<table>
<thead>
<tr>
<th>NESSC States</th>
<th>LIS Schools</th>
<th>Students in LIS Schools</th>
<th>% of Secondary School students</th>
<th>Graduation rate increase across all 5 states 2010-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>56</td>
<td>47,316</td>
<td>11.9</td>
<td>3.67</td>
</tr>
</tbody>
</table>

- **No of policy objectives**: 3
- **Conference Attendees 2013**: 485
- **No of additional students this represents**: 5,586
- **No of Leadership in Action Briefs recipients**: 11
- **No of LIA brief recipients**: 6,710
- **No of Webinars offered 2012-13**: 13

Average number of participating sites = 100

**MARCH 2013**
THE NEW ENGLAND SECONDARY SCHOOL CONSORTIUM is a pioneering partnership committed to fostering forward-thinking innovations in the design and delivery of secondary education across the New England region. The five partner states of Connecticut, Maine, New Hampshire, Rhode Island, and Vermont believe that our bold vision, shared goals, and innovative strategies will empower us to close persistent achievement gaps, promote greater educational equity and opportunity for all students, and lead our educators into a new era of secondary schooling.

1. Increasing five-year graduation rates across each of our five states.
2. Decreasing annual dropout rates.
3. Increasing the percentage of students enrolling in two- and four-year college degree programs or pursuing accredited, industry-certified postsecondary certificates.
4. Increase the percentage of students who graduate from high school college-ready.

Our five states are committed to pursuing three long-term objectives:

1. Diplomas that certify readiness for life: High school graduation decisions that are based on students demonstrating proficiency on learning standards.
2. Student-centered learning opportunities: Personalized and flexible proficiency-based learning pathways for all students.
3. Measuring what matters most: Learner-centered accountability systems that utilize multiple measures of student achievement.

The Consortium brings together state leaders and educators together to pursue three overarching strategies:

Policy: Advance a state-led policy agenda focused on three critical, high-leverage areas of schooling in the 21st century: graduation decisions, learning pathways, and accountability systems.

Practice: Connect and support practicing educators across states through networking activities, best-practice exchange, and our League of Innovative Schools.

Public Will: Build public understanding of and support for more innovative approaches to educating today’s students.

Strong schools are the best job-creation program we have. Imagination, expertise, creativity, entrepreneurialism—these are the assets that drive innovation, create new industries, and produce the most sought-after workers. Preparing every student for success will strengthen our economy and empower our communities.

Strong schools are the foundation of our society. Democracy, opportunity, prosperity, equality—the values that have defined America—depend on an informed, engaged, well-educated citizenry. To prepare the next generation of citizens and leaders, we need great schools for every student.

Strong schools create strong communities. Schools are the cornerstones of our communities. We celebrate our students, cheer on our local teams, and welcome graduates into our workplaces, institutions, and families. To keep our communities vibrant, prosperous, and thriving, we need great schools.
New England Secondary School Consortium Council

**MEMBERSHIP**
commissioners and deputy commissioners of education, state legislators, state board members, governors’ representatives, business leaders, state SEA leads, Nellie Mae Education Foundation, New England Board of Higher Education, New England Association of Schools and Colleges

**RESPONSIBILITIES**
overall leadership, advocacy, and support for all NESSC activities

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**Great Schools Partnership**

**MEMBERSHIP**
GSP staff and liaisons

**RESPONSIBILITIES**
facilitation and coordination of NESSC activities and communications

---

**SEA Leads Team**

**MEMBERSHIP**
state SEA leads and liaisons

**RESPONSIBILITIES**
leadership and coordination of NESSC activities; primary SEA representatives

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**SEA Implementation Team**

**MEMBERSHIP**
state SEA leads and liaisons

**RESPONSIBILITIES**
coordination of in-state NESSC activities; participation on strategic action teams

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**Policy Strategic Action Team**

**MEMBERSHIP**
commissioners, SEA leads, state policy makers, key SEA staff, liaisons

**RESPONSIBILITIES**
development of the NESSC regional policy framework and implementation plan; preparation of the framework for SEA lead and Council approval; state-by-state implementation support

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**League of Innovative Schools Strategic Action Team**

**MEMBERSHIP**
SEA leads, key SEA staff, K-12 leaders, higher education representatives, liaisons

**RESPONSIBILITIES**
development of the LIS framework and plan; preparation of materials for SEA lead and Council approval; state-by-state implementation support

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**Messaging Strategic Action Team**

**MEMBERSHIP**
SEA directors of communication, SEA leads, liaisons

**RESPONSIBILITIES**
development of the NESSC messaging and communications plan; advising on the design of messaging tools; support for and execution of in-state and regional communication and messaging activities

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**Data Strategic Action Team**

**MEMBERSHIP**
SEA data coordinators, liaisons

**RESPONSIBILITIES**
development of the NESSC’s common regional performance metrics and methodologies; collecting and reporting state data; creating a rationale for official state adoption of NESSC metrics for SEA lead and Council approval
§4722-A. Proficiency-based diploma standards

Beginning January 1, 2017, a diploma indicating graduation from a secondary school must be based on student demonstration of proficiency as described in this section. The commissioner may permit a school administrative unit to award diplomas under this section prior to January 1, 2017 if the commissioner finds that the unit’s plan for awarding diplomas meets the criteria for proficiency-based graduation under this section. [2011, c. 669, §7 (NEW).]

1. Requirements for award of diploma. In order to receive a diploma indicating graduation from secondary school, a student must:
   A. Demonstrate that the student engaged in educational experiences relating to English language arts, mathematics and science and technology in each year of the student’s secondary schooling; [2011, c. 669, §7 (NEW).]
   B. Demonstrate proficiency in meeting state standards in all content areas of the system of learning results established under section 6209; [2011, c. 669, §7 (NEW).]
   C. Demonstrate proficiency in each of the guiding principles set forth in department rules governing implementation of the system of learning results established pursuant to section 6209; and [2011, c. 669, §7 (NEW).]
   D. Meet any other requirements specified by the governing body of the school administrative unit attended by the student. [2011, c. 669, §7 (NEW).]

2. Method of gaining and demonstrating proficiency. Students must be allowed to gain proficiency through multiple pathways, as described in section 4703, and must be allowed to demonstrate proficiency by presenting multiple types of evidence, including but not limited to teacher-designed or student-designed assessments, portfolios, performance, exhibitions and projects. [2011, c. 669, §7 (NEW).]

3. Exceptions. Notwithstanding subsection 1, a student may be awarded a diploma indicating graduation from a secondary school in the following circumstances.
   A. A child with a disability, as defined in section 7001, subsection 1-B, who achieves proficiency as required in subsection 1, as specified by the goals and objectives of the child’s individualized education plan, may be awarded a high school diploma. [2011, c. 669, §7 (NEW).]
   B. A student who has satisfactorily completed the freshman year in an accredited degree-granting institution of higher education may be eligible to receive a high school diploma from the school the student last attended. [2011, c. 669, §7 (NEW).]
   C. A student who experiences education disruption, as described in section 5001-A, subsection 4,
paragraph F, who successfully demonstrates proficiency as required in subsection 1 as set forth in the student’s school work recognition plan as defined in section 5161 must, with the approval of the commissioner, be awarded a Department of Education diploma as defined in section 5161. [2011, c. 669, §7 (NEW).]

D. A school administrative unit may award a high school diploma to a student who has met the standards set forth in a waiver request that was approved by the commissioner pursuant to section 4502, subsection 8. [2011, c. 669, §7 (NEW).]

E. A person may be awarded a high school diploma, including a posthumous award, if the person or a family member of the person applies to a secondary school and:

(1) The person:
   (a) Attended a secondary school in the geographic area now served by the secondary school from which a diploma is requested; or
   (b) Resides at the time of application for a diploma in the geographic area served by the secondary school from which a diploma is requested;

(2) The person did not graduate or receive a diploma from a secondary school because the person left secondary school to serve in the Armed Forces and served during the following periods:
   (a) World War II, from December 7, 1941 to August 16, 1945;
   (b) The Korean Conflict; or
   (c) The Vietnam War era, from February 28, 1961 to May 7, 1975; and

(3) The person received an honorable discharge or a certificate of honorable service from the Armed Forces.

