in the same row and evaluate the relationship between them. During the Institute, we will discuss the ratings.

Practice Coding Form: Strength of Alignment

AGLE	GLE	SoA
Student can use/share information gained by reading.	After reading, hearing, or viewing two selections, student can identify which is intended to entertain and which is intended to inform.	
Student can produce and support generalizations acquired from informational text.	Student will apply reading, listening, and viewing strategies to informational texts across all areas of the curriculum.	
Given a set of two objects/pictures, student can identify which is real/not real (e.g., cartoon animals/pictures of real animals).	After reading or listening to passages, student can distinguish which are stories and which are facts.	
Student seeks out books and other print materials to read for pleasure.	Student can read to find facts.	
Student identifies signs, symbols, and/or pictures to match a given prompt.	Student seeks out books and other print materials to read for pleasure.	
Student will respond appropriately to a one-step direction in context.	Student demonstrates understanding of the main idea of simple expository information.	
Student can put key events from a simple story in correct sequence.	Student can retell a story using words or pictures, including the beginning, middle, and end in correct sequence.	
Student can retell a story using words or pictures, including the beginning, middle, and end in correct sequence.	Student can apply effective but basic strategies (e.g., prior knowledge, word identification, understanding of textual features, vocabulary development, context clues, characteristics of genre) to read and interpret information about character, plot, and theme from two types of fiction (e.g., fantasies, fables, myths, mysteries, realistic and historical fiction, adventures, and humorous tales).	
Student can put key events from a simple story in correct sequence.	Student can apply effective but basic strategies (e.g., prior knowledge, word identification, understanding of textual features, vocabulary development, context clues, characteristics of genre) to read and interpret information about character, plot, and theme from two types of fiction (e.g., fantasies, fables, myths, mysteries, realistic and historical fiction, adventures, and humorous tales).	

Depth of Knowledge (DoK)

Depth of knowledge (DoK) is the cognitive complexity of a task or standard.

Table 2: Depth of Knowledge Definitions (Developed by WestEd)

DoK Level	Definition
Recognition (RN)	Requires students to recognize or have an awareness of letters, words, symbols, or objects.
Recall (R)	Requires students to recall a fact, information, or procedure.
Basic Application (BA)	Requires students to use a skill or concept (e.g., information, conceptual knowledge, procedures).
Strategic Thinking (S)	Requires students to reason or develop a plan or sequence of steps.
Extended Thinking (E)	Requires students to conduct an investigation or process multiple condition/elements of a problem or task.

Use the form on the next page to practice applying the Depth of Knowledge definitions.

Appropriateness of Complexity

Appropriateness of complexity is the degree to which the content and skills in an LoC descriptor are appropriately complex relative to the preceding and subsequent LoC descriptors. During the Institute, you will be asked to compare each LoC descriptor to the previous and subsequent descriptors. You will rate each descriptor as **Higher** (H), **Lower** (L), or the **Same** (S) complexity as the previous and subsequent descriptor.

Directions: To determine the relative complexity, consider the following aspects of the LoCs.

- the specific skill(s)
- the nature of the application of the skill(s)
- the number of elements or parts included in the descriptor

Use the form on the next page to practice evaluating the complexity of LoC descriptors. Evaluate the last seven AGLEs listed on the form.

Practice Coding Form: Depth of Knowledge and Appropriateness of Complexity

	AGLE	DoK	Complexity	
			Prev	Next
1	Given a set of two objects/pictures, student identifies which object/picture is real/not real (e.g., cartoon animals vs. pictures of real animals).			
2	Given an array of print materials, student locates and identifies pictures of things that are real and pictures of things that are not real.			
3	After listening to passages (one fiction, one non-fiction), student identifies those that could or could not happen.			
4	Student applies basic but effective strategies to the reading and use of nonfiction in order to gain facts.			
5	Student identifies and traces the development of an author’s argument, purpose, position, or perspective to aid comprehension.			
6	Student identifies signs, symbols, and/or pictures to match a given prompt.			
7	Student initiates use of signs, symbols, and/or pictures to communicate.			
8	Student seeks out books and/or other print materials for pleasure.			
9	Student reads to find facts.			
10	Student reads for a variety of purposes (e.g., to answer specific questions, to form an opinion, to skim for information).			
11	Student makes inferences about causes and effects (informational text).			
12	Student identifies pictures of named events from among a group of two or more pictures depicting varied events.			
13	Student puts key events from a simple story in correct sequence.			
14	Student retells selected events from a story.			
15	Student retells a story using words or pictures, including the beginning, middle, and end in correct sequence.			
16	Student applies effective but basic strategies (e.g., prior knowledge, word identification, understanding of textual features, context clues, characteristics of genre) to read and interpret information about character, plot, theme, and dialogues from three or more types of fiction (e.g., fantasies, fables, myths, mysteries, realistic and historical fiction).			
17	Student identifies or describes the author’s message or theme (literary text).			
18	Student matches items to picture or symbolic representations of them.			
19	Student can use/share information gained by looking at symbols/pictures.			
20	Student can use/share information gained by reviewing pictures and reading key words in context.			
21	Student can use/share information gained by reading materials.			
22	After reading, hearing, or viewing two selections, student can identify which is intended to entertain and which is intended to inform.			
23	After reading, hearing, or viewing selections, student can identify which is intended to entertain and which is intended to inform.			
24	After reading, hearing, or viewing, student can recognize when text is primarily intended to persuade.			

Maine PAAP Alignment Study (Science)
Directions for Coding Alternate Grade Level Expectations

NOTE: Before reading this document, please review the PAAP Alternate Grade Level Expectations and the Maine Learning Results for science.

During the Institute, you will work with other Maine educators to evaluate the degree of alignment between Maine’s Alternate Grade Level Expectations for science and the Maine *Learning Results* for science. Your evaluation will be based on three alignment criteria:

1. Strength of Alignment,
2. Depth of Knowledge, and
3. Appropriateness of Complexity.

Strength of Alignment

Strength of alignment is the relationship between the knowledge and skills specified by the PAAP Level of Complexity (LoC) descriptor and the expectations described in the corresponding *Learning Results* Performance Indicator. During the Institute, you will be asked to determine if the skills and concepts specified by an LoC descriptor reflect the skills and concepts of the corresponding *Learning Results* Performance Indicators and rate the relationship as “Strong,” “Partial,” or “No Relationship.”

Table 1: Link to Learning Results Performance Indicator (Strength of Alignment)

Code	Description
S (Strong)	The AGLE/Level of Complexity descriptor reflects a central idea and/or fundamental or foundational skill or concept of the corresponding Performance Indicators.
P (Partial)	The AGLE/Level of Complexity descriptor reflects a related, but not central idea and/or a related, but not fundamental or foundational skill or concept of the corresponding Performance Indicators.
N (No Relationship)	The AGLE/Level of Complexity descriptor does not reflect an idea or skill that is central, fundamental, or foundational to the corresponding Performance Indicators.

Practice applying these definitions by completing the Practice Coding Form on the next page. Compare each AGLE with the Performance Indicator in the same row and evaluate the relationship between them. Hint: Most of the relationships are “strong.” Two of the relationships are only “partial.” During the Institute, we will discuss the ratings.

Practice Coding Form: Strength of Alignment

AGLE	Performance Indicator	Strength of Alignment
Student can identify one or more of the following types of weather through observations: sunny, rainy, snowy, and/or windy.	Student can demonstrate understanding of Earth’s weather by describing differences in weather from season to season, and the effects of differences on people and their environments.	
Student can match objects based on one or more physical properties.	Student can use observable characteristics to describe: 1) the physical properties of objects and materials, and 2) changes in the physical properties of materials when mixed, heated, frozen, or cut.	
Student can use observable characteristics to describe: 1) the physical properties of objects and materials, and 2) changes in the physical properties of materials when mixed, heated, frozen, or cut.	Student can demonstrate understanding that the heating and cooling of water and other materials can change their properties.	
Student can demonstrate understanding that the heating and cooling of water and other materials can change their properties.	Student can describe properties of objects and materials before and after they undergo a change or interaction by demonstrating understanding that the properties of a material may change but the total amount of material remains the same.	
Student can match objects based on one or more physical properties.	Student can describe properties of objects and materials before and after they undergo a change or interaction by demonstrating understanding that the properties of a material may change but the total amount of material remains the same.	
Student can draw or describe things that they see when using a microscope or viewing an image of something seen through a microscope.	Student can demonstrate understanding that living things are made up of one or more cells and the ways cells help organisms meet their basic needs by: 1) identifying organisms that consist of a single cell and organisms that are made up of a collection of cells, and 2) comparing how the needs of living things are met in single-celled and multi-celled	

AGLE	Performance Indicator	Strength of Alignment
	organisms.	
Student can identify the sun, moon, and planet(s) on a given diagram and list some planets.	Student can describe or otherwise demonstrate understanding of the positions and apparent motions of different objects in our solar system and what these objects look like from Earth, by doing two of the following: 1) describing the relative locations of the sun, Earth, moon, and planets and identifying their orbits; 2) describing how the path of the sun changes over a day, 3) describing how the sun changes over the seasons, and 4) describing the sun as a star that gives off light like other stars.	
Student can identify day and night.	Student can draw or otherwise describe the movement of the sun across the sky by identifying its position at different times of the day, and can draw or identify different phases of the moon.	
Student can identify and pictures or descriptions of given plants or animals.	Student can identify and compare the life stages of living things.	

Depth of Knowledge (DoK)

Depth of knowledge (DoK) is the cognitive complexity of a task or standard.

Table 2: Depth of Knowledge Definitions (Developed by WestEd)

DoK Level	Definition
Recognition (RN)	Requires students to recognize or have an awareness of letters, words, symbols, or objects.
Recall (RC)	Requires students to recall a fact, information, or procedure.
Basic Application (BA)	Requires students to use a skill or concept (e.g., information, conceptual knowledge, procedures).
Strategic Thinking (S)	Requires students to reason or develop a plan or sequence of steps.
Extended Thinking (E)	Requires students to conduct an investigation or process multiple condition/elements of a problem or task.

Hints: Standards requiring extended thinking are not assessed on the MEA, and therefore are not expected to appear in the PAAP ALGEs. Similarly, standards requiring Strategic thinking are very rare.

Use the form on the next page to practice applying the Depth of Knowledge definitions.

Appropriateness of Complexity

Appropriateness of complexity is the degree to which the content and skills in an LoC descriptor are appropriately complex relative to the preceding and subsequent LoC descriptors. During the Institute, you will be asked to compare each LoC descriptor to the previous and subsequent descriptors. You will rate each descriptor as **Higher** (H), **Lower** (L), or the **Same** (S) complexity as the previous and subsequent descriptor.

Directions: To determine the relative complexity, consider the following aspects of the LoCs.

- the specific skill(s)
- the nature of the application of the skill(s)
- the number of elements or parts included in the descriptor

Use the form on the next page to practice evaluating the complexity of LoC descriptors.

**Practice Coding Form for Depth of Knowledge and Appropriateness of Complexity
(Complete only the unshaded cells.)**

	AGLE	DoK	Complexity	
			Prev*	Next**
1	Student can identify pictures or descriptions of given animals or plants.			
2	Student can identify animals or plants that live in given environments.			
3	Student can identify plants, animals, and/or components of their environments on which given animals depend for food and shelter			
4	Student can compare animals and plants that live in different environments to demonstrate understanding of how animals and plants depend on each other and the environment in which they live.			
5	Student can demonstrate understanding of ways in which organisms depend upon and interact with each other by identifying particular organisms in given food chains.			
6	Student can demonstrate understanding of ways in which organisms depend upon and interact within their environment by identifying organisms in a food chain and placing them in an appropriate sequence.			
7	Student can demonstrate understanding of ways in which organisms depend upon and interact within their environment.			
8	Student can demonstrate understanding of ways in which organisms depend upon, interact within, and change the living and nonliving environment, as well as ways in which the environment affects the organisms within it.			
9	Student can match objects based on one physical property.			
10	Student can identify which object in a group has a specific physical property.			
11	Student can sort objects into groups using one or more physical properties.			
12	Student can use observable characteristics to describe: 1) the physical properties of objects and materials, and 2) changes in the physical properties of materials when mixed, heated, frozen, or cut.			
13	Student can demonstrate understanding that the heating and cooling of water and other materials can change their properties.			
14	Student can compare the properties of original materials and their properties after undergoing a change.			
15	Student can, based on observation, reach a conclusion about how the weight of an object compares to the sum of the weight of its parts.			
16	Student can describe properties of objects and materials before and after they undergo a change or interaction by demonstrating understanding that the properties of a material may change but the total amount of material remains the same			

* expected to be higher (H)

** expected to be lower (L)

APPENDIX C

Institute Agenda and Handouts

**Maine Personalized Alternate Assessment Portfolio (PAAP)
Alignment Institute
Agenda**

- | | |
|-------------|--|
| 8:30- 9:00 | Welcome, Introductions, and Overview |
| 9:00-9:15 | Characteristics of Students with Significant Cognitive Disabilities |
| 9:15-9:30 | Design of the PAAP
<i>Laurie Lemieux, Special Education Coordinator, Lewiston, Maine</i> |
| 9:30-10:30 | Training and Calibration: Strength of Alignment, Depth of Knowledge, and Appropriateness of Complexity |
| 10:30-10:45 | Break |
| 10:45-11:30 | Group Coding of AGLEs |
| 11:30-12:15 | Lunch |
| 12:15-3:45 | Group Coding of AGLEs |
| 3:45-4:00 | Evaluate the Process, Debrief, Adjourn |

Maine PAAP Alignment Study

DIRECTIONS FOR CODING AGLES (Mathematics and Reading)

Strength of Alignment

LoC to Next LoC

Table 1: Strength of Alignment between Adjacent LoCs

Code	Description
S (Strong)	The Level of Complexity descriptor reflects a central idea and/or fundamental or foundational skill or concept of the subsequent Level of Complexity descriptor.
P (Partial)	The Level of Complexity descriptor reflects a related, but not central idea and/or a related, but not fundamental or foundational skill or concept of the subsequent Level of Complexity descriptor.
N (No Relationship)	The Level of Complexity descriptor does not reflect an idea or skill that is central, fundamental, or foundational to the subsequent Level of Complexity descriptor.

Link to NECAP GLE

Table 2: Strength of Alignment between LoC Descriptor and NECAP Indicator

Code	Description
S (Strong)	The AGLE/Level of Complexity descriptor reflects a central idea and/or fundamental or foundational skill or concept of the corresponding NECAP indicators or GLEs.
P (Partial)	The AGLE/Level of Complexity descriptor reflects a related, but not central idea and/or a related, but not fundamental or foundational skill or concept of the corresponding NECAP indicators or GLEs.
N (No Relationship)	The AGLE/Level of Complexity descriptor does not reflect an idea or skill that is central, fundamental, or foundational to the corresponding NECAP indicators or GLEs.

The NECAP GLE consists of a bolded stem. The unbolded text indicates how the GLE is specified at a particular grade.

Directions:

1. For each AGLE under the LoC, examine the corresponding NECAP GLE and indicators (unbolded text) at the first grade span (2-5). Rate the link between the AGLE and the NECAP GLEs at the corresponding grades.
2. Repeat step 1 for each grade span (2-5, 6-8, and high school). Note that some LOCs are only rated against the GLEs at upper grades.
3. If the LoC has more than one AGLE, repeat step 1 for the entire LoC (i.e., the overall link between the set of AGLEs collectively and the NECAP GLEs). In most cases, the overall rating will be the same as the majority of ratings for the AGLEs. For example, if an LoC includes

four AGLEs and three are rated “Strong” and one is rated “Partial,” the overall rating will most likely be “Strong.”

4. If the corresponding GLE Indicator is assessed at some, but not all grades within the grade span, evaluate the link for the applicable grades and indicate in the “comments” section of the coding form the grades levels that do not assess the indicator. When the corresponding Indicator is not assessed at any grade within a grade span, apply the definitions to the other GLEs/Indicators in the content strand to determine if the skills and concepts specified by the AGLE are prerequisite to mastering the content. If the skills and concepts are prerequisite, the SoA will be considered “Partial.” In the comments section, indicate that the corresponding indicator is not assessed at that grade span and which GLE(s)/Indicators were examined (e.g., N&O1 or R2).
5. Provide an explanation for all “P” or “N” ratings.

Depth of Knowledge (DoK)

Table 3: Depth of Knowledge Definitions (Developed by WestEd)

DoK Level	Definition
Recognition (RN)	Requires students to recognize or have an awareness of letters, words, symbols, or objects.
Recall (R)	Requires students to recall a fact, information, or procedure.
Basic Application (BA)	Requires students to use a skill or concept (e.g., information, conceptual knowledge, procedures).
Strategic Thinking (S)	Requires students to reason or develop a plan or sequence of steps.
Extended Thinking (E)	Requires students to conduct an investigation or process multiple condition/elements of a problem or task.

Determine the DoK for each AGLE under each LoC.

Appropriateness of Complexity

Appropriateness of complexity is the degree to which the content and skills in an LoC descriptor are appropriately complex relative to the preceding and subsequent LoC descriptors. Compare each LoC descriptor to the previous and subsequent descriptors. Rate each descriptor as **Higher (H)**, **Lower (L)**, or the **Same (S)** complexity as the previous and subsequent descriptor.

Directions: To determine the relative complexity, consider the following aspects of the LoC AGLEs.

- the specific skill(s)
- the nature of the application of the skill(s)
- the number of elements or parts included in the descriptor

Maine PAAP Alignment Study
DIRECTIONS FOR CODING AGLES (Science)

Strength of Alignment

LoC to Next LoC

Table 1: Strength of Alignment between Adjacent LoCs

Code	Description
S (Strong)	The Level of Complexity descriptor reflects a central idea and/or fundamental or foundational skill or concept of the subsequent Level of Complexity descriptor.
P (Partial)	The Level of Complexity descriptor reflects a related, but not central idea and/or a related, but not fundamental or foundational skill or concept of the subsequent Level of Complexity descriptor.
N (No Relationship)	The Level of Complexity descriptor does not reflect an idea or skill that is central, fundamental, or foundational to the subsequent Level of Complexity descriptor.

Link to NECAP GLE

Table 2: Strength of Alignment between LoC Descriptor and Performance Indicators

Code	Description
S (Strong)	The AGLE/Level of Complexity descriptor reflects a central idea and/or fundamental or foundational skill or concept of the corresponding Performance Indicators.
P (Partial)	The AGLE/Level of Complexity descriptor reflects a related, but not central idea and/or a related, but not fundamental or foundational skill or concept of the corresponding Performance Indicators..
N (No Relationship)	The AGLE/Level of Complexity descriptor does not reflect an idea or skill that is central, fundamental, or foundational to the corresponding Performance Indicators.

Directions:

1. For each AGLE under the LoC, examine the corresponding Performance Indicators for the first grade span (PreK-5). Rate the link between the AGLE and the Performance Indicators.
2. Repeat step 1 for each grade span (PreK-5, 6-8, and high school). Note that some LOCs are only rated against the Indicators at upper grades.
3. If the LoC has more than one AGLE, repeat step 1 for the entire LoC (i.e., the overall link between the entire LoC and the Performance Indicators). In most cases, the overall rating will be the same as the majority of ratings for the AGLEs. For example, if an LoC includes four AGLEs and three are rated “Strong” and one is rated “Partial,” the overall rating will most likely be “Strong.”
4. Provide an explanation for all “P” or “N” ratings.

Depth of Knowledge (DoK)

Table 3: Depth of Knowledge Definitions (Developed by WestEd)

DoK Level	Definition
Recognition (RN)	Requires students to recognize or have an awareness of letters, words, symbols, or objects.
Recall (R)	Requires students to recall a fact, information, or procedure.
Basic Application (BA)	Requires students to use a skill or concept (e.g., information, conceptual knowledge, procedures).
Strategic Thinking (S)	Requires students to reason or develop a plan or sequence of steps.
Extended Thinking (E)	Requires students to conduct an investigation or process multiple condition/elements of a problem or task.

Determine the DoK for each AGLE under each LoC.

Appropriateness of Complexity

Appropriateness of complexity is the degree to which the content and skills in an LoC descriptor are appropriately complex relative to the preceding and subsequent LoC descriptors. Compare each LoC descriptor to the previous and subsequent descriptors. Rate each descriptor as **Higher** (H), **Lower** (L), or the **Same** (S) complexity as the previous and subsequent descriptor.

Directions: To determine the relative complexity, consider the following aspects of the LoC AGLEs.

- the specific skill(s)
- the nature of the application of the skill(s)
- the number of elements or parts included in the descriptor

APPENDIX D

Participant Ratings for Mathematics

NECAP GLE M (N&O) - 1 Numbers and Operations - Whole Numbers

Mathematics AGLE/Indicator 1

Student demonstrates conceptual understanding of rational numbers by

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	RN		L	N&O 1 is not assessed at grade 10; Partial, but deemed essential to attaining the NECAP GLEs
	indicating or labeling a collection of up to 3 items								
2		S	S	P	P	RN	H	L	
	indicating or labeling a collection of up to 10 items								same comment
3	doing one or more of the following	S	S	P	P	R	H	L	
	reading, writing, and counting numbers up to 99 AND/OR		S	P	P	R			same comment
	recognizing the place value (tens and ones) of numbers		S	P	P	R			same comment
4	doing one or more of the following	S	S	P	P	R	H	L	
	reading, writing, and counting numbers up to 199		S	P	P	R			same comment
	recognizing the place value (ones, tens, and/or hundreds) of numbers) AND/OR		S	p	P	R			same comment
	skip counting by 2s, 5s, and 10s (may use a hundreds chart)		S	S	P	BA			same comment

NECAP GLE M (N&O) - 1 Numbers and Operations - Whole Numbers

Mathematics AGLE/Indicator 1

Student demonstrates conceptual understanding of rational numbers by

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
5	doing one or more of the following	S	NA	P	P	R	H	L	
	counting forward and backward off a nonzero number from 1-1999 AND/OR			P	P	R			same comment
	recognizing the place value (ones, tens, and/or hundreds) of numbers AND			P	P	R			same comment
	skip counting by 2s, 5s, and 10s			S	P	BA			same comment
6	doing one or more of the following	S	NA	S	P	R	H	L	
	reading and writing numbers up to 199			P	P	R			same comment
	using models, explanations, and/or other representations to show equivalency, AND/OR			S	P	BA			same comment
	composing and decomposing numbers up to 999 (e.g., $786=700+80+6$ or $786=500+200+86$)			S	P	BA			same comment

NECAP GLE M (N&O) - 1 Numbers and Operations - Whole Numbers

Mathematics AGLE/Indicator 1

Student demonstrates conceptual understanding of rational numbers by

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
7	doing two or more of the following	S	NA	NA	P	BA	H	L	
	reading and writing numbers up to 999,999				P	R			same comment
	using models, explanations, and/or other representations to show equivalency, AND/OR				P	BA			same comment
	composing and decomposing numbers up to 9,999 (e.g., $5367 = 5000+300+60+7$ or $5367 = 5000+200+167$)				P	BA			same comment
8			NA	NA	P	BA	H		
	reading and writing numbers up to 9,999,999				P	R			same comment
	using models, explanations, and/or other representations to show equivalency, AND				P	BA			same comment
	composing and decomposing numbers up to 9,999 (e.g., $5367 = 5000+300+60+7$ or $5367 = 5000+200+167$)				P	BA			same comment

NECAP GLE M(N&O) — 1 Numbers and Operations – Fractions

Mathematics AGLE/Indicator — A2

Student demonstrates conceptual understanding of rational numbers by:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	R		L	
	indicating that one half is less than one whole.								N&O 1 is not assessed at the high school level
2		S	S	P	P	R	H	L	
	indicating that two halves make a whole.								N&O 1 is not assessed at the high school level
3		S	S	S	P	R	H	L	
	indicating that two halves, three thirds, and/or four fourths make a whole.								N&O 1 is not assessed at the high school level
4		S	S	P	P	R	H	S	
	indicating 1/2, 1/3, and/or 1/4								N&O 1 is not assessed at the high school level
5		S	NA	P	P	R	S	L	
	indicating and/or illustrating 1/2, 1/3, and/or 1/4								N&O 1 is not assessed at the high school level
6		S	NA	S	S	BA	H	L	
	indicating, comparing, and/or ordering rational numbers (limited to fractions with denominators of 2, 3, 4, and/or 5).								aligns with N&O 2 (magnitude of number--ordering fractions) at MS and HS
7		S	NA	NA	S	BA	H	L	
	indicating, comparing, and/or ordering rational numbers (limited to fractions with denominators of 2, 3, 4, 5, 6, 8, and/or 10).								aligns with N&O 2 (magnitude of number--ordering fractions) at MS and HS

NECAP GLE M(N&O) — 1 Numbers and Operations – Fractions

Mathematics AGLE/Indicator — A2

Student demonstrates conceptual understanding of rational numbers by:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
8			NA	NA	S	BA	H		
	indicating, comparing, and/or ordering rational numbers (limited to proper fractions, improper fractions, and mixed numbers with denominators of 2, 3, 4, 5, 6, 8, 10, 12, 100, and/or 1000.)								aligns with N&O 2 (magnitude of number--ordering fractions) at MS and HS

NECAP GLEs M(N&O) - 1 & 5 Mathematics AGLE/Indicator - A3 Numbers and Operations – Decimals (Including Money) and Percents

Student demonstrates conceptual understanding of rational numbers and monetary value by:

LOC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	RN		L	
	matching coins (penny, nickel, dime, or quarter) to coins of the same value.								This indicator is dropped after grade 4 in NECAP
2		S	S	P	P	RN	H	L	
	identifying coins (penny, nickel, dime, or quarter).								dropped after grade 4 in NECAP
3		S	S	P	P	R	H	L	
	identifying coins (penny, nickel, dime, and quarter) and giving the value of coins (a penny and a quarter).								dropped after grade 4 in NECAP
4		S	S	P	P	R	H	L	
	identifying coins (penny, nickel, dime, and quarter) and giving the value of these coins AND								dropped after grade 4 in NECAP
	distinguishing between decimal notations (e.g., 0.35) and other numbers (e.g., 35).								dropped after grade 4 in NECAP
5	doing one or more of the following:	S	NA	P	P	BA	H	L	
	identifying \$1.00, \$5.00, and \$10.00 bills,			P	P	RN			dropped after grade 4 in NECAP
	finding possible combinations of coins that equal \$0.25 or \$0.50, and/or			P	P	BA			dropped after grade 4 in NECAP
	identifying decimals, within the context of money, as part of 100 (e.g., shows 10 pennies out of 100 is the same as \$0.10).			P	P	BA			dropped after grade 4 in NECAP

NECAP GLEs M(N&O) - 1 & 5 Mathematics AGLE/Indicator - A3 Numbers and Operations – Decimals (Including Money) and Percents

Student demonstrates conceptual understanding of rational numbers and monetary value by:

LOC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
6	doing two or more of the following:	S	NA	P	P	BA	H	L	
	adding like and unlike coin collections using dollar-and-cents notation,			P	P	BA			dropped after grade 4 in NECAP
	identifying the value of bills and how they relate to each other (e.g., \$1.00 as 100 pennies or a \$5.00 bill as 5 \$1.00 bills),			P	P	BA			dropped after grade 4 in NECAP
	making change for a dollar, and/or			P	P	BA			dropped after grade 4 in NECAP
	identifying decimals, within the context of money, and/or percents as part of 100 (e.g., shows 10 pennies out of 100 is the same as \$0.10 or 10%).			P	P	BA			dropped after grade 4 in NECAP
7		S	NA	NA	P	BA	H	L	
	demonstrating an understanding of decimals (to the hundredths place) within the context of money AND				P	BA			dropped after grade 4 in NECAP
	demonstrating an understanding of benchmark percents (10%, 25%, 50%, 75%, and 100%).				S	BA			
8			NA	NA	P	BA	H		
	demonstrating an understanding of decimals (to the thousandths place) AND				P	BA			shows up in N&O2 and N&O4
	describing the relationship between percent and the original number (e.g., 33% percent off means a discount or 15% increase means the number is greater than before).				S	BA			shows up in N&O2 and N&O4

NECAP GLE M(N&O) — 2 Mathematics AGLE/Indicator — A4 Numbers and Operations – Magnitude of Numbers

Student demonstrates understanding of the relative magnitude of numbers by:

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	R		L	
	determining which group has more or less when given two groups of objects (real or pictured).								
2		S	S	P	P	R	H	L	
	determining which group has the most or the least when given three groups of objects (real or pictured).								
3		S	S	S	S	BA	H	L	
	ordering and comparing whole numbers from 0–49.								
4		S	S	S	S	BA	H	L	
	ordering and comparing whole numbers from 0–99.								
5		S	NA	S	S	BA	H	L	
	ordering and comparing whole numbers from 0–199.								
6		S	NA	S	S	BA	H	L	
	ordering and comparing whole numbers from 0–999.								
7		S	NA	NA	S	BA	H	L	
	ordering and comparing whole numbers from 0–999,999 and/or				S	BA			
	ordering and comparing integers (must contain both positive and negative numbers).				S	BA			

NECAP GLE M(N&O) — 2 Mathematics AGLE/Indicator — A4 Numbers and Operations – Magnitude of Numbers

Student demonstrates understanding of the relative magnitude of numbers by:

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
8		S	NA	NA	S	BA	H		
	ordering and comparing whole numbers from 0–9,999,999 AND				S	BA			
	ordering and comparing integers (must contain both positive and negative numbers).				S	BA			

NECAP GLEs M(N&O) — 3 & 4 Mathematics AGLE/Indicator — A5

Numbers and Operations – Understanding of Mathematical Operations, Calculations, and Solving Problems

Student demonstrates conceptual understanding of mathematical operations and problem solving by:

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		P	N	N	N	RN		L	
	matching a set of 2–4 objects with an equivalent set of 2–4 objects.								Unrelated to understanding operations and solving problems
2		S	S	P	P	R	H	L	
	adding and subtracting whole numbers (sums up to 6 and the corresponding subtraction counterparts) using manipulatives								
3		S	S	P	P	R	H	L	
	adding and subtracting whole numbers (sums up to 10 and the corresponding subtraction counterparts) and showing or explaining strategies for such problems.								
4		S	S	S	S	R	H	L	
	adding and subtracting whole numbers (sums up to 20 and the corresponding subtraction counterparts) and showing or explaining strategies for such problems								

NECAP GLEs M(N&O) — 3 & 4 Mathematics AGLE/Indicator — A5

Numbers and Operations – Understanding of Mathematical Operations, Calculations, and Solving Problems

Student demonstrates conceptual understanding of mathematical operations and problem solving by:

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
5	doing one or more of the following	S	NA	P	P	BA	H	L	
	adding and subtracting whole numbers (sums up to 99 and the corresponding subtraction counterparts) with and without contexts and/or			P	P				
	describing or illustrating the inverse relationship between addition and subtraction and/or the relationship between repeated addition and multiplication.			S	S				
6	doing one or more of the following	S	NA	S	P	BA	H	S	Depending on which tasks are selected, LoC 6 and LoC 7 may be identical. Both LoCs require "doing one or more of the following" and the panelists interpreted the first bullet under LoC 6 to be the same as the first bullet under LoC 7.
	adding and subtracting whole numbers (sums up to 199 and the corresponding subtraction counterparts) with and without contexts,			P	P	BA			
	multiplying (limited to one-digit numbers) and dividing (limited to one-digit divisors and two-digit dividends) whole numbers, and/or			S	P	BA			
	describing or illustrating the inverse relationship between multiplication and division (without remainders) and/or the relationship between repeated subtraction and division.			S	P	S			

NECAP GLEs M(N&O) — 3 & 4 Mathematics AGLE/Indicator — A5

Numbers and Operations – Understanding of Mathematical Operations, Calculations, and Solving Problems

Student demonstrates conceptual understanding of mathematical operations and problem solving by:

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
7	doing one or more of the following	S	NA	NA	S	BA	S	L	
	multiplying (up to two digits by two digits) and dividing (limited to one-digit divisors) whole numbers and/or				S	BA			This statement is subject to misinterpretation. Is it "one or two digits multiplied by one or two digits" or one or two digits multiplied by one digit only"
	solving problems involving fractions, decimals, percents, and/or ratios.				S	BA			
8	doing two or more of the following		NA	NA	S	BA	H		
	using each of the four operations on whole numbers (division up to two-digit divisors),				S	BA			
	solving problems involving fractions, decimals, percents, and/or ratios, and/or				S	BA			
	solving problems involving proportional reasoning.				S	BA			

NECAP GLEs M(G&M) — 1, 2, & 3

Mathematics AGLE/Indicator — B1

Geometry and Measurement – Properties of 2- and 3-Dimensional Shapes and Apply Theorems

Student uses properties or attributes of angles, sides, and/or figures to:

LOC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	RN		L	
	select, from two choices, the shape that matches a given model or picture.								Language not specific--any shape?
2		S	S	P	P	RN	H	L	
	match two shapes when given a variety of models or pictures.								
3		S	S	S	P	RN	H	L	
	identify circles, triangles, and squares.								
4		S	S	S	P	RN	H	H	
	identify and classify two-dimensional shapes as circles, triangles, squares, or rectangles								LoC 4 requires students to identify AND classify. LoC 5 requires identification only. The addition of parallelograms is insufficient to be considered more complex. (Note that identifying parallelograms is not necessarily a requirement because of the "and/or.")
5		S	na	S	P	RN	L	L	
	identify circles, triangles, squares, rectangles, and/or parallelograms.								

NECAP GLEs M(G&M) — 1, 2, & 3

Mathematics AGLE/Indicator — B1

Geometry and Measurement – Properties of 2- and 3-Dimensional Shapes and Apply Theorems

Student uses properties or attributes of angles, sides, and/or figures to:

LOC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
6	doing two or more of the following	S	na	S	S	R	H	L	
	identify the number of angles in a polygon,			S	S	R			
	identify angles as more than, less than, or equal to 90 degrees, and/or			S	S	R			
	identify circles, triangles, squares, rectangles, parallelograms, and/or trapezoids.			S	P	RN			
7		S	na	na	P	R	H	L	
	identify acute, obtuse, and right angles AND				P	R			
	identify squares, triangles, circles, squares, rectangles, parallelograms, trapezoids, and/or rhombi				P	RN			
8	doing two or more of the following		na	na	S	BA	H		
	differentiate right angles from acute and obtuse angles,				S	BA			
	identify, describe, classify, or distinguish among two-dimensional shapes using angles (right, acute, or obtuse) or sides (number of congruent sides, parallelism, or perpendicularity), and/or				S	BA			
	identify, compare, and/or describe three-dimensional shapes using the shapes of bases, number of lateral faces, or number of bases.				S	BA			

NECAP GLEs M(G&M) — 4 & 5

Mathematics AGLE/Indicator — B2

Geometry and Measurement – Congruency and Similarities

Student demonstrates conceptual understanding of congruency and similarity by:

LOC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	RN		L	
	matching figures with the same shape and the same size (e.g., matching two rectangles of the same size).								
2		S	S	P	P	RN	H	L	
	identifying congruent figures when given three choices.								
3		S	S	S	P	R	H	L	
	identifying congruent figures from slides (translations).								
4		S	S	S	P	R	H	L	
	identifying congruent figures AND		S	S	P	R			
	identifying similar figures		S	S	P	R			
5		S	na	S	P	BA	H	L	
	identifying congruent figures from flips and slides (reflections or translations) AND			S	P	BA			
	identifying similar figures.			S	P	BA			
6		S	na	S	P	BA	H	L	
	identifying congruent figures from flips and slides (reflections or translations) AND			S	P	BA			
	identifying and comparing similar figures.			S	P	BA			

NECAP GLEs M(G&M) — 4 & 5

Mathematics AGLE/Indicator — B2

Geometry and Measurement – Congruency and Similarities

Student demonstrates conceptual understanding of congruency and similarity by:

LOC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
7	doing two or more of the following	S	na	na	S	BA	H	L	
	identifying congruent figures from reflections, translations, and rotations (flips, slides, and turns),				S	BA			
	identifying and comparing similar figures, and/or				S	BA			
	composing and decomposing shapes to show congruent parts within a shape (e.g., use two congruent trapezoids to make a hexagon).				S	S			
8	doing three or more of the following		na	na	S	BA	H		
	identifying congruent figures from reflections, translations, and rotations (flips, slides, and turns),				S	BA			
	composing and decomposing shapes to show congruent parts within a shape (e.g., using two congruent trapezoids to make a hexagon				P/S	S			
	applying scales on maps, and/or				S	S			
	explaining why two shapes are similar or not similar.				S	BA			

Geometry and Measurement – Perimeter, Area, Volume, and Circumference

Student demonstrates conceptual understanding of perimeter, area, volume, and circumference by:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	S	P	R		S	The first bullet under LoC 2 is the same as the bullet under LoC 1. Since a student must only "do one of the following" for LoC 2, expectations for LoC 1 and 2 will sometimes be identical.
	comparing two items based on length.								
2	doing one or more of the following	S	S	S	P	R	S	L	
	comparing two items based on length and/or		S	S	P	R			
	comparing two containers based on capacity.		S	S	P	R			
3	doing one or more of the following	S	S	S	P	R	H	L	
	comparing two items based on length and/or		S	S	P	R			
	comparing two items based on capacity, AND		S	S	P	R			
	comparing two 2-dimensional figures based on area (e.g., placing one object on top of another to determine which takes up more space).		S	S	S	R			
4		S	S	S	S	BA	H	L	
	measuring length using non-standard units (e.g., paper clips) and standard units (limited to whole inches).								
5		S	na	S	S	BA	H	L	
	measuring and recording the length of each side of a rectangle.								