For the purposes of this paragraph, “Armed Forces” means the United States Army, Navy, Air Force, Marine Corps, Coast Guard and the Merchant Marines. [2011, c. 669, §7 (NEW).]

[ 2011, c. 669, §7 (NEW) .]

4. Grants; contingent extension of full implementation. During the period of transition to proficiency-based graduation in accordance with this section, the department, if funds are available, shall make annual transition grants to each school administrative unit equal to 1/10 of 1% of the school administrative unit’s total cost of education calculated under section 15688, subsection 1 to be used in the manner determined by the school administrative unit to fund the costs of the transition not otherwise subsidized by the State. The date for implementation of the awarding of diplomas based on student demonstration of proficiency as described in this section is extended one year for each year for which transition grants are not made available to a school administrative unit or for which levels of general purpose aid for local schools fall below school year 2012-2013 levels.

[ 2011, c. 669, §7 (NEW) .]

SECTION HISTORY
2011, c. 669, §7 (NEW).

GRADUATION REQUIREMENTS

Overview
The long-standing practice in American high schools has been the awarding of a high school diploma based on the accumulation of credits awarded for courses passed. This practice of awarding credits has not ensured competency based on demonstrated performance. Thus, many students have received a high school diploma, but are not prepared adequately to be successful in their postsecondary pursuits.

To address this problem, the Passamaquoddy School District has adopted a standards-based system of learning. Beginning with students who enter Meddybemps High School as members of the Class of 2018, every graduate, in order to be successful in the workplace and in postsecondary learning experiences – to be college and career ready -- will need to demonstrate what they know, what they can do, and how well they can do it. This Meddybemps High School standards and proficiency-based diploma provides evidence that our graduates have acquired the knowledge and skills – the competency -- to move on to postsecondary experiences.

Further, the proficiency-based diploma system guides the implementation of interventions, supports, and flexible learning pathways for students.

Communicating Graduation Requirements
Prior to entering high school, students and their parents need to know the standards for attaining a high school diploma in order to plan an appropriate, sequential, educational program to meet that goal.

The Superintendent, through the high school principal or other designee, shall be responsible for making accurate information concerning diploma requirements available to incoming students and their parents in the spring prior to the start of their ninth grade school year. An overview of graduation requirements will be disseminated to all incoming ninth grade students at the time of course selection. This policy will also be referenced in each edition of the high school student handbook and on the school district website.

The Board has approved the following schedule of minimum requirements for graduation, which includes minimum requirements specified by the State of Maine. The Board is aware that current law and regulations are subject to change.

The Board expects the Superintendent/designee to inform students and parents as soon as practical of any additional standards established by the State that must be met before students may be awarded a high school diploma.

Academic Requirements for Graduation from Meddybemps High School
For the Meddybemps High School Classes of 2013 – 2017 the following graduation requirements remain in effect.
(NOTE: list present requirements here as a transition to 2018 – to be phased out, beginning with present 7th graders, the Class of 2018)

A. Commencing with the Class of 2018, every Meddybemps High School student will demonstrate proficiency in meeting standards in the following content areas of the Maine Learning Results. Meeting the standards entails demonstrating proficiency on each standard prior to graduation.

- English Language Arts
- Mathematics
- Science and Technology
- Social Studies
- Health Education and Physical Education
- Visual and Performing Arts
- World Languages
- Career and Education Development (embedded in the other content areas)
To satisfy graduation requirements all students must be engaged in educational learning experiences in the content areas of English Language Arts, Mathematics, Science and Technology in each year of their secondary school program.

B. All graduating students must meet the cross content performance standards set forth by the Maine Learning Results’ “Guiding Principles.”

All students will graduate from Meddybemps High School as a:

- Clear and effective communicator
- Self-directed and life-long learner
- Creative and practical problem solver
- Responsible and involved citizen
- Integrative and informed thinker.

C. Every student will complete a capstone research project, through which students will demonstrate their knowledge and skills in conducting in-depth research, as well as proficiency in the presentation of their research through the application of technology.

D. Every student will complete an application to a post-secondary educational institution, training program, or other experience to provide an opportunity for continued growth.

E. Most students will satisfy graduation requirements during a four-year experience; however, students may fulfill the requirements for a diploma in a time period that is accelerated or lengthened, based on their individual needs. These students are expected to develop a Personal Learning Plan with assistance from counselors, teachers and/or administrators.

Additional Considerations Applicable to the Awarding of a Diploma

In order to pursue a multiple pathway to graduation a student must have a Personal Learning Plan detailing how the student will demonstrate competency when a pathway is in lieu of core academic experiences. Each option must provide a quality learning experience that is rigorous. Multiple pathway experiences will be determined, assessed, and documented through the school. Pathway options include the following:

- Early College / Dual Enrollment Courses
- Career and Technical Education Programming
- Online / Virtual Learning
- Alternative / At-Risk Programming
- Apprenticeships / Internships & Additional Field Work and/or Exchange Experiences
- Adult Education

Transfer Students

For students who transfer to Meddybemps High School from another state, country, home schooling program, or from an educational program that is not required to be aligned with the content standards of the Maine Learning Results, the Principal shall determine the value of the student’s prior educational experience towards meeting graduation requirements for a high school diploma. These students will need to satisfy all credit requirements, assessment requirements, and proficiency requirements in the appropriate content subject areas. The Superintendent will ultimately determine whether these students are certified to receive a diploma.

Home-schooled Students

For home-schooled students wishing to receive a diploma from Meddybemps High School, the Principal shall determine the value of the student’s prior educational experience towards meeting graduation credit requirements. A home-schooled student must have attended Meddybemps High School for a minimum of two (2) semesters in order to receive a Meddybemps High School diploma.

Students Receiving Special Education Services

Students who successfully meet the graduation requirements, as specified in the goals and objectives of their Individualized Education Plans (IEP), will be awarded diplomas.

Delayed Awarding of Diplomas
A student who leaves high school to attend an accredited, degree-granting institution of higher education may upon satisfactory completion of the freshman year be awarded a high school diploma, provided that the student has notified the Principal at the time of the early admission.

Extended Study
Students are eligible for extended years of study to complete the requirements of a diploma if they have not reached the age of 20 at the start of the school year. Students eligible for extended years of study may be referred to adult education or other resources.

Participation in Graduation Ceremony
A student must complete all Board requirements for a high school diploma to participate in graduation exercises.

Legal Reference: 20-A M.R.S.A. § 4722-A (as revised) Proficiency-based Diploma Standards Ch. 127 § 7 (Me. Dept. of Ed. Rule) (as revised)

Cross Reference: IHCDA – Post-Secondary Enrollment Options
IK – Assessment of Student Performances
IKFA – Early Graduation
Proficiency-Based Learning Simplified

The Cross-Curricular Graduation Standards are drawn from the Guiding Principles of the Maine Learning Results, which include the Common Core State Standards and are anticipated to include the Next Generation Science Standards, and relevant national college- and career-ready standards documents.

The Content-Area Graduation Standards are drawn from the Maine Learning Results, the Common Core State Standards, the Next Generation Science Standards, and relevant national college- and career-ready standards documents.