Geometry and Measurement – Perimeter, Area, Volume, and Circumference

Student demonstrates conceptual understanding of perimeter, area, volume, and circumference by:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
6		S	na	S	S	BA	H	L	
	measuring and calculating the distance around a figure with a perimeter that is comprised of straight edges.								
7		S	na	na	S	BA	H	L	
	finding the area of rectangles in standard units and the area of irregular figures on grids.								
8	doing two or more of the following		na	na	S	BA	H		
	measuring the circumference (distance around) of a circle,				S	BA			
	finding the area of rectangles or right triangles and the area of irregular figures on grids, and/or				S	BA			
	finding the volume of rectangular prisms.				S	BA			

Geometry and Measurement – Measure and Converting Between Units

Student measures and uses units of measures appropriately and consistently and makes conversions within systems when solving problems, including:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	RN		S	length and temperature not viewed as less complex than weight or capacity
	comparing two items or events based on length or temperature by identifying, for example, which is longer/shorter or hotter/colder.								
2		S	S	P	P	RN	S	L	
	comparing two items based on weight or capacity by identifying, for example, which is heavier/lighter or which has more/less.								length and temperature not viewed as less complex than weight or capacity
3		S	S	S	P	R	H	L	
	estimating and measuring length, temperature, weight, time, or capacity.								
4		S	S	S	P	R	H	L	
	estimating and measuring length, temperature, weight, time, and capacity.								
5	doing one or more of the following	S	na	S	P	R	H	L	
	measuring length (whole inches, feet, and/or centimeters),			S	P	R			
	telling time (hour to 15-minute intervals), and/or			S	P	R			
	reading temperature (degrees Fahrenheit).			S	P	R			

Geometry and Measurement – Measure and Converting Between Units

Student measures and uses units of measures appropriately and consistently and makes conversions within systems when solving problems, including:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments
			2-5	6-7	HS		Prev	Next	
6	doing three or more of the following	S	na	S	P	R	H	L	
	measuring length (half and/or whole inches, feet, and/or centimeters),			S	P	R			
	telling time (hour to 10-minute intervals),			S	P	R			
	reading temperature (degrees Fahrenheit), and/or			S	P	R			
	computing equivalencies (12 inches = 1 foot and/or 24 hours = 1 day).			S	P	BA			
7	doing four or more of the following	S	na	na	P	R	H	L	
	measuring length (quarter, half and/or whole inches; feet; whole centimeters; whole yards; and/or whole meters),				P	R			
	telling time (hour to 5-minute intervals),				P	R			
	reading temperature (degrees Fahrenheit and Celsius),				P	R			
	identifying capacity (whole quarts, liters, and/or gallons),				P	R			
	identifying mass (whole grams),				P	R			
	identifying weight (whole pounds), and/or				P	R			
	computing equivalencies (12 inches = 1 foot, 24 hours = 1 day, and/or 7 days = 1 week).				P	BA			

Geometry and Measurement – Measure and Converting Between Units

Student measures and uses units of measures appropriately and consistently and makes conversions within systems when solving problems, including:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments
			2-5	6-7	HS		Prev	Next	
8	doing five or more of the following		na	na	S	R	H		
	measuring length (quarter, half and/or whole inches; feet; whole yards; whole kilometers, meters, and/or centimeters; and/or miles),				P	R			
	telling time (to the minute),				P	R			
	reading temperature (degrees Fahrenheit and Celsius),				P	R			
	identifying capacity (whole quarts liters, gallons, and/or pints),				S	R			
	identifying mass (whole grams and/or kilograms),				S	R			
	identifying weight (whole pounds), and/or				S	R			
	computing equivalencies (12 inches = 1 foot, 365 days = 1 year, 24 hours = 1 day, 7 days = 1 week, 60 minutes = 1 hour, and/or 60 seconds = 1 minute).				S	BA			

Geometry and Measurement – Coordinate Plane

Student solves problems on and off the coordinate plane by:

LOC	AGLE	LoC to Next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1	na								
2	na								
3	na								
4	na								
5	na								
6	na								
7		S	na	na	S	BA		L	
	locating and/or plotting points in the first quadrant of the coordinate plane.								
8	doing two or more of the following		na	na	S	BA	H		
	locating and/or plotting points in the coordinate plane,				S	BA			
	identifying parallel and/or perpendicular lines, and/or				S	R			
	finding the midpoint of a line segment.				S	BA			

Functions and Algebra – Patterns

Student demonstrates understanding of patterns and linear and non-linear relationships by:

LOC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	RN		L	
	copying simple repeating patterns.								
2		S	S	S	S	R	H	L	
	extending simple repeating patterns of objects to the next step.								
3		S	S	S	S	R	H	L	
	extending a variety of patterns represented in sequences to the next step.								
4		S	S	S	S	R	H	L	
	extending a variety of patterns represented in tables/charts or sequences to the next one or two steps.								
5		S	na	S	S	BA	H	L	
	extending a variety of patterns represented in tables/charts or sequences to the next one, two, or three steps or finding a missing step (e.g., 2, 4, 6, __, 10).								
6		S	na	S	S	BA	H	L	
	extending a variety of patterns represented in models, tables/charts, or sequences.								

Functions and Algebra – Patterns

Student demonstrates understanding of patterns and linear and non-linear relationships by:

LOC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
7	doing one or more of the following	S	na	na	S	BA	H	L	
	identifying and extending to specific cases a variety of linear patterns represented in models, tables/charts, sequences, or problem situations and/or				S	BA			
	writing a rule in words and symbols for finding specific cases of a linear or non-linear relationship.				S	S			
8	doing two or more of the following		na	na	S	BA	H		
	identifying and/or describing a constant rate of change between successive elements in a pattern in a variety of situations (e.g., when looking at a graph, student identifies the rate of change as being constant),				S	BA			
	identifying and extending to specific cases a variety of patterns (linear and non-linear) represented in models, tables/charts, sequences, or problem situations, and/or				S	BA			
	writing a rule in words and symbols for finding specific cases of a linear or non-linear relationship.				S	S			

Functions and Algebra – Equality and Algebraic Expressions

Student demonstrates conceptual understanding of equality and algebraic expressions by:

LOC	AGLE	LoC to Next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	RN		L	
	matching quantities that are equal (e.g., matching a set of 3 blocks to another set of 3 blocks).								
2		S	S	P	P	BA	H	L	
	using concrete materials to represent a mathematical situation								
3		S	S	S	P	BA	H	L	
	using concrete materials and numeric symbols to represent sums and differences								
4		S	S	S	S	BA	H	L	
	finding the value that will make an open sentence true (limited to addition).								
5		S	na	S	S	BA	H	L	
	finding the value that will make an open sentence true (limited to addition and subtraction).								

Functions and Algebra – Equality and Algebraic Expressions

Student demonstrates conceptual understanding of equality and algebraic expressions by:

LOC	AGLE	LoC to Next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
6		S	na	S	S	BA	H	L	
	finding the value that will make an open sentence true (limited to addition, subtraction, and multiplication).								
7	doing one or more of the following	S	na	na	S	BA	H	L	
	representing unknown quantities with letters to write linear algebraic expressions involving addition, subtraction, or multiplication or evaluating linear algebraic expressions using whole numbers and/or				S	BA			
	simplifying numerical expressions				S	BA			
8			na	na	S	BA	H		
	representing unknown quantities with letters to write linear algebraic expressions involving any two of the four operations or evaluating linear algebraic expressions using whole numbers AND				S	BA			
	showing equivalence between two expressions using models or different representations of expressions by solving one-step linear equations.				S	BA			

Data, Statistics, and Probability – Interpreting Data

Student demonstrates ability to work with data, interprets a given representation, and identifies or describes representations or elements of representations that best display a given set of data or situation by:

LOC	AGLE	LoC to Next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	R		L	
	collecting data.								
2		S	S	P	P	R	H	L	
	collecting and organizing data								
3		S	S	S	S	BA	H	L	
	collecting, organizing, and interpreting data.								
4		S	S	S	S	BA	H	L	
	interpreting data in tables/charts.								
5		S	na	S	S	BA	H	L	
	constructing and interpreting data in tables/charts.								
6		S	na	S	S	BA	H	L	
	interpreting a given representation (table/chart, bar graph, or pictograph) and/or			S	S	BA			
	constructing a representation (table/chart, bar graph, or pictograph) of given data			S	S	BA			

Data, Statistics, and Probability – Interpreting Data

Student demonstrates ability to work with data, interprets a given representation, and identifies or describes representations or elements of representations that best display a given set of data or situation by:

LOC	AGLE	LoC to Next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
7		S	na	na	S	S	H	L	
	answering questions related to data presented in a table/chart, frequency chart, bar graph, circle graph, or line graph AND				S	S			
	analyzing data presented in a table/chart, frequency chart, bar graph, circle graph, or line graph to formulate or justify conclusions, make predictions, or solve problems				S	S			
8			na	na	S	S	H		
	answering questions related to data presented in a table/chart, frequency chart, bar graph, circle graph, or line graph,				S	S			
	analyzing data presented in a table/chart, frequency chart, bar graph, circle graph, or line graph to formulate or justify conclusions, make predictions, or solve problems AND				S	S			
	describing representations or elements of representations that best display a given set of data or situation (e.g., when to use a bar graph vs. a line graph or the best intervals for the axes).				S	S			

Data, Statistics, and Probability – Analyzing Data

Student analyzes patterns, trends, or distributions in data in a variety of contexts, including:

LOC	AGLE	LoC to Next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	R		L	
	using “more” or “less” when given a set of 3–6 objects (e.g., 3 marbles is more than 1 marble).								
2		S	S	P	P	R	H	L	
	using “more” or “less” when given a set of 5–10 objects (e.g., 6 marbles is less than 8 marbles).								
3		S	S	P	P	R	H	S	
	using “more” or “less” to analyze data.								
4		S	S	P	P	BA	S	L	
	using “more” or “less” to analyze data or solve problems								
5		S	na	S	S	BA	H	L	
	using “more,” “less,” or “equal” to analyze data or solve problems.								
6		S	na	S	S	BA	H	L	
	using “most frequent” (mode), “least frequent,” “largest/greatest,” or “smallest/fewest” to analyze data or solve problems.								

Data, Statistics, and Probability – Analyzing Data

Student analyzes patterns, trends, or distributions in data in a variety of contexts, including:

LOC	AGLE	LoC to Next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
7		S	na	na	S	BA	H	L	
	using measures of central tendency (median or mode) or range to analyze situations or solve problems.								
8			na	na	S	BA	H		
	using measures of central tendency (mean, median, or mode) or range to analyze situations or solve problems								

Data, Statistics, and Probability – Counting Techniques

Student uses counting techniques to solve problems by:

LOC	AGLE	LoC to Next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1-4	na								
5		S	na	S	S	BA		L	
	determining combinations (limited to 2 categories; e.g., finding all of the possible outfits when you have two shirts and three pair of pants).								
6		S	na	S	S	BA	H	L	
	determining combinations (limited to 3 categories; e.g., finding all of the possible dinners when you have three appetizers, two drinks, and three main course options and you must select one option from each category).								
7		S	na	na	S	S	H	L	
	determining permutations (e.g., finding all of the possible ways that four students can stand in a single-file line).								
8					S	S	H		
	determining permutations (e.g., finding all of the possible combinations of President and Vice President for a class election). AND				S	S			
	using a visual model to show combinations (e.g., tree diagram, organized list, table/chart, or other diagram).				S	S			

Data, Statistics, and Probability – Probability

For a probability event in which the sample space may or may not contain equally likely outcomes, student determines the probability of an event by:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	S	S	R		L	
	identifying appropriate outcomes after observing a simple event/trial.								
2		S	S	S	S	R	H	L	
	identifying whether an outcome is “possible” or “impossible” after observing a simple event/trial with two possible outcomes.								
3		S	S	S	S	R	H	L	
	identifying whether an outcome is “more likely” or “less likely” after observing a simple event/trial with two possible outcomes.								
4		S	S	S	S	R	H	L	
	recording the outcomes of simple events/trials and identifying the “more likely” and “less likely” outcomes.								

Data, Statistics, and Probability – Probability

For a probability event in which the sample space may or may not contain equally likely outcomes, student determines the probability of an event by:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
5		S	na	S	S	BA	H	S	
	determining the likelihood of the occurrence of an event (with between 5 and 10 results) using “more likely,” “less likely,” and “equally likely.”								difference between LoC 5 and 6 is insufficient Note from facilitator: The distinction does make LOC more complex than LoC 5. Recommend clearer language to explain the difference between the 2 LoCs.
6		S	na	S	S	BA	S	L	
	determining the likelihood of the occurrence of an event using “certain,” “likely,” “unlikely,” or “impossible.”								
7		S	na	na	S	BA	H	L	
	determining the experimental or theoretical probability of an event and expressing the result as part-to-whole (e.g., two out of five).								
8			na	na	S	BA	H		
	determining the experimental and theoretical probability of an event and expressing the result.								

Appendix E

Participant Ratings for Reading

NECAP GLEs R1, R2, & R3

Reading AGLE/Indicator — A1

Word Identification and Vocabulary Knowledge

Student applies word identification and decoding strategies, identifies the meaning of unfamiliar vocabulary, shows breadth of vocabulary knowledge, and/or demonstrates understanding of word meaning or relationships by:

LoC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	RN		L	
	identifying signs, symbols, gestures, objects, and/or pictures to show understanding of words.								not assessed at grades 4, 5, 6, 7, HS
2		S	S	P	P	R	H	L	
	showing phonemic awareness and/or sound/symbol relationships.								not assessed at grade 4-5, 6-7, or HS
3	Doing one or more of the following	S	S	P	P	BA	H	S	complexity is the same unless difficulty of text increases with the LoC
	using phonemic awareness and/or		S	p	P	BA			not assessed at 5-7, HS
	using word parts or phonics to decode words, AND		s	p	P	BA			not assessed at 5-7, HS
	using context clues to determine the meaning of words.		S	S	S	BA			
4	Doing one or more of the following	S	S	P	P	BA	S	L	
	using phonemic awareness and/or		S	P	P	BA			not assessed at 5-7, HS
	using word parts or phonics to decode words, AND		S	P	P	BA			not assessed at 5-7, HS
	using context clues to determine the meaning of words.		S	S	S	BA			

NECAP GLEs R1, R2, & R3

Reading AGLE/Indicator — A1

Word Identification and Vocabulary Knowledge

Student applies word identification and decoding strategies, identifies the meaning of unfamiliar vocabulary, shows breadth of vocabulary knowledge, and/or demonstrates understanding of word meaning or relationships by:

LoC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
5	Doing one or more of the following	S	na	S	S	BA	H	L	
	using phonemic awareness and/or			P	P	BA			not assessed as grades 6-7, HS
	using word parts or phonics to decode words, AND			P	P	BA			not assessed as grades 6-7, HS
	Doing one or more of the following:								
	using context clues to determine the meaning of words and/or			S	S	BA			
	identifying unfamiliar vocabulary by using suffixes or base words, AND			S	S	BA			
	Doing one or more of the following:								
	identifying synonyms,			S	S	BA			
	identifying antonyms, and/or			S	S	BA			
	categorizing words.			S	S	BA			

NECAP GLEs R1, R2, & R3

Reading AGLE/Indicator — A1

Word Identification and Vocabulary Knowledge

Student applies word identification and decoding strategies, identifies the meaning of unfamiliar vocabulary, shows breadth of vocabulary knowledge, and/or demonstrates understanding of word meaning or relationships by:

LoC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
6	doing one or more of the following:	S	na	S	S	BA	H	L	
	applying word identification/ decoding strategies and/or			P	P	BA			
	using knowledge of sounds, syllable types, or word patterns such as prefixes or suffixes to decode words, AND			S	S	BA			
	doing one or more of the following:								
	identifying unfamiliar vocabulary by using affixes or base words,			S	S	BA			
	using context clues to determine meaning, and/or			S	S	BA			
	using a dictionary or glossary to determine the meaning of words AND			S	S	BA			
	doing one or more of the following:								
	identifying synonyms,			S	S	BA			
	identifying antonyms,			S	S	BA			
	categorizing words,			S	S	BA			
	selecting words to use in content-specific context, and/or			S	S	BA			
	determining the meaning of a multiple-meaning word that is appropriate for the text.			S	S	BA			

NECAP GLEs R1, R2, & R3

Reading AGLE/Indicator — A1

Word Identification and Vocabulary Knowledge

Student applies word identification and decoding strategies, identifies the meaning of unfamiliar vocabulary, shows breadth of vocabulary knowledge, and/or demonstrates understanding of word meaning or relationships by:

LoC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
7	doing two or more of the following:	S	na	na	S	BA	H	L	
	identifying the meaning of unfamiliar vocabulary by using knowledge of word structure,				S	BA			
	using context clues to determine meaning, and/or				S	BA			
	using a dictionary or glossary to determine the meaning of words, AND				S	BA			
	doing two or more of the following:								
	identifying synonyms,				S	BA			
	identifying antonyms,				S	BA			
	selecting words to use in content-specific context,				S	BA			
	determining the meaning of a multiple-meaning word that is appropriate for the text, and/or				S	BA			
	distinguishing shades of meaning.				S	BA			

NECAP GLEs R1, R2, & R3

Reading AGLE/Indicator — A1

Word Identification and Vocabulary Knowledge

Student applies word identification and decoding strategies, identifies the meaning of unfamiliar vocabulary, shows breadth of vocabulary knowledge, and/or demonstrates understanding of word meaning or relationships by:

LoC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
8	doing two or more of the following:		na	na	S	BA	H		
	identifying the meaning of unfamiliar vocabulary by using knowledge of word structure,				S	BA			
	using context clues to determine meaning, and/or				S	BA			
	using a dictionary, glossary, or thesaurus to determine definitions or usage of words, AND				S	BA			
	doing two or more of the following:								
	identifying synonyms,				S	BA			
	identifying antonyms,				S	BA			
	distinguishing shades of meaning, and/or				S	BA			
	selecting or explaining the use of words in context.				S	BA			

NECAP GLEs R4, R5, & R6

Reading AGLE/Indicator — A2

Literary Text

Student demonstrates initial understanding, analysis, and interpretation of elements of literary text, citing evidence where appropriate, by:

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	S	S	RN		L	
	identifying pictures of named events from among a group of two or more pictures depicting varied events.								
2		S	S	S	S	R	H	L	
	putting key events from a simple story listened to or viewed in correct sequence								
3	doing one or more of the following:	S	S	S	S	R	H	L	
	identifying settings or characters and/or		S	S	S	R			
	retelling events in a story using words and pictures, AND		S	S	S	R			
	answering questions about information from the text.		S	S	S	BA			
4	doing one or more of the following:	S	S	S	S	BA	H	L	
	identifying settings or characters and/or		S	S	S	R			
	retelling a story using relevant details and putting events in proper sequence, AND		S	S	S	BA			
	answering questions about information from the text.		S	S	S	BA			

NECAP GLEs R4, R5, & R6

Reading AGLE/Indicator — A2

Literary Text

Student demonstrates initial understanding, analysis, and interpretation of elements of literary text, citing evidence where appropriate, by:

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
5	doing one or more of the following:	S	na	S	S	BA	H	L	
	identifying or describing characters or setting, and/or			S	S				spilt between R and BA
	identifying or describing problem, solution, or events, AND			S	S	BA			
	doing one or more of the following:			S	S				
	making logical predictions,			S	S	BA			
	identifying characteristics or personality traits of main characters, and/or			S	S	BA			
	making basic inferences.			S	S	BA			
	<i>Text must be read by the student</i>			S	S	BA			
6	doing two or more of the following:	S	na	S	S	BA	H	L	
	identifying or describing characters or setting,			S	S	R/BA			Split between R and BA
	identifying or describing problem, solution, events, or plot, and/or			S	S	BA			
	paraphrasing or summarizing, AND			S	S	BA			
	doing one or more of the following:								
	making logical predictions,			S	S	BA			
	describing main characters' characteristics or personality traits,			S	S	BA			
	providing examples from text that reveal characters' personality traits,			S	S	BA			
	making basic inferences, and/or			S	S	BA			

NECAP GLEs R4, R5, & R6

Reading AGLE/Indicator — A2

Literary Text

Student demonstrates initial understanding, analysis, and interpretation of elements of literary text, citing evidence where appropriate, by:

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
	identifying author’s basic message.			S	S	S			
	<i>Text must be read by the student.</i>								
7	doing two or more of the following:	S	na	na	S	BA	H	L	
	identifying or describing characters, setting, problem/solution, events, or plot,				S	R/BA			split between R and BA
	identifying changes in characters over time, and/or				S	BA			
	paraphrasing or summarizing, AND				S	BA			
	doing two or more of the following:								
	making logical predictions,				S	BA			
	describing characters’ characteristics or personality traits,				S	BA			
	providing examples from text that reveal characters’ personality traits,				S	BA			
	making inferences,				S	BA			
	identifying who is telling the story, and/or				S	BA/S			SPLIT BETWEEN BA AND S
	identifying author’s message or theme.				S	S			
	<i>Text must be read by the student</i>								

NECAP GLEs R4, R5, & R6

Reading AGLE/Indicator — A2

Literary Text

Student demonstrates initial understanding, analysis, and interpretation of elements of literary text, citing evidence where appropriate, by:

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
g	doing two or more of the following:		na	na	S	BA	H		
	identifying or describing characters, setting, problem/solution, events or plot,				S	BA			
	identifying changes in characters over time, and/or				S	BA			
	paraphrasing/summarizing, AND				S	BA			
	doing two or more of the following:								
	making logical predictions,				S	BA			
	describing characters' characteristics, personality traits, or interactions,				S	BA			
	providing examples from text that reveal characters' personality traits,				S	BA			
	describing changes in characters over time,				S	BA			
	making inferences,				S	BA			
	identifying the narrator,				S			SPLIT BETWEEN BA AND S	
	identifying or describing the author's message or theme and/or,				S	S			
	demonstrating knowledge of literary elements and devices (imagery, exaggeration).				S	S			
	<i>Text must be read by the student.</i>								

**NECAP GLEs R7 & R8
Informational Text**

Reading AGLE/Indicator — A3

Student demonstrates initial understanding, analysis, and interpretation of elements of informational text, citing evidence as appropriate, by:

LoC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1	doing one or more of the following:	S	S	P	P	RN		L	
	distinguishing front of a book from the back,		S	P	P	RN			Partial, but understood that this skill is required at all grades
	distinguishing top of a book from the bottom, and/or		S	P	P	RN			Partial, but understood that this skill is required at all grades
	using signs, symbols, pictures, words, or actions to communicate needs or wants.		S	P	P	BA			Partial, but understood that this skill is required at all grades
2	doing one or more of the following:	S	S	S	S	R	H	L	
	differentiating between print and pictures,		S	P	P	RN			
	indicating the title on the cover or title page,		S	S	S	R			
	indicating where one begins to read on a page,		S	P	P	R			Partial, but understood that this skill is required at all grades
	indicating where to find the author's name,		S	S	S	R			
	using explicitly stated information from the text to answer questions, and/or		S	S	S	R			
	recognizing a central idea from text when presented with three pictures.		S	S	S	R/BA			SPLIT BTW/ R AND BA
3	doing one or more of the following:	S	S	S	S	R	H	L	
	obtaining information from a title page (title, author),		S	S	S	R			
	distinguishing between the beginning and end of a book,		S	P	P	R			RECALL IF BEGINNING AND END OF PASSAGE
	differentiating between print and pictures,		S	P	P	RN			

NECAP GLEs R7 & R8
Informational Text

Reading AGLE/Indicator — A3

Student demonstrates initial understanding, analysis, and interpretation of elements of informational text, citing evidence as appropriate, by:

LoC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
	using explicitly stated information from the text to answer questions, and/or		S	S	S	R			
	recognizing main/central idea when presented with pictures and sentences.		S	S	S	R/BA			SPLIT BTW R AND BA
4	doing one or more of the following:	S	S	S	S	BA	H	L	
	obtaining information from a simple table of contents,		S	S	S	BA			
	obtaining information from a simple glossary,		S	S	S	BA			
	obtaining information from illustrations, and/or		S	S	S	BA			
	using explicitly stated information from the text to answer questions, AND		S	S	S	R			
	doing one or more of the following:								
	making basic inferences and/or		S	S	S	BA			
	drawing basic conclusions when given possible choices		S	S	S	BA			
5	doing two or more of the following:	S	na	S	S	BA	H	L	
	obtaining information from simple table of contents or glossary,			S	S	BA			
	obtaining information from simple charts, graphs, diagrams, or illustrations, and/or			S	S	BA			
	using explicitly stated information to answer questions, AND			S	S	R			
	doing one or more of the following:								

**NECAP GLEs R7 & R8
Informational Text**

Reading AGLE/Indicator — A3

Student demonstrates initial understanding, analysis, and interpretation of elements of informational text, citing evidence as appropriate, by:

LoC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
	connecting information within a text,			S	S	BA			
	recognizing generalizations,			S	S	BA			
	making basic inferences or drawing basic conclusions, and/or			S	S	BA			
	inferring cause or effect when signal words are present.			S	S	BA			
6	doing two or more of the following:	S	na	S	S	BA	H	L	
	obtaining information from table of contents, glossary, transition words, bold or italicized text, or headings,			S	S	BA			
	obtaining information from graphic organizers, charts, graphs, or illustrations, and/or			S	S	BA			
	answering questions related to explicitly stated information, AND			S	S	BA			
	doing two or more of the following:								
	connecting information within a text,			S	S	BA			
	recognizing generalizations about a text,			S	S	BA			
	making inferences, including cause/effect,			S	S	S			
	drawing basic conclusions,			S	S	BA			
	forming judgments or opinions, and/or			S	S	S			
	distinguishing fact from opinion.			S	S	BA/S			SPLIT BETWEEN S AND BA

NECAP GLEs R7 & R8
Informational Text

Reading AGLE/Indicator — A3

Student demonstrates initial understanding, analysis, and interpretation of elements of informational text, citing evidence as appropriate, by:

LoC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
7	doing two or more of the following:	S	na	na	S	BA	H	L	
	obtaining information from table of contents, glossary, index, transition words or phrases, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations,				S	BA			
	answering questions related to explicitly stated information, and/or				S	BA			
	paraphrasing or summarizing, AND				S	BA			
	doing two or more of the following:								
	connecting information within or across texts,				S	BA			
	synthesizing information from one or more texts,				S	BA			
	making inferences including cause/effect,				S	S			
	determining author’s purpose,				S	BA			
	drawing basic conclusions,				S	BA			
	forming judgments/opinions, and/or				S	S			
	distinguishing fact from opinion.				S	BA/S			SPLIT BETWEEN S AND BA

**NECAP GLEs R7 & R8
Informational Text**

Reading AGLE/Indicator — A3

Student demonstrates initial understanding, analysis, and interpretation of elements of informational text, citing evidence as appropriate, by:

LoC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
8	doing two or more of the following:		na	na	S	BA	H		
	obtaining information from table of contents, glossary, index, transition words or phrases, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations,				S	BA			
	using information from the text to answer questions, and/or				S	BA			
	summarizing or comparing/contrasting, AND				S	BA			
	doing two or more of the following:								
	connecting information within or across texts,				S	BA			
	synthesizing information from one or more texts,				S	BA			
	drawing conclusions about text,				S	BA/S		SPLIT BETWEEN BA AND S	
	determining author's purpose,				S	BA			
	forming and supporting opinions/judgments and assertions, and/or				S	S			
	distinguishing fact from opinion,				S	BA/S		SPLIT BETWEEN BA AND S	
	making inferences about causes and effects.				S	S			

Appendix F

Participant Ratings for Science

Universe and Solar System

Indicator - D1

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
1	describing or otherwise demonstrating understanding of the positions or apparent motions of different objects in our solar system and what these objects look like from Earth, by:	S	S	P	N	Rn	Na	L	
	identifying day and night.								
2	describing or otherwise demonstrating understanding of the positions or apparent motions of different objects in our solar system and what these objects look like from Earth, by doing <u>both</u> of the following:	S	S	P	P	R	H	L	Perpetuates the misconception that the moon is only out at night
	identifying the Sun and Earth’s Moon AND		S	P	P	Rn			
	matching the Sun and Earth’s Moon appropriately to pictures of night and day.		N	N	N	R			
3	describing or otherwise demonstrating understanding of the positions or apparent motions of different objects in our solar system and what these objects look like from Earth, by doing <u>one</u> or more of the following:	S	S	S	P	R	H	L	

Universe and Solar System

Indicator - D1

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
	drawing or otherwise describing t+he movement of the Sun across the sky by identifying its position at different times of the day and/or		S	S	P	BA/R			Cognitive complexity of identifying is significantly lower than the complexity of drawing. It seems inappropriate to put both in the same statement.
	drawing or identifying different phases of the Moon.		S	S	P	BA/R			
4	describing or otherwise demonstrating understanding of the positions or apparent motions of different objects in our solar system and what these objects look like from Earth, by doing BOTH of the following:	S	S	S	P	R	H	L	
	drawing or otherwise describing the movement of the Sun across the sky by identifying its position at different times of the day and		S	S	P	BA/R			
	drawing or identifying different phases of the Moon.		S	S	P	BA/R			Same comment as above--drawing vs. identifying
5	explaining the movements and describing the location, composition, and characteristics of our solar system and universe, including planets, the sun, and galaxies, by doing the following:	S	na	S	P	R	H	L	

Universe and Solar System

Indicator - D1

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
	identifying the Sun, Earth’s Moon, and planet(s) on a given diagram and listing some planets.			S	P	R			
6	explaining the movements and describing the location, composition, and characteristics of our solar system and universe, including planets, the Sun, and galaxies, by doing the following:	S	na	S	P	R	H	L	
	listing the four inner planets and placing them in order relative to the sun.			S	P	R			
7	explaining the physical formation and changing nature of our universe and solar system, and how our past and present knowledge of the universe and solar system develop, by doing <u>both</u> of the following:	S	na	na	P	R	H	L	
	placing the planets in order relative to the Sun AND				P	R			
	identifying the orbits of Earth’s Moon and selected planets.				P	R			

Universe and Solar System

Indicator - D1

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
8	explaining the physical formation and changing nature of our universe and solar system, and how our past and present knowledge of the universe and solar system develop by doing <u>two</u> of the following:	na	na	na	P	R	H	na	
	describing the relative locations of the Sun, Earth, Earth’s Moon, and planets and identifying their orbits;				S	R			
	describing how the path of the Sun changes over a day,				P	R			Found at grade 3-5 Wording is misleading..the path does not change
	describing how the path of the Sun in the sky differs for different changes over the seasons, and/or				P	R			What does this mean--"...differs for different changes over the seasons" (higher in the sky, lower in the sky)
	describing the Sun as a star that gives off light like other stars.				P	R			

Earth

Indicator D2

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
1	describing the properties of Earth’s surface materials, the processes that change them, and cycles that effect Earth by:	S	S	P	N	RN	na	L	typo: affect not effect
	Identifying sunny, rainy, snowy, and/or windy weather through observation.								
2	describing the properties of Earth’s surface materials, the processes that change them, and cycles that effect Earth by:	S	S	P	N	RN	H	L	typo: affect not effect
	matching pictures to the type of weather they depict.								
3	describing the properties of Earth’s surface materials, the processes that change them, and cycles that effect Earth by:	S	S	P	N	R	H	L	typo: affect not effect
	identifying the different forms that water can take in the weather.								
4	describing the properties of Earth’s surface materials, the processes that change them, and cycles that effect Earth by doing BOTH of the following:	S	S	S	P	R	H	S	typo: affect not effect

Earth

Indicator D2

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next	Link to Pls			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
	demonstrating understanding of Earth’s weather by matching weather to the effects it can have on the surface of Earth (erosion or weathering) AND		S	S	P	R			
	describing the effects of the differences on people and their environments.		P	P	P	R			What does this mean? Differences in what...weather, seasons? The MLRs do not cover the effect of weather on people
5	describing the various cycles, physical and biological forces and processes, positions in space, energy transformations, and human actions that affect the short-term and long-term changes to Earth by doing <u>both</u> of the following:	S	na	P	P	R	S	L	Identifying climates and describing the seasons were not viewed as more complex than relating weather to erosion and describing the effects of weather on people and environments. LoC 4 may even require more sophisticated cognitive abilities than LoC 5.
	identifying different climates AND			P	P	R			
	describing the seasons.			P	P	R			

Earth

Indicator D2

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next	Link to Pls			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
6	describing the various cycles, physical and biological forces and processes, positions in space, energy transformations, and human actions that affect the short-term and long-term changes to Earth by doing <u>one</u> or more of the following:	S	na	S	P	R	H	L	
	identifying slow and abrupt changes to Earth (like volcanoes and earthquakes versus erosion and weathering), and/or			S	P	R			
	describing what happens to objects on Earth when they are dropped.			S	P	R			
7	describing and analyzing the biological, physical, energy, and human influences that shape and alter Earth Systems by doing the following:	S	na	na	S	R	H	L	
	identifying the Sun’s heat, ocean movement, or weather as things that can change the conditions of Earth.				S	R			

Earth

Indicator D2

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
8	describing and analyzing the biological, physical, energy, and human influences that shape and alter Earth Systems by doing <u>both</u> of the following:	na	na	na	S	BA	H	na	ODD THAT 8 IS BIOLOGICAL EFFECTS AND 7 IS EFFECTS OF PROCESSES
	explaining how people can change Earth				S	BA			
	explaining how plants and animals can change Earth.				S	BA			

Matter and Energy

Indicator D3

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments
			K-5	6-8	HS		Prev	Next	
1	describing properties of objects and materials before and after they undergo a change or interaction by:	S	S	P	P	RN		L	
	matching objects based on one physical property.		S	P	P	RN			
2	describing properties of objects and materials before and after they undergo a change or interaction by:	S	S	P	P	R	H	L	
	identifying which object in a group has a specific physical property.		S	P	P	R			
3	describing properties of objects and materials before and after they undergo a change or interaction by:	S	S	P	P	R	H	L	
	sorting objects into groups using one or more physical properties.		S	P	P	R			
4	describing properties of objects and materials before and after they undergo a change or interaction by doing BOTH of the following:	S	S	S	P	BA	H	L	
	describing the physical properties of objects and materials AND		S	P	P	R			
	using observable characteristics to describe changes in the physical properties of materials when mixed, heated, frozen, or cut.		S	S	P	BA			

Matter and Energy

Indicator D3

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments
			K-5	6-8	HS		Prev	Next	
5	describing physical and chemical properties of matter, interactions and changes in matter, and transfer of energy through matter by doing <u>both</u> of the following:	S	na	S	S	R	H	L	
	identifying chemical changes		na	S	S	R			
	identifying physical changes.		na	S	S	R			
6	describing physical and chemical properties of matter, interactions and changes in matter, and transfer of energy through matter by doing <u>both</u> of the following:	S	na	S	S	BA	H	L	
	comparing the properties of original materials and their properties after undergoing chemical or physical change AND			S	S	BA			
	observing and drawing conclusions about how the weight of an object compares to the sum of the weights of its parts.			S	S	BA			
7	describing the structure, behavior, and interactions of matter at the atomic level and the relationship between matter and energy by doing <u>both</u> of the following:	S	na	na	S	R	H	L	
	explaining that all materials are made of small particles AND				S	R			
	identifying examples of chemical and physical changes.				S	R			

Matter and Energy

Indicator D3

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments
			K-5	6-8	HS		Prev	Next	
8	describing the structure, behavior, and interactions of matter at the atomic level and the relationship between matter and energy by doing <u>both</u> of the following:	na	na	na	S	BA	H		Why is energy transfer omitted
	explaining that adding heat causes the small particles in matter to move faster AND				S	R			
	demonstrating understanding that the properties of a material may change but the total amount of material remains the same.				S	BA			

Force and Motion

Indicator D4

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to Next LoC	Link to Pls			DoK	Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
1	summarizing how various forces affect the motion of objects by:	S	S	P	N	RN	na	L	
	identifying or demonstrating one way (e.g., forward, backward, straight, zigzag, up, down, fast, slow) an object can move.								
2	summarizing how various forces affect the motion of objects by:	S	S	P	N	RN	H	L	
	identifying or demonstrating two ways (e.g., forward, backward, straight, zigzag, up, down, fast, slow) an object can move.								
3	summarizing how various forces affect the motion of objects by doing BOTH of the following:	S	S	S	P	R	H	L	
	describing or demonstrating three ways (e.g., forward, backward, straight, zigzag, up, down, fast, slow) an object can move		S	P	N	RN			
	identifying that the way an object moves can be changed by pushing or pulling it.		S	S	P	R			