<table>
<thead>
<tr>
<th>Required for Graduation</th>
<th>Reporting Method</th>
<th>Assessment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YES</strong></td>
<td>Transcript</td>
<td><strong>Cross-Curricular</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Graduation Standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-8 school-wide standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Demonstration by Body of Evidence</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Portfolios, exhibitions, and other culminating demonstrations of learning are assessed</td>
</tr>
<tr>
<td><strong>YES</strong></td>
<td>Transcript and Report Cards</td>
<td><strong>Content-Area</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Graduation Standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-8 standards per content area</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Verification and Proficiency</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Student progress toward the achievement of standards is determined and reported</td>
</tr>
<tr>
<td><strong>NO</strong></td>
<td>Progress Reports</td>
<td><strong>Performance Indicators</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-10 indicators per content-area standard</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Common School-Wide Assessments</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Common summative assessments ensure greater consistency in the evaluation of student learning</td>
</tr>
<tr>
<td><strong>NO</strong></td>
<td>Feedback to Student</td>
<td><strong>Unit-Based Learning Objectives</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guided by essential questions, teachers use daily learning targets to create progressions that move students toward the demonstration of performance indicators</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Formative Teacher Assessments</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ongoing formative assessment is used to evaluate student learning progress</td>
</tr>
</tbody>
</table>

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The graphic below represents four general assessment options for learning pathways in a proficiency-based education system, as well as the potential compromises and outcomes that result from each option. When learning experiences, demonstration tasks, and scoring guides are common, students will inevitably be given less choice in their learning; when all three are unique, more student choice is possible, but results are no longer comparable and it is harder to maintain consistent learning expectations and assessment practices across courses, content areas, and grade levels. Common scoring guides establish the expectations for learning—the definition of proficiency and the criteria against which proficiency is measured—and well-designed common scoring guides can promote greater validity, reliability, and comparability of learning outcomes when students are pursuing personalized learning pathways. It is important to note that valid and reliable results are only a potential outcome of each option—such results are not assured, although common scoring guides can significantly increase the likelihood that grading and reporting will be both valid and reliable.

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# English Language Arts

## Sample Graduation Standards and Performance Indicators

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### English Language Arts: Reading Foundations

**READING FOUNDATIONS**

Understand concepts of print and basic conventions of English (CCRF). *Proficiency in this area should be demonstrated by the end of grade 5, at which point students should apply these skills into their daily reading routine.*

<table>
<thead>
<tr>
<th>Fifth-Grade Performance Indicators</th>
<th>Eighth-Grade Performance Indicators</th>
<th>High School Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Demonstrate an understanding of the organization and basic features of print. (RF.1)</td>
<td><strong>Applied in reading comprehension and interpretation performance indicators.</strong></td>
<td><strong>Applied in reading comprehension and interpretation performance indicators.</strong></td>
</tr>
<tr>
<td>B. Demonstrate an understanding of spoken words, syllables and sounds (phonemes). (RF.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Know and apply grade level phonics and word-analysis skills in decoding words. (RF.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Read with sufficient accuracy and fluency to support comprehension. (RF.4)</td>
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</tbody>
</table>

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### English Language Arts Graduation Standard 1

**READING COMPREHENSION**

Read and comprehend appropriately complex literary and informational texts independently and proficiently. (CCRA 10)

<table>
<thead>
<tr>
<th>Fifth-Grade Performance Indicators</th>
<th>Eighth-Grade Performance Indicators</th>
<th>High School Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Determine the theme of a story, drama or poem from details in the text; summarize the text. (RL.2)</td>
<td>A. Determine the theme or central ideas of the text, analyze its development including its relationship to character, setting, and plot, and provide an objective summary. (RL.2)</td>
<td>A. Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text. (RL.2)</td>
</tr>
<tr>
<td>B. Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text. (RL.2)</td>
<td>B. Determine a central idea of the text, analyze its development including its relationship to</td>
<td></td>
</tr>
</tbody>
</table>
Interpret, analyze, and evaluate appropriately complex literary and informational texts. (CCRA 7, 10)

A. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (RL+RI.1)

B. Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more literary and informational texts. (RL+RI.5)

C. Analyze multiple accounts of the same event or topic, noting important similarities and differences in the point of view they represent. (RL+RI.6)

D. Analyze how visual and multimedia elements contribute to the meaning, tone, or beauty of a text. (RL.7)

E. Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to support an answer. (RL+RI.7)

F. Examine the relationships or interactions between two or more individuals, events, ideas, or concepts in a literary or informational text based on specific information in the text. (RL+RI.3)

B. Compare and contrast the structure of two or more literary and informational texts and analyze how the differing structure of each text contributes to its meaning and style. (RL+RI.5)

C. Determine an author’s point of view, purpose, or rhetorical strategies in a text, analyzing how conflicting evidence and points of view impact the text, or how a character’s point of view creates effects such as suspense or humor. (RI+RL.6)

D. Determine the meaning of words and phrases as they are used in the text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone. (RL+RI.4; L.4,5,6)

E. Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to support an answer. (RL+RI.7)

B. Determine the central ideas of a text, analyze their development, and provide an objective summary. (RI.2)

C. Analyze how any genre of text makes connections among and distinctions between individuals, ideas, or events. (RL+RI.3)

D. Determine the meaning of words and phrases as they are used in the text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone. (RL+RI.4; L.4,5,6)

E. Delineate and evaluate the argument and supporting ideas, and provide an objective summary. (RI.2)
solve a problem efficiently. (RI.7)

F. Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s). (RI.8)

G. Integrate and compare information from several texts on the same topic, or in the same genre, in order to write or speak about the subject knowledgeably. (RL+RI.9)

specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize irrelevant. (RI.8)

F. Analyze how multiple texts demonstrate factual or interpretive agreement, conflict, or different information on the same topic, and draw on themes, patterns or character types from a variety of literary and informational texts. (RL+RI.9)

E. Delineate and evaluate the argument and specific claims in a text, including seminal U.S. texts, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning. (RI.8)

F. Integrate information from diverse sources, including foundational U.S. documents, into a coherent understanding of an idea or event, noting discrepancies and agreement among sources. (RL+RI.9)

English Language Arts Graduation Standard 3

WRITING ARGUMENTS
Write clear and coherent arguments for a range of tasks, purposes, and audiences. (CCWA 1, 4,10)

Fifth-Grade Performance Indicators
Write opinion pieces on topics or texts, supporting a point of view with reasons and information that: (W.1)

A. Introduce a topic or text clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support the writer’s purpose. (W.1a)

B. Provide logically ordered reasons that are supported by facts and details. (W.1b)

C. Link opinion and reasons using words, phrases, and clauses. (W.1c)

D. Provide a concluding statement or section related to the opinion presented. (W.1d)

Eighth-Grade Performance Indicators
Write arguments to support claims with clear reasons and relevant evidence that: (W.1)

A. Introduce claim(s), acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. (W.1a)

B. Support claim(s) with logical reasoning and relevant evidence. (W.1b)

C. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. (W.1c)

D. Establish and maintain a formal style. (W.1d)

E. Provide a concluding statement or section that follows from and supports the argument presented. (W.1e)

High School Performance Indicators
Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence that: (W.1)

A. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), and distinguish the claim(s) from alternate or opposing claims. (W.1a)

B. Develop claim(s) and counterclaims fairly and thoroughly. (W.1b)

C. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. (W.1c)

D. Establish and maintain a formal style and objective tone. (W.1d; W.2e)

E. Provide a concluding statement or section that follows from and supports the argument presented. (W.1e)
### English Language Arts Graduation Standard 4

**WRITING INFORMATIVE AND NARRATIVE TEXTS**

Produce clear and coherent informative and narrative writing for a range of tasks, purposes, and audiences. (CCWA 2, 3, 4, 10)