Force and Motion

Indicator D4

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to Next LoC	Link to PIs			DoK	Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
4	summarizing how various forces affect the motion of objects by	S	S	S	P	R	H	L	
	demonstrating understanding of how given objects move.								
5	describing the force of gravity, the motion of objects, the properties of waves, and the wavelike property of energy in light waves by:	S	na	S	P	R	H	L	
	identifying or describing wave motions, earthquakes, vibrations and/or water waves.								
6	describing the force of gravity, the motion of objects, the properties of waves, and the wavelike property of energy in light waves by doing <u>one</u> or more of the following:	S	na	S	S	R	H	L	
	giving examples of how gravity pulls objects,			S	S	R			
	giving examples of how magnets pull and push objects, and/or			S	S	R			
	describing similarities in motion of sound vibration and earthquakes, and water waves.			S	S	BA			

Force and Motion

Indicator D4

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to Next LoC	Link to PIs			DoK	Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
7	showing understanding that the laws of force and motion are the same across the universe by doing <u>one</u> or more the following:	S	na	na	S	BA	H	L	LOC 7 MAY BE HIGHER THAN LOC 8
	predicting the effect of a given force on the motion of objects, and/or				S	BA			
	describing how waves can have different magnitudes, and lengths, and frequencies.				S	R			
8	showing understanding that the laws of force and motion are the same across the universe by doing <u>one</u> or more the following:				S	BA	H	na	
	summarizing the effects of various forces on the motion of objects, and/or				S	R/BA			Summarizing is a lower skill than predicting. Descriptor is not clear.
	describing how waves of water and other materials interact in similar ways.				S	BA			

Biodiversity

Indicator E1

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
1	comparing living things based on their behaviors, external features, and environmental needs by:	S	S	S	N	RN	na	L	
	identifying pictures or descriptions of given animals or plants.								
2	comparing living things based on their behaviors, external features, and environmental needs by:	S	S	S	N	RN	H	L	
	identifying given organisms as plants or animals based on external features.								
3	comparing living things based on their behaviors, external features, and environmental needs by:	S	S	S	N	RN	H	L	
	identifying organisms that are similar and different based on external features, behaviors, and/or needs.								
4	comparing living things based on their behaviors, external features, and environmental needs by doing two of the following:	S	S	S	N	R	H	L	
	describing how plants and/or animals look,		S	S	N	R			
	describing the things that plants and/or animals do, an/or		S	S	N	R			

Biodiversity

Indicator E1

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
	describing ways in which the needs of a plant and/or animal are met by its environment.		S	S	P	R			
5	differentiating among organisms based on biological characteristics and identifying patterns of similarity by sorting living things based on:	S	na	S	P	R	H	L	
	external features or behaviors								
6	differentiating among organisms based on biological characteristics and identifying patterns of similarity by doing <u>one</u> or more of the following:	S	na	S	P	R	H	L	
	identifying how external (or internal) features can influence how an animal or plant gets food, and/or			S	P	R			
	differentiate among living things that make their food, living things that eat their food and those that do not clearly belong in one group or the other.			S	P	R			“differentiate” should be “differentiating”

Biodiversity

Indicator E1

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
7	describing and analyzing the evidence for relatedness among and within diverse populations of organisms and the importance of biodiversity by:	S	na	na	P	R	H	L	
	describing environments that have many different types of organisms and those that have fewer types of organisms.								
8	describing and analyzing the evidence for relatedness among and within diverse populations of organisms and the importance of biodiversity by:	na	na	na	S	BA	H	na	
	predicting possible changes that could result if the numbers of different types of organisms were to be drastically reduced.								

Ecosystems

Indicator E2

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next Loc	Link to PIs			DoK	Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
1	describing ways organisms depend upon, interact within, and change the living and non-living environment as well as ways the environment affects organisms by:	S	P	N	N	RN	na	L	
	identifying pictures or descriptions of given animals or plants.								
2	describing ways organisms depend upon, interact within, and change the living and non-living environment as well as ways the environment affects organisms by:	S	S	P	N	RN	H	L	
	identifying animals or plants that live in given environments.								
3	describing ways organisms depend upon, interact within, and change the living and non-living environment as well as ways the environment affects organisms by:	S	S	S	N	R	H	L	
	identifying plants, animals, and/or components of their environments on which given animals depend for food and shelter.								

Ecosystems

Indicator E2

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next Loc	Link to PIs			DoK	Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
4	describing ways organisms depend upon, interact within, and change the living and non-living environment as well as ways the environment affects organisms by:	S	S	S	P	BA	H	L	
	comparing animals and plants that live in different environments to demonstrate understanding of how animals and plants depend on each other and the environments in which they live.								
5	examining how the characteristics of the physical, non-living environment, the types and behaviors of living organisms, and the flow of matter and energy affect organisms and the ecosystem of which they are part by doing <u>both</u> of the following:	S	na	S	P	R	H	L	
	identifying particular organisms in given food chains AND			S	P	R			
	placing organisms in a food chain in an appropriate sequence.			S	P	R			

Ecosystems

Indicator E2

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next Loc	Link to PIs			DoK	Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
6	examining how the characteristics of the physical, non-living environment, the types and behaviors of living organisms, and the flow of matter and energy affect organisms and the ecosystem of which they are part by doing <u>two</u> of the following:	S	na	S	P	R	H	L	
	identifying different things in an environment that organisms compete for in an environment,		na	S	P	R			
	identifying organisms as those that eat other organisms, are eaten, or recycle material, and/or		na	S	P	R			
	explaining how matter is transferred in an ecosystem.		na	S	S	R/BA			
7	describing and analyzing the interactions, cycles, and factors that affect short-term and long-term ecosystem stability and change by doing <u>one</u> of the following:	S	na	na	P	R	H	L	
	explaining ways in which organisms depend upon and interact within their environment, and/or		na		P	R			

Ecosystems

Indicator E2

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next Loc	Link to PIs			DoK	Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
	explaining ways in which organisms depend upon, interact within, and change the living and non-living environment.		na		S	R			
8	describing and analyzing the interactions, cycles, and factors that affect short-term and long-term ecosystem stability and change by:	na	na	na	S	R	H	na	
	explaining things which can limit how many plants and animals can survive in an area.								

Cells

Indicator E3

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to Pls			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
1	describing how living things are made up of one or more cells and the ways cells help organisms meet their basic needs by:	S	N	n	N	RN	na	L	AGLE descriptor does not fit with bulleted information ("identifying given parts of the human body"). Language in MLRs for K-2 is a closer fit.
	identifying given parts of the human body.								
2	describing how living things are made up of one or more cells and the ways cells help organisms meet their basic needs by:	S	N	N	N	RN	H	L	AGLE descriptor does not fit with bulleted info ("matching animals and/plants..."). Language in MLRs for K-2 is a closer fit.
	matching animals and/or plants to their parts.								
3	describing how living things are made up of one or more cells and the ways cells help organisms meet their basic needs by:	S	S	P	N	R	H	L	
	identifying parts that allow living things to meet basic needs.								

Cells

Indicator E3

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
4	describing how living things are made up of one or more cells and the ways cells help organisms meet their basic needs by:	S	S	P	P	R	H	L	
	identifying structures and/or processes that help given organisms stay alive.								
5	describing the hierarchy of organization and function in organisms, and the similarities and differences in structure, function, and needs among and within organisms by:	S	na	N	N	BA	H	L	
	drawing or describing things seen when using a microscope or viewing an image of something seen through a microscope.								
6	describing the hierarchy of organization and function in organisms, and the similarities and differences in structure, function, and needs among and within organisms by doing <u>both</u> of the following:	S	na	S	P	R	H	L	

Cells

Indicator E3

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
	identifying that some living things are made of one cell and some living things are made of many cells AND			S	P	R			
	identifying that all living things(single-celled and multi-celled) must have ways to get food and get rid of wastes.			S	P	R			
7	describing structure and function of cells at the intracellular and molecular level including differentiation to form systems; interactions between cells and their environment; and the impact of cellular processes and changes on individuals by doing <u>both</u> of the following:	S	na	na	S	R	H	L	
	explaining that living things produce new cells AND				S	R			
	explaining that cells produce complete copies of themselves when they divide.				S	R			

Cells

Indicator E3

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
8	describing structure and function of cells at the intracellular and molecular level including differentiation to form systems; interactions between cells and their environment; and the impact of cellular processes and changes on individuals by doing <u>both</u> of the following:	na	na	na	S	R	H	na	
	identifying that cells have parts in them that help them to release energy, dispose of wastes, and build new parts AND				S	R			
	explaining how changes can occur in cells that can cause them to work incorrectly.				S	R			

Heredity and Reproduction

Indicator E4

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
1	describing characteristics of organisms and the reason why organisms differ from or are similar to their parents by:	s	S	N	N	RN	na	L	PI for PreK-2 would be more appropriate here. As written, there is a big disconnect between LoC descriptor and bulleted info
	identifying parents and their offspring by matching pictures of a baby organism to an adult of the same organism.								
2	describing characteristics of organisms and the reason why organisms differ from or are similar to their parents by:	S	S	P	N	RN	H	L	
	identifying things about offspring that are like and not like their parents.								
3	describing characteristics of organisms and the reason why organisms differ from or are similar to their parents:	S	S	N	N	R	H	L	

Heredity and Reproduction

Indicator E4

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
	demonstrating understanding of life cycles by explaining, drawing, or otherwise communicating knowledge of stages in given life cycles.								
4	describing characteristics of organisms and the reason why organisms differ from or are similar to their parents by doing <u>both</u> of the following:	S	S	N	N	R	H	L	
	naming similarities between the adults and offspring of varied organisms AND		S	N	N	R			
	identifying and describing, drawing, or otherwise communicating knowledge of stages in a life cycle.		S	N	N	R			
5	describing the general characteristics and mechanisms of reproduction and heredity in organisms, including humans, and ways in which organisms are affected by their genetic traits by:	S		P	N	R	H	L	

Heredity and Reproduction

Indicator E4

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
	identifying the characteristics of offspring and parents based on similarities and differences.								
6	describing the general characteristics and mechanisms of reproduction and heredity in organisms, including humans, and ways in which organisms are affected by their genetic traits by doing <u>both</u> of the following:	S		S	S	R	H	L	
	identifying living things that reproduce by getting all their inherited information from one parent AND			S	S	R			
	identifying living things that reproduce by getting all their inherited information from two parents.			S	S	R			
7	examining the role of DNA in transferring traits from generation to generation, in differentiating cells, and in evolving new species by:	S			S	R	H	L	

Heredity and Reproduction

Indicator E4

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
	identifying that cells contain information that makes living things look the way they do.					R			
8	examining the role of DNA in transferring traits from generation to generation, in differentiating cells, and in evolving new species by:				S	R	H		
	explaining that different living things contain some information in their cells that is similar to other living things and some that is different.								

Evolution

Indicator E5

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
1	describing fossil evidence and present explanations that help us understand why there are differences among and between present and past organisms by:	S	S	P	N	RN	na	L	PI for PreK-2 would be more appropriate here (students describe similarities and differences...)
	identifying organisms from the local environment.								
2	describing fossil evidence and present explanations that help us understand why there are differences among and between present and past organisms by:	S	S	P	N	R	H	L	PI for PreK-2 would be more appropriate here (students describe similarities and differences...)
	matching pictures of organisms to the environment in which they live.								
3	describing fossil evidence and present explanations that help us understand why there are differences among and between present and past organisms by doing both of the following:	S	S	P	P	R	H	L	
	identifying organisms that no longer live today AND		S	P	N	R			

Evolution

Indicator E5

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
	describing features that organisms no longer living today share with organisms now alive and features that differ from those of organisms now alive.		S	P	P	R			
4	describing fossil evidence and present explanations that help us understand why there are differences among and between present and past organisms by doing both of the following:	S	S	P	S	R	H	L	
	describing features that allow or allowed present and past organisms to live in their environment AND		S	P	S	R			
	identifying organisms that once lived on Earth but no longer exist.		S	P	S	R			
5	describing the evidence that evolution occurs over many generations, allowing species to acquire many of their unique characteristics or adaptations, by doing <u>both</u> of the following:	S	na	S	P	R	H	L	
	identifying examples of fossils AND			S	P	R			

Evolution

Indicator E5

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
	demonstrating understanding of how fossils are formed.			S	P	R			
6	describing the evidence that evolution occurs over many generations, allowing species to acquire many of their unique characteristics or adaptations, by:	S	na	S	S	R	H	L	
	explaining how fossils are used to help us understand the past.			S	S				
7	describing the interactions between and among species, populations, and environments that lead to natural selection and evolution, by:	S	na	na	S	BA	H	L	
	presenting explanations that help us understand similarities and differences among and between past and present organisms.								

Evolution

Indicator E5

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
8	describing the interactions between and among species, populations, and environments that lead to natural selection and evolution, by doing <u>both</u> of the following:	na	na	na	S	BA	H	na	
	explaining why some organisms survive to the next generation AND				S				
	explaining why some organisms have traits that provide no apparent survival advantage.				S				

Addendum

Alignment Analysis of Maine's 2009-2010 Personalized Alternate Assessment Portfolio (PAAP) Alternate Grade Level Expectations for Reading, Mathematics, and Science

**Amy S. Burkam
Lothlorien Consulting, LLC**

May, 2010

ADDENDUM

Alignment Analysis of Maine's 2009-2010 Personalized Alternate Assessment Portfolio (PAAP) Alternate Grade Level Expectations for Reading, Mathematics, and Science

**Amy S. Burkam
Lothlorien Consulting, LLC
Wakefield, New Hampshire**

May, 2010

This study was conducted for the State of Maine. Alignment Institutes were held May 10, 2010, May 12, 2010, and May 13, 2010 using protocols developed by WestEd to analyze the strength of alignment of revised Maine Alternate Grade Level Expectations (AGLEs) to the Grade Level Expectations (GLEs) for the general population. This report consists of a description of the criteria used to judge the alignment between the revised Maine AGLEs and GLEs for reading, mathematics, and science. Tables listing the results of reviewers' judgments about the alignment are included in this report.

Acknowledgements

Panel Members

Panelist	Institute	Institution	Position
Sheree Lynn Granger	Language Arts and Science	Sweetser	Special Education Teacher
Kelly Tobin	Language Arts	Dexter Regional High School	Special Education – Life Skills/Day Treatment Teacher
Mary Jo Badger	Mathematics	Presque Isle Middle School	Special Education Teacher
Deborah Howard	Mathematics	Baxter School for the Deaf	K-12 Deaf Education Teacher (all content areas)
Robyn Lessard	Mathematics	Ellsworth High School	Special Education Teacher
Deborah Pelletier	Science	Acton Elementary School	Special Education Teacher

Facilitator	Institution	Title/Institution
Amy Burkam	Lothlorien Consulting	Owner

The State of Maine funded this analysis through Research in Action, Inc. John Paul Beaudoin, CEO of Research in Action, Inc., provided oversight.

Dan Hupp, Director of Student Assessment and Sue Fossett, Alternate Assessment and Accommodations Coordinator from the Maine Department of Education were the main contacts for the Department and oversaw the coordination of the study.

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ADDENDUM

Alignment Analysis of Maine’s 2009-2010 Personalized Alternate Assessment Portfolio (PAAP) Alternate Grade Level Expectations for Reading, Mathematics, and Science

Executive Summary

In 2009, Maine adopted the *New England Common Assessment Program (NECAP) Grade Level Expectations (GLEs)* for mathematics and reading that articulate and define academic expectations for students. With the adoption of new academic standards, Maine created new Alternate Grade Level Expectations (AGLEs) for its Personalized Alternate Assessment Portfolio (PAAP) and began the process of building a new task bank to assess the new AGLEs. Maine did not adopt the NECAP GLEs for science and will continue to assess student progress against the *Maine Learning Results (MLRs)*. However, to maintain consistency across content areas and to address issues identified in previous alignment studies, Maine developed new science AGLEs for the science portion of the PAAP. The 2010-2011 school year is the first year Maine schools will be accountable for the new PAAP AGLEs.

The Maine Department of Education selected Lothlorien Consulting to conduct an independent study to determine the degree of alignment of the new PAAP AGLEs to the NECAP GLEs for math and reading and to the MLRs for science. The study conducted in January 2010 revealed alignment issues with some AGLEs (Burkam, 2010). In response to the findings, the MDE revised or provided justification for the AGLEs that showed poor alignment. The purpose of this study is to examine the alignment characteristics of the revised AGLEs and evaluate the justification for the AGLEs that were not revised.

Maine educators who attended the January alignment institutes were invited to participate in this study. The study followed the same protocols used during the January institutes, which involved evaluating the Level of Complexity (LoC) descriptors that comprise the AGLEs against three alignment characteristics.

1. Strength of Alignment (LoC descriptors to subsequent LoC descriptors and LoC descriptors to NECAP/MLR indicators)
2. Appropriateness of Complexity (LoC descriptors compared to previous and subsequent LoC descriptors)
3. Depth of Knowledge (DoK)

The PAAP AGLEs for reading met or exceeded all alignment criteria. The strength of alignment of LoC descriptors to the subsequent LoC descriptors were all considered “Strong.” All of the LoC descriptors were considered strongly related to the NECAP GLEs at the corresponding grade span. The complexity of all LoC descriptors was rated as appropriately lower than the subsequent descriptor and higher than the previous descriptor. The depth of knowledge levels showed a reasonable range, with the majority of LoCs at the “recall” or “basic application” levels. The combined findings of this study and the January 2010 study suggest the alignment characteristics of the PAAP AGLEs for reading to the NECAP GLEs are technically sound.

The PAAP AGLEs for mathematics met all alignment criteria. The strength of alignment of LoC descriptors to the subsequent LoC descriptors was “Strong” or “Partial,” with 101 “Strong” ratings and one “Partial” rating. The descriptors for LoCs 1 through 4 were all strongly or partially related to the NECAP GLEs for grades 2 through 5, with 55 considered strongly related and three considered partially related. For LoCs 5 through 6, 27 descriptors were considered strongly related and three descriptors were considered partially related to the NECAP GLEs for grades 6 through 7. Of the descriptors for LoCs 7 and 8, 28 were judged strongly related and four were judged partially related to the NECAP GLEs for high school. All LoC descriptors were rated as appropriately lower than the subsequent descriptor and higher than the previous descriptor. The depth of knowledge levels showed a reasonable range, with the majority of LoCs at the “recall” or “basic application” levels. The combined findings of this study and the January 2010 study suggest the alignment characteristics of the PAAP AGLEs for mathematics to the NECAP GLEs are technically sound.

The PAAP AGLEs for science met or exceeded all alignment criteria. The strength of alignment of LoC descriptors to the subsequent LoC descriptors was “Strong” in all cases. The descriptors for LoCs 1 through 4 were all strongly or partially related to the NECAP GLEs for grades 2 through 5, with 35 considered strongly related and one considered partially related. For LoCs 5 through 6, 16 descriptors were considered strongly related and two descriptors were considered partially related to the NECAP GLEs for grades 6 through 7. All of the descriptors for LoCs 7 and 8 were judged strongly related to the NECAP GLEs for high school. All LoC descriptors were rated as appropriately lower than the subsequent descriptor and higher than the previous descriptor. The depth of knowledge levels showed a reasonable range, with 17 percent of the descriptors at the “recognition” level, 42 percent at the “recall” level, and 13 percent at the “basic application” level. The combined findings of this study and the January 2010 study suggest the alignment characteristics of the PAAP AGLEs for science to the NECAP GLEs are technically sound.

ADDENDUM

Alignment Analysis of Maine’s 2009-2010 Personalized Alternate Assessment Portfolio (PAAP) Alternate Grade Level Expectations for Reading, Mathematics, and Science

**Amy S. Burkam
Lothlorien Consulting, LLC**

I. Introduction

Overview

In 2009, Maine adopted the *New England Common Assessment Program (NECAP) Grade Level Expectations* (GLEs) for mathematics and reading that articulate and define academic expectations for students (Chapter 131: The Maine Federal, State, and Local Accountability Standards). The 2009-2010 school year is the first year Maine will assess the NECAP Grade Level Expectations for mathematics and reading as part of the accountability system to satisfy the requirements of the federal No Child Left Behind Act of 2001. With the adoption of new academic standards, Maine revised the design for the Personalized Alternate Assessment Portfolio (PAAP), created Alternate Grade Level Expectations (AGLEs), and began the process of building a new standardized task bank to measure the new AGLEs. Due to disparities between the NECAP and Maine accountability standards for science, Maine did not adopt the NECAP science GLEs and will continue to assess student progress against the *Maine Learning Results* (MLRs). Although Maine’s science standards did not change, the PAAP science rubrics were replaced by AGLEs to maintain consistency across content areas and to address issues identified by a previous alignment study. The new Maine PAAP AGLEs will go into effect for the 2010-2011 school year.

To ensure proper alignment of the new AGLEs to the NECAP mathematics and reading GLEs and to the MLRs for science, The Maine Department of Education (MDE) selected Amy S. Burkam of Lothlorien Consulting, LLC to conduct an independent alignment study. In January 2010, Maine educators evaluated the alignment of the PAAP AGLEs during Alignment Institutes held in Augusta, Maine. A detailed description of the study and findings is provided in the report, *Alignment Analysis of Maine’s 2009-2010 Personalized Alternate Assessment Portfolio (PAAP) Alternate Grade Level Expectations for Reading, Mathematics, and Science* (Burkam, 2010).

Analysis of the data collected during the January Alignment Institutes revealed alignment issues with some AGLEs. In response to the findings, the MDE revised or provided justification for the AGLEs that showed poor alignment. The purpose of this study is to examine the alignment characteristics of the revised AGLEs and evaluate the justification for the AGLEs that were not revised.

Alignment Institute

This alignment study relied on expert judgments made by Maine educators during separate Alignment Institutes for each content area. The institutes occurred after school on May 10, 2010 for mathematics, May 12, 2010 for science, and May 13, 2010 for reading.

The MDE invited the Maine educators who attended the institutes in January to participate in the May institutes. The May mathematics panel included three of the five experts who attended the January institute. The May science panel included two of the three experts from the January study and the English language arts panel included two of the five experts from the January study. Biographies summarizing the qualifications of each participant are provided in the original report.

The Alignment Institutes were conducted using the MDE secure Adobe Connect® web conferencing system. Participants received an e-mail with a link to the website. Once on the website, participants were given instructions to access the telephone conference line. During the webinar, participants could view the facilitator's computer screen and hear other participants on the telephone. Icons on the computer screen indicated who was speaking at any given moment. Despite limitations (e.g., frequent and audible announcements over school public announcement systems, limited bandwidth in schools), this approach proved effective since participants were familiar with the process and the number of alignment judgments was small.

Participants were sent a packet of training materials to review prior to the webinar. Copies of the training materials are provided in Appendix A of the January 2010 report (Burkam, 2010). The training packet included the following documents.

- A coding form with the revised PAAP AGLEs
- Practice worksheets for making judgments about each alignment relationship
- Annotated keys for the practice worksheets
- Directions for coding the AGLEs

Participants were asked to read the materials in the training packet, complete the practice worksheets, and check their work using the annotated keys. The practice materials were identical to those used during the training for the January institutes. At the start of each webinar, participants were given the opportunity to review and discuss the ratings on the practice worksheets.

Participants were paid an honorarium for reviewing the training materials, attending the institutes, and reviewing the final report. The final copy of this report was sent to all participants to verify the accuracy of its contents.

II. Methodology

The methodology used for this alignment study was identical to that used for the January study. The 2009-2010 PAAP Alternative Grade Level Expectations consist of eight Levels of Complexity (LoCs) for each alternate expectation. Participants examined the alignment characteristics of each LoC that was revised subsequent to the original alignment study in January. A detailed description of the methodology is provided in the report, *Alignment Analysis of Maine's 2009-2010 Personalized Alternate Assessment Portfolio (PAAP) Alternate Grade Level Expectations for Reading, Mathematics, and Science* (Burkam, 2010). An abbreviated description of the methodology is provided in this addendum.

To understand and evaluate the correspondence of the PAAP AGLEs to NECAP/MLR indicators, this study examined three alignment characteristics.

1. Strength of Alignment
2. Appropriateness of Complexity
3. Depth of Knowledge

Strength of Alignment

Strength of Alignment applies to two relationships.

1. The relationship between one LoC and the subsequent LoC.
2. The relationship between the knowledge and skills specified by the PAAP LoC descriptor and the expectations described in the corresponding NECAP/MLR Indicators.

Institute participants determined if the skills and concepts specified by each LoC reflect the skills and concepts of the NECAP/MLR indicators and evaluated the relationship as “strong,” “partial,” or “no relationship.” This alignment criterion is met if all relationships are “strong” or “partial.”

Table 1: Definitions for Evaluating Strength of Alignment (WestEd, 2007, 2009)

Code	Description
S (Strong)	The Level of Complexity descriptor reflects a central idea and/or fundamental or foundational skill or concept of the corresponding NECAP/MLR indicators or subsequent LoC.
P (Partial)	The Level of Complexity descriptor reflects a related, but not central idea and/or a related, but not fundamental or foundational skill or concept of the corresponding NECAP/MLR indicators or subsequent LoC.
N (No Relationship)	The Level of Complexity descriptor does not reflect an idea or skill that is central, fundamental, or foundational to the corresponding NECAP/MLR or subsequent LoC.

Appropriateness of Complexity

Appropriateness of complexity is the degree to which the content and skills specified by an LoC descriptor are suitably complex relative to the preceding and subsequent LoC descriptors. Maine’s intention was for the expectations described in the AGLE LoC descriptors to spiral downward in difficulty and complexity. Participants compared the LoC descriptors and rated each descriptor as “higher,” “lower,” or the “same” complexity as the previous and subsequent descriptor. This alignment criterion is met if the complexity of all LoC descriptors is lower than the subsequent descriptor and higher than the previous descriptor.

Depth of Knowledge

Depth of knowledge (DoK) is the cognitive complexity of a task or standard. DoK is not a function of difficulty, but relates to the cognitive processes required to successfully complete a task or demonstrate mastery of a standard. To determine the DoK of each LoC, participants first determined the DoK for each bullet associated with the LoC. After evaluating the DoK of each bullet under the LoC, participants assigned a DoK rating to the LoC as a whole. Participants applied the following DoK definitions developed by WestEd. The criterion for DoK is met if the AGLEs show a range of cognitive complexity skewed to lower DoK levels than the NECAP GLEs/MLRs (Flowers, Wakeman, Browder, & Karvonen, 2007).

Table 2: Depth of Knowledge Definitions (WestEd, 2007, 2009)

DoK Level	Definition
Recognition (RN)	Requires students to recognize or have an awareness of letters, words, symbols, or objects.
Recall (R)	Requires students to recall a fact, information, or procedure.
Basic Application (BA)	Requires students to use a skill or concept (e.g., information, conceptual knowledge, procedures).
Strategic Thinking (S)	Requires students to reason or develop a plan or sequence of steps.
Extended Thinking (E)	Requires students to conduct an investigation or process multiple condition/elements of a problem or task.

Process

Final alignment judgments were made using a consensus process. The facilitator solicited the input and ideas of all participants and encouraged discussion until the group reached consensus for each rating. If necessary, the facilitator referred participants to examples in the training materials. The consensus process involved the following steps for each rating.

1. Participants independently made a judgment about a rating.
2. The facilitator polled participants.
3. If participants disagreed, the facilitator asked participants to justify their decisions using language from the definitions and the LoC descriptor(s).

4. After each participant provided justification, the facilitator re-pollled the participants.
5. This process was repeated all participants agreed to accept the same rating.

During the webinars, most participants could view the coding form on the facilitator's computer screen. (Bandwidth issues prevented one member of the science panel from accessing the live video stream.) As the facilitator recorded each rating, participants verified the accuracy of the record.

A detailed list of the alignment decisions made by the participants is provided below.

1. Determine the strength of alignment relationship (strongly related, partially related, or unrelated) between the revised LoC descriptor and the previous LoC descriptor.
2. Determine the strength of alignment (strongly related, partially related, or unrelated) of the revised LoC descriptor to the next LoC descriptor.
3. Determine if the revised LoC descriptor is more complex, less complex, or of the same complexity as the previous LoC descriptor.
4. Determine if the revised LoC descriptor is more complex, less complex, or of the same complexity as the subsequent LoC descriptor.
5. Determine the strength of alignment (strong, partial, or unrelated) of each bulleted statement associated with the revised LoC to the corresponding GLEs/MLRs for grades preK/2 through 5.
6. Determine the strength of alignment (strong, partial, or unrelated) of each bulleted statement associated with the revised LoC to the corresponding GLEs/MLRs for grades 6 through 7/8.
7. Determine the strength of alignment (strong, partial, or unrelated) of each bulleted statement associated with the revised LoC to the corresponding GLEs/MLRs for high school.
8. Consider the strength of alignment ratings for each bullet associated with a revised LoC and assign an overall strength of alignment rating to the LoC.
9. Determine the DoK level for each bulleted statement associated with a revised LoC.
10. Consider the DoK ratings for each bulleted statement associated with a revised LoC and assign an overall DoK level to the LoC.

This process was repeated for each revised LoC descriptor.

Copies of the completed data collection forms are provided in Appendices A, B, and C.

III. Findings

Summary Analyses for Mathematics

Fifteen LoC descriptors across seven mathematics AGLEs were revised as a result of findings from the January 2010 alignment study. Revisions to five of the LoC descriptors (LoC 7 for AGLE A5, LoCs 1 and 2 for AGLE B1, LoC 1 for AGLE B4, and LoC 5 for AGLE D4) added clarification without changing the meaning or intent of the descriptors. Participants verified that the revisions did not alter the meaning or alignment characteristics of the LoC descriptors. Two descriptors that were flagged as having alignment issues were not changed. A third LoC descriptor was revised, but the change did not alter its meaning. The MDE provided rationale for the three unchanged LoCs.

Table 3 summarizes the alignment issues the MDE intended to correct by revising the LoC descriptors and the outcome of their efforts. With these changes, the Maine PAAP AGLEs for mathematics meet all alignment criteria.

Table 3: Summary of Revisions to Mathematics LoC Descriptors

AGLE	LoC	Alignment Issue	Resolution	Outcome
A2	4	Same complexity as LoC 5	LoC 5 revised	Revised LoC 5 is higher than LoC 4
A2	5	Same complexity as LoC 4; “Partial” relationship to MLR	LoC 5 revised	Revised LoC 5 is higher than LoC 4 Revised LoC is strongly related to MLR
A2	6	Revision to LoC 5 made it the same complexity as LoC 6	LoC 6 revised	Complexity of the revised LoC 6 is higher than LoC 5 and lower than LoC 7
A5	1	Unrelated to NECAP GLE	MDE provided rationale	Panelists agreed with rationale and identified the relationship as “Partial”
A5	5	Link to NECAP GLE was “Partial”	LoC 5 revised	Revised LoC is strongly related to NECAP GLE
A5	6	Same complexity as LoC 7	LoC 6 revised	Complexity of the revised LoC 6 is lower than LoC7
A5	7	LoC required additional clarification	LoC 7 revised	Language is clearer; no change to alignment relationships
B1	1	LoC required additional clarification	LoC 1 revised	Language is clearer; no change to alignment relationships
B1	2	LoC required additional clarification	LoC 2 revised	Language is clearer; no change to alignment relationships
B1	4	LoC 4 was higher in complexity than LoC 5	LoC 5 revised	Complexity of the revised LoC 5 is higher than LoC 4
B1	5	LoC 5 was lower in complexity than LoC 5	LoC 5 revised	Complexity of the revised LoC 5 is higher than LoC 4
B1	7	Link to NECAP GLE was “Partial”	LoC 7 revised	Revised LoC is strongly related to the NECAP GLE

AGLE	LoC	Alignment Issue	Resolution	Outcome
				Revision raised DoK from “Recall” to “Basic Application”
B3	1	Same complexity as LoC 2	LoC 2 revised	Complexity of the revised LoC 2 is higher than LoC 1
B3	2	Same complexity as LoC 1	LoC 2 revised	Complexity of the revised LoC 2 is higher than LoC 1
B4	1	Same complexity as LoC 2	Cosmetic edits to LoC1 LoC 2 revised	Complexity of the revised LoC 2 is higher than LoC 1
B4	2	Same complexity as LoC 1	LoC 2 revised	Complexity of the revised LoC 2 is higher than LoC 1 Edit changed DoK from “Recognition” to “Recall”
B4	7	Inconsistency: “Partial” ratings for LoC 7 bullets were considered “Strong” for the same bullets listed under LoC 8		Panelists revised LoC 7 ratings to be consistent with LoC 8 LoC 7 now strongly related to the GLEs
D2	3	Same complexity as LoC 4	LoC 3 and 4 revised	Complexity of the revised LoC 4 is higher than LoC 3
D2	4	Same complexity as LoC 4	LoC 3 and 4 revised	Complexity of the revised LoC 4 is higher than LoC 3
D4	5	Same complexity as LoC 6	Cosmetic edit to LoC 5 Rationale provided	Panelists agreed with rationale and identified LoC 6 as higher than LoC 5
D4	6	Same complexity as LoC 6	Rationale provided	

Strength of Alignment

Alignment of LoC Descriptors to Subsequent LoC Descriptors

To determine the degree of consistency among the LoCs, panelists compared each revised LoC to the subsequent LoC and rated the relationship as “strong,” “partial,” or “no relationship.” Panelists also rated the relationship of the previous LoC to the revised LoC. The results of this analysis revealed no changes to the alignment relationships identified during the January alignment study.

Table 4 shows the final results for strength of alignment of Mathematics LoCs to the subsequent LoC.

Table 4: Strength of Alignment of Mathematics LoCs to the Subsequent LoC

LoC 1-8	Strong	Partial	Strong or Partial	No	Total
Number	101	1	102	0	102
Percent	99%	1%	100%	0%	100%

Alignment of LoC Descriptors to NECAP GLE Indicators

To determine the relationship of the PAAP AGLEs to the corresponding NECAP GLEs, participants compared each revised LoC to the NECAP indicators for the corresponding grade span and rated the relationship as “strong,” “partial,” or “no relationship.”

As a result of revisions to LoCs 1 through 4, participants changed one rating from “No Relationship” to “Partial.” Table 5 shows the results of this change to the overall strength of alignment relationship between LoCs 1-4 and the corresponding NECAP indicators.

Table 5: Strength of Alignment of Mathematics LoCs 1-4 to the NECAP Indicators for Grades 2-5

LoC 1-4	Strong	Partial	Strong or Partial	No	Total
Number	55	1	56	0	56
Percent	98%	2%	100%	0%	100%

For LoCs 5 and 6, participants changed two ratings from “Partial” to “Strong.” Table 6 shows the results of this change to the overall alignment of LoCs 5 and 6 to the NECAP GLEs for grades 6 and 7.

Table 6: Strength of Alignment of Mathematics LoCs 5-6 to the NECAP Indicators for Grades 6-7

LoC 5-6	Strong	Partial	Strong or Partial	No	Total
Number	27	3	30	0	30
Percent	90%	10%	100%	0%	100%

For LoCs 7 and 8, participants changed two ratings from “Partial” to “Strong.” Table 7 shows the results of this change to the overall alignment of LoCs 7 and 8 to the NECAP GLEs for grade 10.

Table 7: Strength of Alignment of Mathematics LoCs 7-8 to the NECAP Indicators for Grade 10

LoC 7-8	Strong	Partial	Strong or Partial	No	Total
Number	28	4	32	0	32
Percent	88%	12%	100%	0%	100%

Appropriateness of Complexity

This alignment characteristic was evaluated by comparing each LoC descriptor to the previous and subsequent descriptors. The descriptors for LoCs 1 through 8 were rated as “higher,” “lower,” or the “same” complexity as the previous and subsequent descriptors. The January alignment study revealed five instances where an LoC was the same complexity as the previous LoC and one instance where an LoC was lower than the previous LoC. Participants determined that the revisions to the LoCs resolved all alignment issues associated with appropriateness of complexity. Table 8 shows the results of this analysis merged with the unchanged results from the previous study.

*Table 8: Complexity of Mathematics LoCs in Relationship to Previous LoC
(Expected to be Higher)*

Loc 1-8	Higher	Lower	Same	Total
Number	102	0	0	102
Percent	100%	0%	0%	100%

Depth of Knowledge

The third alignment criterion applied in this study was depth of knowledge or cognitive complexity. Edits to the LoCs resulted in two changes to the DoK levels: one LoC moved from “Recognition” to “Recall” and one LoC moved from “Recall” to “Basic Application.” Table 9 shows the distribution of DoK levels across LoCs.

Table 9: Depth of Knowledge Ratings for Mathematics LoCs

LoC 1-8	Total	Recognition	Recall	Basic Application	Strategic Thinking	Extended Thinking
Number	118	15	41	58	4	0
Percent	100%	13%	35%	49%	3%	0%

When compared to the distribution of DoK levels across the NECAP GLEs, the distribution of DoK levels across the LoCs descriptors is appropriately skewed to lower cognitive levels. Across all grades, four percent of the NECAP GLEs were rated at Webb’s DoK level 1, 68 percent at DoK level 2, and 28 percent at DoK level 3 (Erpenbach, 2007). Webb’s DoK level 1 is comparable to recall. Webb’s level 2 is comparable to basic application because it requires students to apply skills and concepts that are covered in level 1. Webb’s DoK level 3 requires reasoning and planning and thus is similar to strategic thinking. (Webb, 1997)

Table 10 shows the distribution of depth of knowledge ratings by LoC.