<table>
<thead>
<tr>
<th>Fifth-Grade Performance Indicators</th>
<th>Eighth-Grade Performance Indicators</th>
<th>High School Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write informative/explanatory texts to examine a topic and convey ideas and information that: (W.2; L.3)</td>
<td>Write informative/explanatory texts to examine and convey ideas, concepts, and information that: (W.2; L.3)</td>
<td>Write informative/explanatory texts to examine and convey complex ideas, concepts, and information that: (W.2; L.3)</td>
</tr>
<tr>
<td>A. Introduce a topic clearly, provide a general observation and focus, and group related information logically. (W.2a)</td>
<td>A. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories. (W.2a)</td>
<td>A. Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole. (W.2a)</td>
</tr>
<tr>
<td>B. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic. (W.2b)</td>
<td>B. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. (W.2b)</td>
<td>B. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic. (W.2b)</td>
</tr>
<tr>
<td>Write narratives to develop real or imagined experiences or events that: (W.3)</td>
<td>Write narratives to develop real or imagined experiences or events that: (W.3)</td>
<td>Write narratives to develop real or imagined experiences or events that: (W.3)</td>
</tr>
<tr>
<td>C. Orient the reader by establishing a situation and introducing a narrator and/or characters; organize an event sequence that unfolds naturally. (W.3a)</td>
<td>C. Engage and orient the reader by establishing a context and point of view and introducing a narrator and/or characters; organize an event sequence that unfolds naturally and logically. (W.3a)</td>
<td>C. Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events. (W.3a)</td>
</tr>
<tr>
<td>D. Use narrative techniques, such as dialogue, description, and pacing, to develop experiences and events or show the responses of characters to situations. (W.3b)</td>
<td>D. Use narrative techniques, such as dialogue, pacing, description, and reflection, to develop experiences, events, and/or characters. (W.3b)</td>
<td>D. Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters. (W.3b)</td>
</tr>
<tr>
<td>For both informative and narrative pieces of writing:</td>
<td>For both informative and narrative pieces of writing:</td>
<td>For both informative and narrative pieces of writing:</td>
</tr>
<tr>
<td>E. Use a variety of transitional words, phrases, and clauses to manage the sequence of events and link ideas. (W.2c; W.3c)</td>
<td>E. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas, concepts, events and/or experiences. (W.2c; W.3c)</td>
<td>E. Use appropriate and varied techniques, transitions and syntax to link the major sections of the text, create cohesion, clarify the relationships among complex ideas and concepts, and build toward a particular outcome. (W.2c; W.3c)</td>
</tr>
<tr>
<td>F. Use precise language, domain-specific vocabulary, and sensory details to explain a topic or convey experiences. (W.2d; W.3d)</td>
<td>F. Use precise language, domain-specific vocabulary, and descriptive details explain a topic or convey experiences. (W.2d; W.3d)</td>
<td></td>
</tr>
<tr>
<td>G. Provide a conclusion that follows from the narrated experiences or events or the information presented. (W.2f; W.3e)</td>
<td>G. Provide a conclusion that follows from the narrated experiences or events or the information presented. (W.2f; W.3e)</td>
<td></td>
</tr>
</tbody>
</table>
**English Language Arts Graduation Standard 5**

**WRITING PROCESS**
Develop and strengthen writing. (CCWA 5)

<table>
<thead>
<tr>
<th>Fifth-Grade Performance Indicators</th>
<th>Eighth-Grade Performance Indicators</th>
<th>High School Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.</strong> With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (W.5)</td>
<td><strong>A.</strong> With some guidance, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed. (W.5)</td>
<td><strong>A.</strong> Independently develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (W.5)</td>
</tr>
<tr>
<td><strong>B.</strong> Demonstrate a grade-level appropriate command of the conventions of standard English grammar and usage when writing. (L.1; L.2)</td>
<td><strong>B.</strong> Demonstrate a grade-level appropriate command of the conventions of standard English grammar and usage when writing. (L.1; L.2)</td>
<td><strong>B.</strong> Demonstrate command of the conventions of standard English grammar and usage when writing (L.1; L.2).</td>
</tr>
<tr>
<td><strong>C.</strong> With some guidance and support from adults, use technology to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting. (W.6)</td>
<td><strong>C.</strong> Use technology to produce and publish writing, and present the relationships between information and ideas efficiently, as well as to interact and collaborate with others. (W.6)</td>
<td><strong>C.</strong> Use technology to produce, publish and update individual or shared writing products in response to ongoing feedback, including new arguments or information. (W.6)</td>
</tr>
<tr>
<td><strong>D.</strong> Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships (e.g., however, although, nevertheless, similarly, moreover, in addition). (L.6)</td>
<td><strong>D.</strong> Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression. (L.6)</td>
<td><strong>D.</strong> Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression. (L.6)</td>
</tr>
</tbody>
</table>
**English Language Arts Graduation Standard 6**

**WRITING RESEARCH:**
Conduct short and sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. (CCWA 7, 10)

<table>
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</thead>
<tbody>
<tr>
<td>A. Recall relevant information from experiences or gather relevant information from print and digital sources. (W.8)</td>
<td>A. Collect relevant information from multiple print and digital sources. (W.8)</td>
<td>A. Collect relevant information from multiple print and digital sources. (W.8)</td>
</tr>
<tr>
<td>B. Summarize or paraphrase information in notes and finished work, and provide a list of sources. (W.8)</td>
<td>B. Quote and paraphrase data and conclusions of others, while avoiding plagiarism and following a standard citation format. (W.8)</td>
<td>B. Integrate accurate information into the text selectively and purposefully to maintain the flow of ideas, while following a standard citation format and avoiding plagiarism and overreliance on any one source. (W.8)</td>
</tr>
<tr>
<td>C. Draw evidence from literary or informational texts to support analysis, reflection, and research, integrating information from several texts. (W.9)</td>
<td>C. Draw evidence from literary or informational texts to support analysis, reflection, and research, integrating how multiple texts or works of literature demonstrate factual or interpretive agreement, conflict, or different information on the same topic. (W.9)</td>
<td>C. Draw evidence from literary or informational texts to support analysis, reflection and research, integrating information from diverse sources into a coherent understanding of an idea or event, noting discrepancies and agreement among sources. (W.9)</td>
</tr>
</tbody>
</table>

**English Language Arts Graduation Standard 7**

**SPEAKING AND LISTENING DISCUSSION:**
Initiate and participate effectively in a range of discussions, responding thoughtfully to diverse perspectives, and expressing ideas clearly and persuasively. (CCSLA 1)

<table>
<thead>
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<th>Fifth-Grade Performance Indicators</th>
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</tr>
</thead>
<tbody>
<tr>
<td>A. Explicitly draw on texts and other information known about the topic to explore ideas under discussion. (SL.1a)</td>
<td>A. Refer to evidence on the topic, text or issue to probe and reflect on ideas under discussion, and acknowledge evidence presented by others. (SL.1a,d)</td>
<td>A. Refer to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. (SL.1a)</td>
</tr>
<tr>
<td>B. Follow agreed-upon rules for discussions and carry out assigned roles. (SL.1b)</td>
<td>B. Follow rules for collegial discussions and decision-making, track progress toward goals and deadlines, and define individual roles as needed. (SL.1b)</td>
<td>B. Operate effectively in a group to promote a civil exchange of ideas that probes reasoning and evidence. (SL.1b,c)</td>
</tr>
<tr>
<td>C. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others. (SL.1c)</td>
<td></td>
<td>C. Respond thoughtfully to diverse perspectives;</td>
</tr>
</tbody>
</table>
D. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions. (SL.1d)

E. Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally. (SL.2)

F. Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence. (SL.3; L.3)

C. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas. (SL.1c)

D. Analyze the purpose of information presented in diverse formats and media and evaluate the motives behind its presentation. (SL.2)

E. Delineate a speaker's argument and claims, evaluating the soundness of reasoning, sufficiency of evidence, and identify when irrelevant evidence is introduced. (SL.3; L.3)

D. Integrate multiple sources of information presented in diverse formats and media to make informed decisions and solve problems. (SL.2)

E. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric. (SL.3; L.3)

English Language Arts Graduation Standard 8

**SPEAKING AND LISTENING PRESENTATION:**
Present information, findings, and supporting evidence, conveying a clear and distinct perspective (CCSLA 4)

**Fifth-Grade Performance Indicators**

A. Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes. (SL.4)

B. Speak clearly at an understandable pace. (SL.4)

C. Include multimedia and visual displays in presentations. (SL.5)

D. Adapt speech to a variety of contexts and tasks. (SL.6; L.3)

E. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships (L.6)

**Eighth-Grade Performance Indicators**

A. Present claim and findings in a focused, cohesive manner, emphasizing salient points and relevant evidence. (SL.4)

B. Use appropriate eye contact, adequate volume, and clear pronunciation. (SL.4)

C. Integrate multimedia and visual displays into presentations. (SL.5)

D. Adapt speech to a variety of contexts and tasks. (SL.6; L.3)

E. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression. (L.6)

**High School Performance Indicators**

A. Develop a clear line of reasoning that addresses alternative or opposing perspectives. (SL.4)

B. Use appropriate organization, development, style, and substance appropriate to a range of purposes and audiences for both formal and informal tasks. (SL.4)

C. Make strategic use of digital media in presentations. (SL.5)

D. Adapt speech to a variety of contexts and tasks. (SL.6; L.3)

E. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for speaking and listening at the college- and career-readiness level. (L.6)
Mathematics
Sample Graduation Standards and Performance Indicators

Based on Common Core State Standards in Mathematics (CCSS, 2010). Using the Kentucky Department of Education’s “Progress to High School Conceptual Categories” flow chart, domains within K-8 were embedded in the original five high school domains and interpreted as standards within this proficiency-based learning model. Citations follow a distinct format: grade level, domain, standard, and in some cases, descriptor numbers. Modeling is embedded within the content standards as suggested in the CCSS document.

Mathematics Graduation Standard 1

NUMBER AND QUANTITY
Reason and model quantitatively, using units and number systems to solve problems.

Fifth-Grade Performance Indicators

A. Understand the place value system. (CCSS K.CC.A-C, K.NBT.A.1, 1.NBT.A-B, 2.NBT.A, 4.NBT.A, 5.NBT.A.1-3)
B. Use place value understanding and properties of operations to add and subtract. (CCSS 1.NBT.C, 2.NBT.B)
C. Use place value understanding and properties of operations to perform multi-digit arithmetic. (CCSS 3.NBT.A, 4.NBT.B)
D. Understand fractions as numbers and explain fraction equivalence and ordering. (CCSS 3.NF.A, 4.NF.A)
E. Use equivalent fractions as a strategy to add and subtract fractions. (CCSS 5.NF.A)
F. Apply and extend understandings of operations on whole numbers to build fractions from unit fractions. (CCSS 4.NF.B)
G. Apply and extend understandings of multiplication and division to multiply and divide fractions. (CCSS 5.NF.B)

Eighth-Grade Performance Indicators

A. Understand ratio concepts and use ratio reasoning to solve problems. (CCSS 6.RP.A)
B. Analyze proportional relationships and use them to solve real-world and mathematical problems. (CCSS 7.RP.A)
C. Apply and extend previous understandings of multiplication and division to divide fractions by fractions. (CCSS 6.NS.A)
D. Apply and extend previous understandings of numbers to the system of rational numbers. (CCSS 6.NS.C)
E. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. (CCSS 7.NS.A)

High School Performance Indicators

A. Extend the properties of exponents to rational exponents. (CCSS HSN.RN.A)
B. Use the properties of rational and irrational numbers. (CCSS HSN.RN.B)
C. Reason quantitatively and use units to solve problems. (CCSS HSN.Q.A)
D. Perform arithmetic operations with complex numbers. (CCSS HSN.CN.A.1-2)
E. Use complex numbers in polynomial identities and equations. (CCSS HSN.CN.C.7)
**Mathematics Graduation Standard 2**

**ALGEBRA**
Interpret, represent, create and solve algebraic expressions.

<table>
<thead>
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<th>High School Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Represent and solve problems involving addition, subtraction, multiplication, and division (CCSS 1.OA.A-C, 2.OA.A, 3.OA.A)</td>
<td>A. Apply and extend previous understandings of arithmetic to algebraic expressions. (CCSS 6.EE.A)</td>
<td>A. Interpret the structure of expressions. (CCSS HSA.SSE.A)</td>
</tr>
<tr>
<td>B. Understand and apply properties of operations and the relationship between addition, subtraction, multiplication, and division. (CCSS 2.OA.B-C, 3.OA.B-D)</td>
<td>B. Use properties of operations to generate equivalent expressions. (CCSS 7.EE.A)</td>
<td>B. Write expressions in equivalent forms to solve problems. (CCSS HSA.SSE.B)</td>
</tr>
<tr>
<td>C. Identify factors and multiples of whole numbers. (CCSS 4.OA.B)</td>
<td>C. Solve real-life and mathematical problems using numerical and algebraic expressions and equations. (CCSS 7.EE.B)</td>
<td>C. Perform arithmetic operations on polynomials. (CCSS HSA.APR.A)</td>
</tr>
<tr>
<td>D. Use the four operations with whole numbers to solve problems. (CCSS 4.OA.A)</td>
<td>D. Represent and analyze quantitative relationships between dependent and independent variables. (CCSS 6.EE.C)</td>
<td>D. Understand the relationship between zeros and factors of polynomials. (CCSS HSA.APR.B)</td>
</tr>
<tr>
<td>E. Generate and analyze patterns and relationships. (CCSS 4.OA.C; 5.OA.B)</td>
<td>E. Work with radicals and integer exponents. (CCSS 8.EE.A)</td>
<td>E. Use polynomial identities to solve problems. (CCSS HSA.APR.C.4)</td>
</tr>
<tr>
<td>F. Write and interpret numerical expressions. (CCSS 5.OA.A)</td>
<td>F. Analyze and solve linear equations and pairs of simultaneous linear equations. (CCSS 8.EE.B)</td>
<td>F. Rewrite rational expressions. (CCSS HSA.APR.D.6)</td>
</tr>
<tr>
<td></td>
<td>G. Understand the connections between proportional relationships, lines, and linear equations. (8.EE.C)</td>
<td>G. Create equations that describe numbers or relationships. (CCSS HSA.CED.A)</td>
</tr>
<tr>
<td></td>
<td>H. Understand solving equations as a process of reasoning and explain the reasoning. (CCSS HSA.REI.A)</td>
<td>H. Solve equations and inequalities in one variable. (CCSS HSA.REI.B)</td>
</tr>
<tr>
<td></td>
<td>I. Solve systems of equations. (CCSS HSA.REI.C.5-7)</td>
<td>I. Solve systems of equations. (CCSS HSA.REI.C.5-7)</td>
</tr>
<tr>
<td></td>
<td>J. Represent and solve equations and inequalities graphically. (CCSS HSA.REI.D)</td>
<td>J. Represent and solve equations and inequalities graphically. (CCSS HSA.REI.D)</td>
</tr>
</tbody>
</table>
# Mathematics Graduation Standard 3

## FUNCTIONS
Interpret, analyze, construct, and solve linear, quadratic, and trigonometric functions.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Not applicable</td>
<td>A. Define, evaluate and compare functions. (CCSS 8.F.A)</td>
<td>A. Understand the concept of a function and use function notation. (CCSS HSF.IF.A)</td>
</tr>
<tr>
<td></td>
<td>B. Use functions to model relationships between quantities. (CCSS 8.F.B)</td>
<td>B. Interpret functions that arise in applications in terms of the context. (CCSS HSF.IF.B)</td>
</tr>
<tr>
<td></td>
<td>C. Analyze functions using different representations. (CCSS HSF.IF.C.7A-C,E,8-9)</td>
<td>C.</td>
</tr>
</tbody>
</table>
GEOMETRY:
Prove, understand, and model geometric concepts, theorems, and constructions to solve problems.