Table 10: Depth of Knowledge Ratings for Mathematics by LoC

LoC	Statistic	Recognition	Recall	Basic Application	Strategic Thinking	Total
1	Number	8	6	0	0	14
	Percent	57%	43%	0%	0%	100%
2	Number	4	9	1	0	14
	Percent	29%	64%	7%	0%	100%
3	Number	1	10	3	0	14
	Percent	7%	71%	21%	0%	100%
4	Number	1	8	5	0	14
	Percent	7%	57%	36%	0%	100%
5	Number	1	3	11	0	15
	Percent	7%	20%	73%	0%	100%
6	Number	0	3	12	0	15
	Percent	0%	20%	80%	0%	100%
7	Number	0	1	13	2	16
	Percent	0%	6%	81%	12%	100%
8	Number	0	1	13	2	16
	Percent	0%	6%	81%	12%	100%

Summary Analyses for Reading

With a single exception, the results of the January alignment study showed that the PAAP reading AGLEs met all alignment criteria. The study revealed one pair of adjacent LoCs (LoC 3 and 4) for AGLE A1 with the same complexity. To correct this alignment issue, the MDE revised both LoC descriptors. The reading panelists determined that the revisions corrected the problem, making the complexity of LoC 4 higher than LoC 3. Table 11 shows the effect of this change on the overall complexity of the reading LoCs.

Table 11: Complexity of Reading LoCs in Relationship to Previous LoC (Expected to be Higher)

Loc 1-8	Higher	Lower	Same	Total
Number	21	0	0	21
Percent	100%	0%	0%	100%

With this change, the Maine PAAP reading AGLEs meet or exceed all alignment criteria.

Summary Analyses for Science

Nine LoC descriptors associated with four science AGLEs were revised as a result of findings from the January 2010 alignment study. Two LoC descriptors that were flagged as having alignment issues were not changed. The MDE provided rationale for the unchanged descriptors.

Table 12 summarizes the alignment issues the MDE intended to correct by revising the LoC descriptors and the outcome of their efforts. With these changes, the Maine PAAP AGLEs for science meet or exceed all alignment criteria.

Table 12: Summary of Revisions to Science LoC Descriptors

AGLE	LoC	Alignment Issue	Resolution	Outcome
D1	2	Descriptor included incorrect science	LoC 2 revised	Error corrected Revision changed DoK from “Recall” to “Recognition”
D1	3	No issues	LoC 3 revised	Revision does not change alignment relationships
D1	4	No issues	LoC 4 revised	Revision does not change alignment relationships
D1	7	Partial relationship to MLR	LoC 7 revised	Revised LoC is strongly related to the MLR Revisions raised DoK from “Recall” to “Basic Application”
D1	8	Partial relationship to MLR	LoC 8 revised	Revised LoC is strongly related to the MLR Revision raised DoK from “Recall” to “Basic Application”
D2	4	Same complexity as LoC 5	LoC 4 and 5 revised	Complexity of LoC 5 is higher than LoC 4
D2	5	Same complexity as LoC 4; Relationship to MLR was “Partial”	LoC 4 and 5 revised	Complexity of LoC 5 is higher than LoC 4 Revised LoC 5 is strongly related to MLR
D2	7	Relationship to MLR was “Partial”	LoC 7 revised	Revised LoC is strongly related to MLR
E2	7	Relationship to MLR was “Partial”	LoC 7 revised	Revised LoC is strongly related to MLR Revision raised DoK from “Recall” to “Basic Application”
E3	1	Unrelated to MLR	MDE provided rationale	Panelists agreed with rationale and identified the relationship as “Strong”
E3	2	Unrelated to MLR	MDE provided rationale	Panelists agreed with rationale and identified the relationship as “Strong”
E3	5	Unrelated to MLR	LoC 5 revised	Revised MLR is strongly related to MLR Revision changed DoK from “Basic Application” to “Recall”

Strength of Alignment

Alignment of LoC Descriptors to Subsequent LoC Descriptors

To determine the degree of consistency among the LoC descriptors for each AGLE, participants compared each LoC to the subsequent LoC and rated the relationship as “strong,” “partial,” or “no relationship.” The results of this analysis revealed no changes to the alignment relationships identified during the January alignment study. Table 13 shows the results from the January study.

Table 13: Strength of Alignment of Science LoCs to the Subsequent LoC

LoC 1-8	Strong	Partial	Strong or Partial	No	Total
Number	63	0	63	0	63
Percent	100%	0%	100%	0%	100%

Alignment of LoC Descriptors to the MLR Performance Indicators

To determine the relationship of the PAAP AGLEs to the corresponding MLR Performance Indicators, participants compared each LoC to the Performance Indicators for the corresponding grade span and rated the relationship as “strong,” “partial,” or “no relationship.”

As a result of revisions to LoCs 1 through 4, participants changed two ratings from “No Relationship” to “Strong Relationship.” Table 14 shows the results of this change to the overall strength of alignment between LoCs 1 through 4 and the corresponding MLR performance indicators.

Table 14: Strength of Alignment of Science LoCs 1-4 to the MLR Performance Indicators for PreK-5

LoC 1-4	Strong	Partial	Strong or Partial	No	Total
Number	35	1	36	0	36
Percent	97%	3%	100%	0%	100%

For LoCs 5 and 6, participants changed one rating from “No Relationship” to “Strong” and one rating from “Partial” to “Strong.” Table 15 shows the results of the changes to the overall strength of alignment of LoCs 5 and 6 to the corresponding MLR performance indicators for grades 6 through 8.

Table 15: Strength of Alignment of Science LoCs 5-6 to the MLR Performance Indicators for Grades 6-8

LoC 5-6	Strong	Partial	Strong or Partial	No	Total
Number	16	2	18	0	18
Percent	89%	11%	100%	6%	100%

As a result of revisions to 7 and 8, participants changed four ratings from “Partial” to “Strong.” Table 16 shows the results of the changes on the overall alignment relationships between LoCs 7 and 8 and the MLRs for high school.

Table 16: Strength of Alignment of Science LoCs 7-8 to the MLR Performance Indicators for Grades 9-Diploma

LoC 7-8	Strong	Partial	Strong or Partial	No	Total
Number	18	0	18	0	18
Percent	100%	0%	100%	0%	100%

Appropriateness of Complexity

This alignment characteristic was evaluated by comparing each LoC descriptor to the previous and subsequent descriptors. LoC descriptors were rated as higher, lower, or the same complexity as the previous and subsequent descriptors. The results of the January alignment study revealed one instance where adjacent LoC descriptors were the same complexity. Revisions to the LoCs resolved this alignment issue. Table 17 shows the results of this analysis.

Table 17: Complexity of Science LoCs in Relationship to Previous LoC (Expected to be Higher)

LoC 1-8	Higher	Lower	Same	Total
Number	63	0	0	63
Percent	100%	0%	0%	100%

Depth of Knowledge

Edits to the LoCs affected the DoK levels of five LoC descriptors:

- one LoC dropped from “Recall” to “Recognition,”
- one LoC dropped from “Basic Application” to “Recall,” and
- three LoCs moved from “Recall” to “Basic Application.”

Table 18 shows the distribution of LoC descriptors across the five depth of knowledge levels.

Table 18: Depth of Knowledge Ratings for Science LoCs

LoC 1-8	Total	Recognition	Recall	Basic Application	Strategic Thinking	Extended Thinking
Number	72	17	42	13	0	0
Percent	100%	24%	58%	18%	0%	0%

The distribution of DoK levels across the LoCs descriptors is consistent with the distribution found in the MLRs for science and is appropriately skewed to lower cognitive levels. Across all grade spans covered by the MLRs, 15 percent of the Performance Indicators were rated at Webb’s DoK level 1, 78 percent at DoK level 2, and 7 percent at DoK level 3 (Burkam, 2009). Webb’s DoK level 1 is comparable to recall. Webb’s level 2 is comparable to basic application because it requires students to apply skills and concepts that are covered in level 1. Webb’s DoK level 3 requires reasoning and planning and thus is similar to strategic thinking. (Webb, 1997)

Table 19 shows the distribution of depth of knowledge ratings by LoCs.

Table 19: Depth of Knowledge Ratings for Science by LoC

LoC	Statistic	Recognition	Recall	Basic Application	Strategic Thinking	Total
1	Number	9	0	0	0	9
	Percent	100%	0%	0%	0%	100%
2	Number	7	2	0	0	9
	Percent	78%	22%	0%	0%	100%
3	Number	1	8	0	0	9
	Percent	11%	89%	0%	0%	100%
4	Number	0	7	2	0	9
	Percent	0%	78%	22%	%	100%
5	Number	0	9	0	0	9
	Percent	0%	100%	0%	0%	100%
6	Number	0	8	1	0	9
	Percent	0%	89%	11%	0%	100%
7	Number	0	5	4	0	9
	Percent	0%	56%	44%	0%	100%
8	Number	0	3	6	0	9
	Percent	0%	33%	67%	0%	100%

The depth of knowledge required to demonstrate mastery of an expectation generally increases with the Levels of Complexity. At LoC 1, all of the descriptors are at the recognition level. At LoC 3, all but one of the descriptors require skills at the recall level. By LoC 8, two-thirds of the descriptors require skills at the basic application level.

IV. Conclusions

The PAAP AGLEs for mathematics met all alignment criteria. The strength of alignment of LoC descriptors to the subsequent LoC descriptors was “Strong” or “Partial,” with 101 “Strong” ratings and one “Partial” rating. The descriptors for LoCs 1 through 4 were all strongly or partially related to the NECAP GLEs for grades 2 through 5, with 55 considered strongly related and three considered partially related. For LoCs 5 through 6, 27 descriptors were considered strongly related and three descriptors were considered partially related to the NECAP GLEs for grades 6 through 7. Of the descriptors for LoCs 7 and 8, 28 were judged strongly related and four were judged partially related to the NECAP GLEs for high school. All LoCs descriptors were rated as appropriately lower than the subsequent descriptor and higher than the previous descriptor. The depth of knowledge levels showed a reasonable range, with the majority of LoC descriptors at the “recall” or “basic application” levels. The combined findings of this study and the January 2010 study suggest the alignment characteristics of the PAAP AGLEs for mathematics to the NECAP GLEs are technically sound.

The PAAP AGLEs for reading met or exceeded all alignment criteria. The strength of alignment of LoC descriptors to the subsequent LoC descriptors were all considered “Strong.” All of the LoC descriptors were considered strongly related to the NECAP GLEs at the corresponding grade span (LoC 1-4 to the grades 2-5 GLEs, LoCs 5-6 to the grades 6-7 GLEs, and LoCs 7-8 to the high school GLEs). The complexity of all LoC descriptors was rated as appropriately lower than the subsequent descriptor and higher than the previous descriptor. The depth of knowledge levels showed a reasonable range, with the majority of LoC descriptors at the “recall” or “basic application” levels. The combined findings of this study and the January 2010 study suggest the alignment characteristics of the PAAP AGLEs for reading to the NECAP GLEs are technically sound.

The PAAP AGLEs for science met or exceeded all alignment criteria. The strength of alignment of LoC descriptors to the subsequent LoC descriptors was “Strong” in all cases. The descriptors for LoCs 1 through 4 were all strongly or partially related to the NECAP GLEs for grades 2 through 5, with 35 considered strongly related and one considered partially related. For LoCs 5 through 6, 16 descriptors were considered strongly related and two descriptors were considered partially related to the NECAP GLEs for grades 6 through 7. All of the descriptors for LoCs 7 and 8 were judged strongly related to the NECAP GLEs for high school. All LoC descriptors were rated as appropriately lower than the subsequent descriptor and higher than the previous descriptor. The depth of knowledge levels showed a reasonable range, with 17 percent of the descriptors at the “recognition” level, 42 percent at the “recall” level, and 13 percent at the “basic application” level. The combined findings of this study and the January 2010 study suggest the alignment characteristics of the PAAP AGLEs for science to the NECAP GLEs are technically sound.

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APPENDIX A

Participant Ratings for Mathematics

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

NECAP GLE M(N&O) — 1 Numbers and Operations – Fractions

Mathematics AGLE/Indicator — A2

Student demonstrates conceptual understanding of rational numbers by:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	R		L	
	indicating that one half is less than one whole.								N&O 1 is not assessed at the high school level
2		S	S	P	P	R	H	L	
	indicating that two halves make a whole.								N&O 1 is not assessed at the high school level
3		S	S	S	P	R	H	L	
	indicating that two halves, three thirds, and/or four fourths make a whole.								N&O 1 is not assessed at the high school level
4		S	S	P	P	R	H	S L	
	indicating 1/2, 1/3, and/or 1/4								N&O 1 is not assessed at the high school level
5		S	NA	PS	PS	R	SH	L	
	indicating and/or illustrating 1/2, 1/3, and/or 1/4 <u>AND</u>			P	P	R			N&O 1 is not assessed at the high school level
	<u>Comparing 1/2, 1/3, and 1/4</u>			S	S	R			
6		S	NA	S	S	BA	H	L	
	indicating, comparing, and/or ordering rational numbers (limited to fractions with denominators of 2, 3, 4, and or 5).								aligns with N&O 2 (magnitude of number--ordering fractions) at MS and HS
7		S	NA	NA	S	BA	H	L	
	indicating, comparing, and/or ordering rational numbers (limited to fractions with denominators of 2, 3, 4, 5, 6, 8, and/or 10).								aligns with N&O 2 (magnitude of number--ordering fractions) at MS and HS

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

NECAP GLE M(N&O) — 1 Numbers and Operations – Fractions

Mathematics AGLE/Indicator — A2

Student demonstrates conceptual understanding of rational numbers by:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
8			NA	NA	S	BA	H		
	indicating, comparing, and/or ordering rational numbers (limited to proper fractions, improper fractions, and mixed numbers with denominators of 2, 3, 4, 5, 6, 8, 10, 12, 100, and/or 1000.)								aligns with N&O 2 (magnitude of number--ordering fractions) at MS and HS

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

NECAP GLEs M(N&O) — 3 & 4 Mathematics AGLE/Indicator — A5

Numbers and Operations – Understanding of *Mathematical* Operations, Calculations, and Solving Problems

Student demonstrates conceptual understanding of mathematical operations and problem solving by:

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		P	NP	NP	NP	RN		L	
	matching a set of 2–4 objects with an equivalent set of 2–4 objects.								Far relationship to understanding operations and solving problems
4		S	S	S	S	R	H	L	
	adding and subtracting whole numbers (sums up to 20 and the corresponding subtraction counterparts) and showing or explaining strategies for such problems								
5	doing one or more of the following	S	NA	S	S	BA	H	L	
	adding and subtracting whole numbers (sums up to 99 and the corresponding subtraction counterparts) with and without contexts and/or <u>and showing or explaining strategies for such problems, AND/OR</u>			p	P	BA			
	describing or illustrating the inverse relationship between addition and subtraction and/or the relationship between repeated addition and multiplication.			S	S	BA			

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

NECAP GLEs M(N&O) — 3 & 4 Mathematics AGLE/Indicator — A5

Numbers and Operations – Understanding of *Mathematical Operations*, Calculations, and Solving Problems

Student demonstrates conceptual understanding of mathematical operations and problem solving by:

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
6	doing one or more of the following	S	NA	S	P	BA	H	SL	
	adding and subtracting whole numbers (sums up to 199 and the corresponding subtraction counterparts) with and without contexts , and showing or explaining strategies for such problems, <u>AND</u>			P	P	BA			
<u>Doing one or more of the following</u>									
	multiplying (limited to one-digit numbers) and dividing (limited to one-digit divisors and two-digit dividends) whole numbers, and/or			S	P	BA			
	describing or illustrating the inverse relationship between multiplication and division (without remainders) and/or the relationship between repeated subtraction and division.			S	P	S			
7	doing one or more of the following	S	NA	NA	S	BA	SH	L	
	multiplying (up to two <u>one</u> digit by two digits <u>and/or two digits by two digits</u>) and dividing (limited to one-digit divisors) whole numbers and/or				S	BA			This statement is subject to misinterpretation. Is it "one or two digits multiplied by one or two digits" or one or two digits multiplied by one digit only"
	solving problems involving fractions, decimals, percents, and/or ratios.				S	BA			

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

NECAP GLEs M(N&O) — 3 & 4 Mathematics AGLE/Indicator — A5

Numbers and Operations – Understanding of *Mathematical* Operations, Calculations, and Solving Problems

Student demonstrates conceptual understanding of mathematical operations and problem solving by:

LoC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
8	doing two or more of the following		NA	NA	S	BA	H		
	using each of the four operations on whole numbers (division up to two-digit divisors),				S	BA			
	solving problems involving fractions, decimals, percents, and/or ratios, and/or				S	BA			
	solving problems involving proportional reasoning.				S	BA			

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

NECAP GLEs M(G&M) — 1, 2, & 3

Mathematics AGLE/Indicator — B1

Geometry and Measurement – Properties of 2- and 3-Dimensional Shapes and Apply Theorems

Student uses properties or attributes of angles, sides, and/or figures to:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	RN		L	
	selecting, from two choices, the <u>a</u> shape (circle, triangle, and/or square) that matches a given model or picture.								Any shape?
2		S	S	P	P	RN	H	L	
	matching two shapes (circle, triangle, and/or square) when given a variety of models or pictures.								Any shape?
3		S	S	S	P	RN	H	L	
	identifying circles, triangles, and squares.								
4		S	S	S	P	RN	H	H L	
	identifying and classify two-dimensional shapes as circles, triangles, squares, or rectangles								
5		S	na	S	P	RN	L H	L	
	identifying circles, triangles, squares, rectangles, and or <u>AND</u> parallelograms,			S	P	RN			
	<u>classifying two-dimensional shapes</u>			S	P	R			

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

NECAP GLEs M(G&M) — 1, 2, & 3 Mathematics AGLE/Indicator — B1
 Geometry and Measurement – Properties of 2- and 3-Dimensional Shapes and Apply Theorems
 Student uses properties or attributes of angles, sides, and/or figures to:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
6	doing two or more of the following	S	na	S	S	R	H	L	
	identify the number of angles in a polygon,			S	S	R			
	identify angles as more than, less than, or equal to 90 degrees, and/or			S	S	R			
	identify circles, triangles, squares, rectangles, parallelograms, and/or trapezoids.			S	P	RN			
7	<u>Doing one or more of the following</u>	S	na	na	PS	RBA	H	L	
	identify acute, obtuse, and right angles <u>AND differentiate right angles from acute and obtuse angles, and/or</u>				S	BA			
	identify squares, triangles, circles, squares, rectangles, parallelograms, trapezoids, and/or rhombi <u>identify, describe, classify, or distinguish among two-dimensional shapes using angles (right, acute, or obtuse) or sides (number of congruent sides, parallelism, or perpendicularity).</u>				S	BA			

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

NECAP GLEs M(G&M) — 1, 2, & 3

Mathematics AGLE/Indicator — B1

Geometry and Measurement – Properties of 2- and 3-Dimensional Shapes and Apply Theorems

Student uses properties or attributes of angles, sides, and/or figures to:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
8	doing two or more of the following		na	na	S	BA	H		
	differentiate right angles from acute and obtuse angles,				S	BA			
	identify, describe, classify, or distinguish among two-dimensional shapes using angles (right, acute, or obtuse) or sides (number of congruent sides, parallelism, or perpendicularity), and/or				S	BA			
	identify, compare, and/or describe three-dimensional shapes using the shapes of bases, number of lateral faces, or number of bases.				S	BA			

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

NECAP GLE M(G&M) — 6

Mathematics AGLE/Indicator — B3

Geometry and Measurement – Perimeter, Area, Volume, and Circumference

Student demonstrates conceptual understanding of perimeter, area, volume, and circumference by:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	S	P	R		SL	
	comparing two items based on length.								
2	doing one or more of the following	S	S	S	P	R	SH	L	
	comparing two items based on length and or		S	S	P	R			
	comparing two containers based on capacity.		S	S	P	R			
3	doing one or more of the following	S	S	S	P	R	H	L	
	comparing two items based on length and/or		S	S	P	R			
	comparing two items based on capacity, AND		S	S	P	R			
	comparing two 2-dimensional figures based on area (e.g., placing one object on top of another to determine which takes up more space).		S	S	S	R			

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

NECAP GLE M(G&M) — 7

Mathematics AGLE/Indicator — B4

Geometry and Measurement – Measure and Converting Between Units

Student measures and uses units of measures appropriately and consistently and makes conversions within systems when solving problems, including:

LOC	AGLE	LoC to next	Link to NECAP			DoK	Complexity		Comments
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	RN		SL	
	comparing two items or events based on length or temperature by identifying for example (e.g., which item/event , which is longer/shorter or hotter/colder).		S	P	P	RN			
2		S	S	P	P	RNR	SH	L	
	comparing two items based on weight or capacity by identifying, for example, (e.g., which item is heavier/lighter) or which has more/less. <u>AND</u>		S	P	P	RN			
	<u>Comparing two items based on capacity, for example, by identifying which item has or holds more/less</u>		S	P	P	R			
3		S	S	S	P	R	H	L	
	estimating and measuring length, temperature, weight, time, or capacity.								
6	doing three or more of the following	S	na	S	P	R	H	L	
	measuring length (half and/or whole inches, feet, and/or centimeters),			S	P	R			
	telling time (hour to 10-minute intervals),			S	P	R			
	reading temperature (degrees Fahrenheit), and/or			S	P	R			
	computing equivalencies (12 inches = 1 foot and/or 24 hours = 1 day).			S	P	BA			

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

NECAP GLE M(G&M) — 7

Mathematics AGLE/Indicator — B4

Geometry and Measurement – Measure and Converting Between Units

Student measures and uses units of measures appropriately and consistently and makes conversions within systems when solving problems, including:

LOC	AGLE	LoC to next	Link to NECAP			DoK	Complexity		Comments
			2-5	6-7	HS		Prev	Next	
7	doing four or more of the following	S	na	na	PS	R	H	L	
	measuring length (quarter, half and/or whole inches; feet; whole centimeters; whole yards; and/or whole meters),				P	R			
	telling time (hour to 5-minute intervals),				P	R			
	reading temperature (degrees Fahrenheit and Celsius),				P	R			
	identifying capacity (whole quarts, liters, and/or gallons),				PS	R			
	identifying mass (whole grams),				SP	R			
	identifying weight (whole pounds), and/or				PS	R			
	computing equivalencies (12 inches = 1 foot, 24 hours = 1 day, and/or 7 days = 1 week).				PS	BA			
8	doing five or more of the following		na	na	S	R	H		
	measuring length (quarter, half and/or whole inches; feet; whole yards; whole kilometers, meters, and/or centimeters; and/or miles),				P	R			
	telling time (to the minute),				P	R			
	reading temperature (degrees Fahrenheit and Celsius),				P	R			
	identifying capacity (whole quarts liters, gallons, and/or pints),				S	R			
	identifying mass (whole grams and/or kilograms),				S	R			
	identifying weight (whole pounds), and/or				S	R			
	computing equivalencies (12 inches = 1 foot, 365 days = 1 year, 24 hours = 1 day, 7 days = 1 week, 60 minutes = 1 hour, and/or 60 seconds = 1 minute).				S	BA			

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

NECAP GLE M(DSP) — 2

Mathematics AGLE/Indicator — D2

Data, Statistics, and Probability – Analyzing Data

Student analyzes patterns, trends, or distributions in data in a variety of contexts, including:

LOC	AGLE	LoC to Next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
2		S	S	P	P	R	H	L	
	using “more” or “less” when given a set of 5–10 objects (e.g., 6 marbles is less than 8 marbles).								
3		S	S	P	P	R	H	SL	
	using “more” or “less” to analyze data <u>presented in charts and pictographs.</u>								
4		S	S	P	P	BA	SH	L	
	using “more” or “less” to analyze data <u>and or solve problems based on data presented in charts and graphs.</u>								
5		S	na	S	S	BA	H	L	
	using “more,” “less,” or “equal” to analyze data or solve problems.								

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

NECAP GLE M(DSP) — 5

Mathematics AGLE/Indicator — D4

Data, Statistics, and Probability – Probability

For a probability event in which the sample space may or may not contain equally likely outcomes, student determines the probability of an event by:

LOC	AGLE	LoC to next LoC	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
4		S	S	S	S	R	H	L	
	recording the outcomes of simple events/trials and identifying the “more likely” and “less likely” outcomes.								
5		S	na	S	S	BA	H	SL	
	determining the likelihood of the occurrence of an event (with between 5 and 10 <u>outcomes</u> results) using “more likely,” “less likely,” and “equally likely.”								
6		S	na	S	S	BA	SH	L	
	determining the likelihood of the occurrence of an event using “certain,” “likely,” “unlikely,” <u>and</u> “impossible.”								

Appendix B

Participant Ratings for Reading

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment

NECAP GLEs R1, R2, & R3

Reading AGLE/Indicator — A1

Word Identification and Vocabulary Knowledge

Student applies word identification and decoding strategies, identifies the meaning of unfamiliar vocabulary, shows breadth of vocabulary knowledge, and/or demonstrates understanding of word meaning or relationships by:

LoC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
1		S	S	P	P	RN		L	
	identifying signs, symbols, gestures, objects, and/or pictures to show understanding of words.								not assessed at grades 4, 5, 6, 7, HS
2		S	S	P	P	R	H	L	
	showing phonemic awareness and/or sound/symbol relationships.								not assessed at grade 4-5, 6-7, or HS
3	Doing one or more of the following	S	S	P	P	BA	H	SL	complexity is the same unless difficulty of text increases with the LoC
	using <u>basic</u> phonemic awareness <u>skills</u> (e.g., <u>identifying beginning and/or ending sounds or rhyming words</u> and/or		S	P	P	BA			not assessed at 5-7, HS
	using word parts or <u>basic</u> phonics to decode words (e.g., CVC words), AND and /or		S	P	P	BA			not assessed at 5-7, HS
	<u>Decoding sight words of the highest frequency in the English language</u> (e.g., the, and, is) AND		S	P	P	RN			<u>Replace “decoding” with “reading aloud”</u>
	using <u>pictures</u> and/or context clues to determine the meaning of words.		S	S	S	BA			
4	Doing one or more of the following	S	S	P	P	BA	SH	L	
	using <u>the full range of</u> phonemic awareness <u>skills</u> (e.g., <u>identifying medial sounds, orally segmenting sounds or parts of words</u> , and/or		S	P	P	BA			not assessed at 5-7, HS

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment

NECAP GLEs R1, R2, & R3

Reading AGLE/Indicator — A1

Word Identification and Vocabulary Knowledge

Student applies word identification and decoding strategies, identifies the meaning of unfamiliar vocabulary, shows breadth of vocabulary knowledge, and/or demonstrates understanding of word meaning or relationships by:

LoC	AGLE	LoC to next	Link to NECAP GLE			DoK	Complexity		Comments (use back if needed)
			2-5	6-7	HS		Prev	Next	
	using word parts or phonics to decode words (e.g., CCVC, CVCC, CCVCC word patterns, common long vowel patterns, inflectional endings, AND and/or		S	P	P	BA			not assessed at 5-7, HS
	<u>Decoding common English sight words (e.g., all, eat, good, out, that, with, yes) AND</u>		S	P	P	Rn			Replace “decoding” with “reading aloud”
	using context clues to determine the meaning of words.		S	S	S	BA			
5	Doing one or more of the following	S	na	S	S	BA	H	L	
	using phonemic awareness and/or			P	P	BA			not assessed as grades 6-7, HS
	using word parts or phonics to decode words, AND			P	P	BA			not assessed as grades 6-7, HS
	Doing one or more of the following:								
	using context clues to determine the meaning of words and/or			S	S	BA			
	identifying unfamiliar vocabulary by using suffixes or base words, AND			S	S	BA			
	Doing one or more of the following:								
	identifying synonyms,			S	S	BA			
	identifying antonyms, and/or			S	S	BA			
	categorizing words.			S	S	BA			

Appendix C

Participant Ratings for Science

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rationale

Universe and Solar System

Indicator - D1

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
describing or otherwise demonstrating understanding of the positions or apparent motions of different objects in our solar system and what these objects look like from Earth by:									
1		S	S	P	N	Rn	Na	L	
	identifying day and night.								
2	by doing both of the following:	S	S	P	P	Rn	H	L	
	matching the Sun and Earth's Moon appropriately to pictures of night and day.		N	N	N	R			
	<u>identifying pictures of night and day AND</u>		<u>S</u>	<u>P</u>	<u>P</u>	<u>Rn</u>			
	Identifying the Sun and Earth's Moon.		S	P	P	Rn			
3		S	S	S	P	R	H	L	
	drawing or otherwise describing the movement of the Sun across the sky by identifying its position at different times of the day and/or <u>Identifying the position of the Sun at different times by drawing or otherwise describing the movement of the Sun across the sky.</u>		S	S	P	BA/R			
	drawing or identifying different phases of the Moon.		S	S	P	BA/R			

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rational

Universe and Solar System

Indicator - D1

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
4	by doing BOTH of the following:	S	S	S	P	R	H	L	
	drawing or otherwise describing the movement of the Sun across the sky by identifying its position at different times of the day and <u>Identifying the position of the Sun at different times by drawing or otherwise describing the movement of the Sun across the sky and</u>		S	S	P	BA/R			
	drawing or identifying different phases of the Moon.		S	S	P	BA/R			
explaining the movements and describing the location, composition, and characteristics of our solar system and universe, including planets, the sun, and galaxies, by doing the following:									
5		S	na	S	P	R	H	L	
	identifying the Sun, Earth’s Moon, and planet(s) on a given diagram and listing some planets.			S	P	R			
6		S	na	S	P	R	H	L	
	listing the four inner planets and placing them in order relative to the sun.			S	P	R			

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rational

Universe and Solar System

Indicator - D1

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
7	by doing both of the following:	S	na	na	PS	RBA	H	L	
	placing the planets in order relative to the Sun AND	-	-	-	P	R			
	identifying the orbits of Earth's Moon and selected planets.	-	-	-	P	R			
	<u>describing the relative locations of the Sun, Earth, Earth's moon, and planets and identifying their orbits AND</u>				S	R			
	<u>identifying the role that gravity plays in forming stars, planets, and the solar system</u>				S	BA			
8	by doing both of the following:	na	na	na	PS	RBA	H	na	
	describing the relative locations of the Sun, Earth, Earth's Moon, and planets and identifying their orbits;	-	-	-	S	R	-	-	-
	describing how the path of the Sun changes over a day,	-	-	-	P	R	-	-	Found at grade 3-5 Wording is misleading..the path does not change
	describing how the path of the Sun in the sky differs for different changes over the seasons, and/or	-	-	-	P	R	-	-	What does this mean—"...differs for different changes over the seasons" (higher in the sky, lower in the sky)
	describing the Sun as a star that gives off light like other stars.	-	-	-	P	R	-	-	-
	<u>identifying the role that gravity plays in forming stars, planets, and the solar system</u>				S	BA			
	<u>Identifying the role that gravity plays in keeping moons in position around planets and planets around stars.</u>				S	BA			

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rational

Earth

Indicator D2

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
describing the properties of Earth’s surface materials, the processes that change them, and cycles that affect Earth by:									
3		S	S	P	N	R	H	L	
	identifying the different forms that water can take in the weather.								
4	by doing <u>one</u> BOTH of the following:	S	S	S	P	R	H	<u>SL</u>	
	demonstrating understanding of Earth’s weather by matching weather to the effects it can have on the surface of Earth (erosion or weathering) AND	-	S	S	P	R	-		
	describing the effects of the differences on people and their environments.	-	P	P	P	R	-	-	What does this mean? Differences in what...weather, seasons? The MLRs do not cover the effect of weather on people
	<u>Matching weather to the effects it can have on the surface of Earth (erosion or weathering) and/or</u>		<u>S</u>	<u>S</u>	<u>P</u>	<u>R</u>			
	<u>Identifying factors that can influence temperature in the environment (day/night cycle, cloud cover, and presence of a star)</u>		<u>S</u>	<u>P</u>	<u>P</u>	<u>R</u>			

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rational

Earth

Indicator D2

Student understands the universal nature of matter, energy, force, and motion, and identifies how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe by:

LoC	AGLE	LoC to next	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
describing the various cycles, physical and biological forces and processes, positions in space, energy transformations, and human actions that affect the short-term and long-term changes to Earth by:									
5	doing both of the following:	S	na	P <u>S</u>	P	R	S <u>H</u>	L	Identifying climates and describing the seasons were not viewed as more complex than relating weather to erosion and describing the effects of weather on people and environments. LoC 4 may even require more sophisticated cognitive abilities than LoC 5.
	identifying different climates AND	-	-	P	P	R			
	describing the seasons.	-	-	P	P	R			
	<u>Describing climates in different regions of the world AND</u>			<u>S</u>	<u>P</u>	<u>R</u>			
	<u>Describing seasonal changes for different locations of earth (polar regions, equator, northern hemisphere vs. southern hemisphere)</u>			<u>S</u>	<u>P</u>	<u>R</u>			
6	by doing one or more of the following:	S	na	S	P	R	H	L	
	identifying slow and abrupt changes to Earth (like volcanoes and earthquakes versus erosion and weathering), and/or			S	P	R			
	describing what happens to objects on Earth when they are dropped.			S	P	R			

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Biodiversity

Indicator E1

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next	Link to PIs			DoK	Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
6	by doing one or more of the following:	S	na	S	P	R	H	L	
	identifying how external (or internal) features can influence how an animal or plant gets food, and/or			S	P	R			
	differentiate among living things that make their food, living things that eat their food and those that do not clearly belong in one group or the other.			S	P	R			“differentiate” should be “differentiating”
describing and analyzing the evidence for relatedness among and within diverse populations of organisms and the importance of biodiversity by:									
7	<u>Doing both of the following</u>	S	na	na	PS	R	H	L	
	describing environments that have many different types of organisms and those that have fewer types of organisms <u>AND</u>				P S	R			
	<u>Identifying ways that organisms are related using physical evidence such as presence or absence of a backbone.</u>				S	BA			
8		na	na	na	S	BA	H	na	
	predicting possible changes that could result if the numbers of different types of organisms were to be drastically reduced.								

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rational

Ecosystems

Indicator E2

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next Loc	Link to PIs			DoK	Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
examining how the characteristics of the physical, non-living environment, the types and behaviors of living organisms, and the flow of matter and energy affect organisms and the ecosystem of which they are part by									
6	by doing two of the following:	S	na	S	P	R	H	L	
	identifying different things in an environment that organisms compete for in an environment,		na	S	P	R			
	identifying organisms as those that eat other organisms, are eaten, or recycle material, and/or		na	S	P	R			
	explaining how matter is transferred in an ecosystem.		na	S	S	R/BA			
describing and analyzing the interactions, cycles, and factors that affect short-term and long-term ecosystem stability and change by									
7	doing one of the following:	S	na	na	<u>PS</u>	<u>RBA</u>	H	L	
	explaining ways in which organisms depend upon and interact within their environment, and/or	-		-	P	R	-		
	explaining ways in which organisms depend upon, interact within, and change the living and non-living environment.	-	na	-	S	R	-		
	<u>explaining ways in which organisms depend upon, interact within, and change the living and nonliving environment.</u>				<u>S</u>	<u>BA</u>			

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Ecosystems

Indicator E2

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next Loc	Link to PIs			DoK	Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
8		Na	na	na	S	R	H	na	
	explaining things which can limit how many plants and animals can survive in an area.								

Key: red font = deleted text; black underlined font = new text; yellow cell = alignment judgment; purple cell = unchanged LoC with rational

Cells

Indicator E3

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
describing how living things are made up of one or more cells and the ways cells help organisms meet their basic needs by:									
1		S	NS	n	N	RN	na	L	
	identifying given parts of the human body.								
2		S	NS	N	N	RN	H	L	
	matching animals and/or plants to their parts.								
3		S	S	P	N	R	H	L	
	identifying parts that allow living things to meet basic needs.								
4		S	S	P	P	R	H	L	
	identifying structures and/or processes that help given organisms stay alive.								
describing the hierarchy of organization and function in organisms, and the similarities and differences in structure, function, and needs among and within organisms by:									
5	doing one of the following:	S	na	NS	NP	BAR	H	L	
	drawing or describing things seen when using a microscope or viewing an image of something seen through a microscope.								

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Cells

Indicator E3

Student understands that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Student understands the similarities and differences between humans and other organisms and the interconnections of these interdependent webs by:

LoC	AGLE	LoC to next LoC	Link to PIs			DoK	LoC Complexity		Comments (use back if needed)
			K-5	6-8	HS		Prev	Next	
	<u>Identifying that some living things are made of one cell and some living things are made of many cells, and/or</u>			<u>S</u>	<u>P</u>	<u>R</u>			
	<u>Identifying that all living things (single-celled and multi-celled) must have ways to get food and get rid of wastes.</u>			<u>S</u>	<u>P</u>	<u>R</u>			
6	by doing both of the following:	S	na	S	P	R	H	L	
	identifying that some living things are made of one cell and some living things are made of many cells AND			S	P	R			
	identifying that all living things(single-celled and multi-celled) must have ways to get food and get rid of wastes.			S	P	R			