**Fifth-Grade Performance Indicators**

A. Identify and describe shapes. (CCSS K.G.A)
B. Analyze, compare, create and compose shapes. (CCSS K.G.B)
D. Draw and identify lines and angles, and classify shapes by properties of their lines and angles. (CCSS 4.G.A)
E. Graph points on the coordinate plane to solve real-world and mathematical problems. (CCSS 5.G.A)
F. Classify two-dimensional figures into categories based on their properties. (CCSS 5.G.B)

**Eighth-Grade Performance Indicators**

B. Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. (CCSS 8.G.C)
C. Draw, construct, and describe geometrical figures and describe the relationships between them. (CCSS 7.G.A)
D. Understand congruence and similarity using physical models, transparencies, or geometry software. (CCSS 8.G.A)
E. Understand and apply Pythagorean Theorem. (CCSS 8.G.B)

**High School Performance Indicators**

A. Experiment with transformations in the plane. (CCSS HSG.CO.A)
B. Understand congruence in terms of rigid motions. (CCSS HSG.CO.B)
C. Prove geometric theorems. (CCSS HSG.CO.C)
D. Make geometric constructions. (CCSS HSG.CO.D)
E. Understand similarity in terms of similarity transformations. (CCSS HSG.SRT.A)
F. Prove theorems involving similarity. (CCSS HSG.SRT.B)
G. Define trigonometric ratios and solve problems involving right triangles. (CCSS HSG.SRT.C)
H. Understand and apply theorems about circles. (CCSS HSG.C.A.1-3)
I. Find arc lengths and areas of sectors of circles. (CCSS HSG.C.B)
J. Translate between the geometric description and the equation for a conic section. (CCSS HSG.GPE.A.1-2)
K. Use coordinates to prove simple geometric theorems algebraically. (CCSS HSG.GPE.B)
L. Explain volume formulas and use them to solve problems. (CCSS HSG.GMD.A.1,3)
M. Visualize relationships between two-dimensional and three-dimensional objects. (CCSS HSG.GMD.B)
N. Apply geometric concepts in modeling situations. (HSG.MG.A)
Mathematics Graduation Standard 5

**STATISTICS & PROBABILITY:**
Interpret, infer and apply statistics and probability to analyze data and reach and justify conclusions.

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</thead>
<tbody>
<tr>
<td>A. Measure, compare and estimate lengths in length units and standard units. (CCSS K.MD.A, 1.MD.A, 2.MD.A-B)</td>
<td>A. Develop understanding of statistical variability. (CCSS 6.SPA)</td>
<td>A. Summarize, represent, and interpret data on a single count or measurement variable. (CCSS HSS.ID.A)</td>
</tr>
<tr>
<td>B. Represent and interpret data. (CCSS K.MD.B, 1.MD.C, 2.MD.D, 3.MD.B, 4.MD.B, 5.MD.B)</td>
<td>B. Summarize and describe distributions. (CCSS 6.SP.B)</td>
<td>B. Summarize, represent, and interpret data on two categorical and quantitative variables. (CCSS HSS.ID.B)</td>
</tr>
<tr>
<td>C. Tell and write time. (CCSS 1.MD.B, 2.MD.C.7)</td>
<td>C. Use random sampling to draw inferences about a population. (CCSS 7.SP.B)</td>
<td>C. Interpret linear models. (CCSS HSS.ID.C)</td>
</tr>
<tr>
<td>D. Solve word problems involving money. (CCSS 2.MD.C.8)</td>
<td>D. Investigate chance processes and develop, use, and evaluate probability models. (CCSS 7.SP.C)</td>
<td>D. Understand and evaluate random processes underlying statistical experiments. (CCSS HSS.IC.A)</td>
</tr>
<tr>
<td>E. Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. (CCSS 3.MD.D)</td>
<td>E. Investigate patterns of association in bivariate data. (CCSS 8.SP.A)</td>
<td>E. Make inferences and justify conclusions from sample surveys, experiments, and observational studies. (CCSS HSS.IC.B)</td>
</tr>
<tr>
<td>F. Geometric measurement: understand concepts of area and volume and relate to multiplication and to addition. (CCSS 3.MD.C, 5.MD.C.3-4)</td>
<td></td>
<td>F. Understand independence and conditional probability and use them to interpret data. (CCSS HSS.CP.A)</td>
</tr>
<tr>
<td>G. Geometric measurement: understand concepts of angle and measure angles. (CCSS 4.MD.C)</td>
<td></td>
<td>G. Use the rules of probability to compute probabilities of compound events in a uniform probability model. (CCSS HSS.CP.B.6-7)</td>
</tr>
<tr>
<td>H. Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. (CCSS 3.MD.A)</td>
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</table>
### Science
Sample Graduation Standards and Performance Indicators

#### Science Graduation Standard 1

**PHYSICAL SCIENCES: STRUCTURE/PROPERTIES OF MATTER, FORCES, AND INTERACTIONS**
Understand and analyze matter, reactions and physical systems as demonstrated through the integration of scientific and engineering practices and cross-cutting concepts (PS 1 + PS 2)

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<tbody>
<tr>
<td>A. Make observations to construct an evidence-based account on how an object made of a small set of pieces can be disassembled and made into a new object. (2-PS1-3)</td>
<td>A. Develop models to describe the atomic composition of simple molecules and extended structures. (MS-PS1-1)</td>
<td>A. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. (HS-PS1-1)</td>
</tr>
<tr>
<td>B. Develop a model to describe that matter is made of particles too small to be seen. (5-PS1-1)</td>
<td>B. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. (MS-PS1-2)</td>
<td>B. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. (HS-PS1-2)</td>
</tr>
<tr>
<td>C. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. (5-PS1-2)</td>
<td>C. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. (MS-PS1-3)</td>
<td>C. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. (HS-PS1-3)</td>
</tr>
<tr>
<td>D. Plan and conduct investigations, make observations and measurements to identify materials based on their (observable) properties (2-PS1-1 AND 5-PS1-3)</td>
<td>D. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. (MS-PS1-4)</td>
<td>D. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. (HS-PS1-4)</td>
</tr>
<tr>
<td>E. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.(2-PS1-4)</td>
<td>E. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. (MS-PS1-5)</td>
<td>E. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. (HS-PS1-5)</td>
</tr>
<tr>
<td>F. Conduct an investigation to determine whether the mixing of two or more substances results in new substances. (5-PS1-4)</td>
<td>F. Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the</td>
<td></td>
</tr>
</tbody>
</table>
mass of the object. (MS-PS2-2)

G. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. (MS-PS2-3)

H. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. (MS-PS2-4)

I. Conduct an investigation to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. (MS-PS2-5)

J. Support an argument that the gravitational force exerted by Earth on objects is directed down. (5-PS2-1)

K. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. (HS-PS-2-5)
**PHYSICAL SCIENCES: ENERGY, WAVES, AND ELECTROMAGNETIC RADIATION**
Understand and analyze energy and the characteristics and dynamics of waves as demonstrated through the integration of scientific and engineering practices and cross-cutting concepts (PS 3 + PS 4)

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</thead>
<tbody>
<tr>
<td>A. Make observations to determine the effect of sunlight on Earth's surface. (K-PS3-1)</td>
<td>A. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object. (MS-PS3-1)</td>
<td>A. Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. (HS-PS3-1)</td>
</tr>
<tr>
<td>B. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. (1-PS4-1)</td>
<td>B. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. (MS-PS3-2)</td>
<td>B. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields. (HS-PS3-2)</td>
</tr>
<tr>
<td>C. Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light. (1-PS4-3)</td>
<td>C. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. (MS-PS3-4)</td>
<td>C. Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). (HS-PS3-4)</td>
</tr>
<tr>
<td>D. Use evidence to construct an explanation relating the speed of an object to the energy of that object. (4-PS3-1)</td>
<td>D. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. (MS-PS3-5)</td>
<td>D. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. (HS-PS3-5)</td>
</tr>
<tr>
<td>E. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. (4-PS3-2)</td>
<td>E. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. (MS-PS4-1)</td>
<td>E. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. (HS-PS4-1)</td>
</tr>
<tr>
<td>F. Ask questions and predict outcomes about the changes in energy that occur when objects collide. (4-PS3-3)</td>
<td>F. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. (MS-PS4-2)</td>
<td>F. Evaluate questions about the advantages of using a digital transmission and storage of information. (HS-PS4-2)</td>
</tr>
<tr>
<td>G. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. (5-PS3-1)</td>
<td>G. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. (MS-PS4-3)</td>
<td>G. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or</td>
</tr>
</tbody>
</table>
based account that objects can be seen only when illuminated (1-PS4-2) AND develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. (4-PS4-2)

H. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. (HS-PS4-4)

-- Science Graduation Standard 3

LIFE SCIENCES: STRUCTURE, FUNCTION, AND INFORMATION PROCESSING
Understand and analyze molecular, structural, and chemical biology as demonstrated through the integration of scientific and engineering practices and cross-cutting concepts (LS 1)

A. Use observations to describe patterns of what plants and animals (including humans) need to survive. (K-LS1-1)

B. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. (1-LS1-2)

C. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. (3-LS1-1)

D. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. (4-LS1-1)

E. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. (4-LS1-2)

F. Support an argument that plants get the materials they need for growth chiefly from air and water. (5-LS1-1)

A. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. (MS-LS1-1)

B. Develop and use a model to describe the function of a cell as a whole, and the ways parts of cells contribute to the function. (MS-LS1-2)

C. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. (MS-LS1-3)

D. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. (MS-LS1-4)

E. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. (MS-LS1-5)

F. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells. (HS-LS1-1)

B. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)

C. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)

D. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. (HS-LS1-4)

E. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. (HS-LS1-5)

F. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/
F. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. (MS-LS1-6)

G. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. (MS-LS1-7)

H. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. (MS-LS1-8)

Science Graduation Standard 4

LIFE SCIENCES: MATTER AND ENERGY IN ORGANISMS AND ECOSYSTEMS
Understand and analyze the characteristics, functions, and behavioral interactions within an ecosystem as demonstrated through the integration of scientific and engineering practices and cross-cutting concepts (LS 2)

<table>
<thead>
<tr>
<th>Fifth-Grade Performance Indicators</th>
<th>Eighth-Grade Performance Indicators</th>
<th>High School Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Plan and conduct an investigation to determine if plants need sunlight and water to grow. (2-LS2-1)</td>
<td>A. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. (MS-LS2-1)</td>
<td>A. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. (HS-LS2-1)</td>
</tr>
<tr>
<td>B. Construct an argument that some animals form groups that help members survive. (3-LS2-1)</td>
<td>B. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. (MS-LS2-2)</td>
<td>B. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. (HS-LS2-2)</td>
</tr>
<tr>
<td>C. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. (5-LS2-1)</td>
<td>C. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. (MS-LS2-3)</td>
<td>C. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions. (HS-LS2-3)</td>
</tr>
<tr>
<td>D. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. (MS-LS2-4)</td>
<td>D. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. (MS-LS2-4)</td>
<td>D. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. (HS-LS2-4)</td>
</tr>
</tbody>
</table>
**E.** Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. (HS-LS2-5)

**F.** Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. (HS-LS2-6)

**G.** Evaluate the evidence for the role of group behavior on individual and species’ chances to survive and reproduce. (HS-LS2-8)

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**Science Graduation Standard 5**

**LIFE SCIENCES: GROWTH, DEVELOPMENT, AND REPRODUCTION OF ORGANISMS, NATURAL SELECTION, AND ADAPTATIONS**

Understand and analyze genetics, adaptation, and biodiversity as demonstrated through the integration of scientific and engineering practices and cross-cutting concepts (LS 3 + LS 4)

### Fifth-Grade Performance Indicators

A. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. (1-LS3-1)

B. Make observations of plants and animals to compare the diversity of life in different habitats. (2-LS4-1)

C. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. (3-LS3-1)

D. Use evidence to support the explanation that traits can be influenced by the environment. (3-LS3-2)

E. Analyze and interpret data from fossils to provide evidence of the organisms and the

### Eighth-Grade Performance Indicators

A. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. (MS-LS3-1)

B. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. (MS-LS3-2)

C. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. (MS-LS4-1)

### High School Performance Indicators

A. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. (HS-LS3-1)

B. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. (HS-LS3-2)

C. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. (HS-LS3-3)

D. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. (HS-LS4-1)
environments in which they lived long ago. (3-LS4-1)

F. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)

G. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

D. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. (MS-LS4-2)

E. Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy. (MS-LS4-3)

F. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals’ probability of surviving and reproducing in a specific environment. (MS-LS4-4)

G. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. (MS-LS4-5)

H. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. (MS-LS4-6)

E. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. (HS-LS4-2)

F. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. (HS-LS4-3)

G. Construct an explanation based on evidence for how natural selection leads to adaptation of populations. (HS-LS4-4)

H. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. (HS-LS4-5)
EARTH AND SPACE SCIENCES: EARTH, SPACE, AND THE UNIVERSE
Understand and analyze the origins, interactions and relationships between and among the earth, our solar system, and the universe as demonstrated through the integration of scientific and engineering practices and cross-cutting concepts (ESS1)

<table>
<thead>
<tr>
<th>Fifth-Grade Performance Indicators</th>
<th>Eighth-Grade Performance Indicators</th>
<th>High School Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Use observations of the sun, moon, and stars to</td>
<td>A. Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar</td>
<td>A. Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear</td>
</tr>
<tr>
<td>describe patterns that can be predicted. (1-ESS1-1)</td>
<td>phases, eclipses of the sun and moon, and seasons. (MS-ESS1-1)</td>
<td>fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.</td>
</tr>
<tr>
<td>B. Make observations at different times of year to</td>
<td>B. Develop and use a model to describe the role of gravity in the motions within galaxies and the</td>
<td>(HS-ESS1-1)</td>
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<tr>
<td>relate the amount of daylight to the time of year.</td>
<td>solar system. (MS-ESS1-2)</td>
<td>B. Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra,</td>
</tr>
<tr>
<td>(1-ESS1-2)</td>
<td>C. Use information from several sources to provide evidence that Earth events can occur quickly or</td>
<td>motion of distant galaxies, and composition of matter in the universe. (HS-ESS1-2)</td>
</tr>
<tr>
<td></td>
<td>slowly. (2-ESS1-1)</td>
<td>C. Communicate scientific ideas about the way stars, over their life cycle, produce elements.</td>
</tr>
<tr>
<td>D. Identify evidence from patterns in rock</td>
<td>D. Construct a scientific explanation based on evidence from rock strata for how the geologic time</td>
<td>D. Use mathematical or computational representations to predict the motion of orbiting objects in the</td>
</tr>
<tr>
<td>formations and fossils in rock layers to support</td>
<td>scale properties of objects in the solar system. (MS-ESS1-3)</td>
<td>solar system. (HS-ESS1-4)</td>
</tr>
<tr>
<td>an explanation for changes in a landscape over</td>
<td>D. Analyze and interpret data to determine scale properties of objects in the solar system. (MS-ESS1-3)</td>
<td>E. Evaluate evidence of the past and current movements of continental and oceanic crust and the</td>
</tr>
<tr>
<td>time. (4-ESS1-1)</td>
<td></td>
<td>theory of plate tectonics to explain the ages of crustal rocks. (HS-ESS1-5)</td>
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<tr>
<td>E. Support an argument that differences in the</td>
<td></td>
<td>F. Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other</td>
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<tr>
<td>apparent brightness of the sun compared to other</td>
<td></td>
<td>planetary surfaces to construct an account of Earth's formation and early history.</td>
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<tr>
<td>stars is due to their relative distances from the</td>
<td></td>
<td>(HS-ESS1-6)</td>
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<tr>
<td>Earth. (5-ESS1-1)</td>
<td></td>
<td></td>
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<tr>
<td>F. Represent data in graphical displays to</td>
<td></td>
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<tr>
<td>reveal patterns of daily changes in length and</td>
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<td>direction of shadows, day and night, and the</td>
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<tr>
<td>seasonal appearance of some stars in the night</td>
<td></td>
<td></td>
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<tr>
<td>sky. (5-ESS1-2)</td>
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EARTH AND SPACE SCIENCES: EARTH SYSTEMS
Understand and analyze earth’s systems and the relationship between human activity and the earth as demonstrated through the integration of scientific and engineering practices and cross-cutting concepts (ESS 2 + ESS 3)

Fifth-Grade Performance Indicators

A. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. (K-ESS2-2)

B. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live. (K-ESS3-1)

C. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather (K-ESS2-1) AND represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. (3-ESS2-1)

D. Obtain and combine information to describe climates in different regions of the world. (3-ESS2-2)

E. Obtain information to identify where water is found on Earth and that it can be solid or liquid. (2-ESS2-3)

F. Develop a model, using an example, to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. (5-ESS2-1)

G. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth (5-ESS2-2)

Eighth-Grade Performance Indicators

A. Develop a model to describe the cycling of Earth’s materials and the flow of energy that drives this process. (MS-ESS2-1)

B. Construct an explanation based on evidence for how geoscience processes have changed Earth’s surface at varying time and spatial scales. (MS-ESS2-2)

C. Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. (MS-ESS2-3)

D. Develop a model to describe the cycling of water through Earth’s systems driven by energy from the sun and the force of gravity. (MS-ESS2-4)

E. Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. (MS-ESS2-5)

F. Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. (MS-ESS2-6)

G. Construct a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy and groundwater resources are the result of past and current geoscience processes. (MS-ESS3-1)

High School Performance Indicators

A. Develop a model to illustrate how Earth’s internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features. (HS-ESS2-1)

B. Analyze geoscience data to make the claim that one change to Earth’s surface can create feedbacks that cause changes to other Earth systems (HS-ESS2-2)

C. Develop a model based on evidence of Earth’s interior to describe the cycling of matter by thermal convection. (HS-ESS2-3)

D. Use a model to describe how variations in the flow of energy into and out of Earth’s systems result in changes in climate. (HS-ESS2-4)

E. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. (HS-ESS2-5)

F. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. (HS-ESS2-6)

G. Construct an argument based on evidence about the simultaneous coevolution of Earth’s systems and life on Earth. (HS-ESS2-7)

H. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in
H. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. (4-ESS2-1)

I. Develop a model to represent the shapes and kinds of land and bodies of water in an area (2-ESS2-2) AND Analyze and interpret data from maps to describe patterns of Earth’s features. (4-ESS2-2)

J. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. (4-ESS3-1)

K. Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment. (5-ESS3-1)

H. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. (MS-ESS3-2)

I. Construct and argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems. (MS-ESS3-4)

J. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. (MS-ESS3-5)

K. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. (HS-ESS3-6)

Science Graduation Standard 8

ENGINEERING, TECHNOLOGY, AND APPLICATION OF SCIENCE
Demonstrate engineering concepts across multiple disciplines and novel situations as demonstrated through the integration of scientific and engineering practices and cross-cutting concepts (ETS). While performance indicators that end with an * were originally assigned to an earlier standard (DCI) by NGSS, they are listed here because they demonstrate application of engineering. These performance indicators may also serve to inform whether students can demonstrate proficiency in the particular content standard in which they were originally assigned.

Fifth-Grade Performance Indicators

Define and delimit engineering problems
Ask questions, make observations and gather information about a situation people want to change to define a simple problem that can be solved through development of a new object or tool, AND define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time, or cost. (K-2-ETS1-1; 3-5-ETS1-1)

A. Analyze data to determine if a design solution works as intended to change the speed or climate have influenced human activity. (HS-ESS3-1)

I. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity. (HS-ESS3-3)

J. Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems. (HS-ESS3-5)

K. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. (HS-ESS3-6)
direction of an object with a push or a pull.* (K-PS2-2)

B. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.* (K-ESS3-2)

C. Define a simple design problem that can be solved by applying scientific ideas about magnets.* (3-PS2-4)

D. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.* (4-PS3-4)

Develop possible solutions

Develop simple sketches, drawings or physical models to show how an object’s shape helps it function to solve a problem; AND generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (K-2-ETS1-2; 3-5-ETS1-2)

E. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.* (K-PS3-2)

F. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.* (K-ESS3-3)

G. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.* (1-PS4-4)

H. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*( 1-LS1-1)

I. Develop a simple model that mimics the

B. Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.* (MS-PS2-1)

C. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.* (MS-ESS3-3)

D. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.* (MS-PS1-6)

E. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.* (MS-PS3-3)

F. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.* (MS-LS2-5)

G. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.* (HS-ESS3-2)

H. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.* (HS-ESS3-4)

I. Use a computer simulation to model the
function of an animal in dispersing seeds or pollinating plants.* (2-LS2-2)

J. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. (3 -LS4-4)

K. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.* (4-ESS3-2)

Optimize the Design Solution

Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. (MS-ETS1-3) AND develop models to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. (MS-ETS1-4)

G. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.* (MS-PS1-6)

Optimize the Design Solution

Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (HS-ETS1-2)

J. Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.* (HS-PS1-6)

K. Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.* (HS-PS2-3)
Proficiency-Based Transcript
DESIGN FEATURES + CONSIDERATIONS

Problem Statement
Traditionally, high school transcripts have been used by college admissions professionals to compare students, discriminate among levels of academic accomplishment, and make admissions decisions based on what students have achieved relative to other students in their school or other schools. In addition, transcripts are typically homegrown documents that vary widely in design, language, and purpose, which often make it difficult for admissions professionals to decipher individual school systems, particularly non-conventional systems. Consequently, common denominators—such as class rank, Advance Placement courses, SAT scores—are often relied on during the decision-making process because they provide a fairly consistent benchmark, from student to student and school to school, for evaluating performance.

With the move to a proficiency-based system of teaching, assessing, grading, and reporting, schools will be able to significantly increase both the educational achievement and preparation of their graduates, as well as the consistency and reliability of their reporting. Yet proficiency-based reporting systems may also reduce the amount of comparative information available to college admissions professionals. Consequently, schools either need to supplement the lost information (the abandonment of tracked courses, class rank, etc.) or college admissions professionals will look to whatever comparative information they can obtain—such as, for example, standardized-test scores—to sort, rank, or discriminate among applicants.

Our Mission
Identify the critical transcript features that will give admissions professionals the information they need to make the right choice, while also honoring and valuing proficiency-based systems that are designed to increase educational equity and college readiness, as well as making academic reporting more valid, reliable, and accurate.
Design Features

General Design Recommendations
—Clear visual separation of critical elements—do not clump information together.
—Use standard letter-size paper—colleges often copy/scan and distribute internally, and letter-sized paper makes it easier.

School Profile (one or two pages max)
Describe the academic program clearly and concisely:

1. Statement on the school’s approach to pedagogy, learning standards, and curricular rigor.
2. Description of the purpose of proficiency-based instruction.
3. Description of how the curriculum works and how challenging it is (include link to online program of studies and other relevant documents, if applicable).
4. Description of the grading system (include link to more detailed online description, if needed or applicable).
5. Description of graduation requirements and how proficiency is determined (include link to more detailed online description, if needed or applicable).
7. Colleges and universities where graduates have matriculated or been accepted in the past three or five years.
8. The percentages of students who have been accepted to and who have matriculated into two- and four-year collegiate programs in the past three or five years (reported as a rolling average).
9. Description of “habits of work” grading and proficiency (if applicable).
10. Student demographic information with subgroup distributions.
Class Profile (one page max)
Describe the achievement of the graduating class—the distribution of grades and/or accomplishments—to provide a contextual framework for understanding individual student achievement.

1. Percentage of students meeting standards by content areas and cross-curricular skills.
2. Median proficiency attainment levels by content areas and cross-curricular skills.
3. Percentage/number of students pursuing and completing honors options/challenges.
4. Percentage/number of students attaining honors in each of the three honor levels: cum laude, magna, summa.
5. Percentage/number of students completing extended learning opportunities (dual-enrollment, internships, etc.).
6. Percentage/number of students completing AP and IB courses.
7. Standardized-test scores for the class relative to state/national averages.

Student Narrative (optional)
In addition to the formal transcript and school and class profiles, schools may elect to provide a descriptive narrative of students and their individual accomplishments. If a student narrative is provided, it should (1) be brief, (2) be written by teachers or other adults knowledgeable about the student, and (3) focus on academic accomplishments, unique learning attributes, and other information that will help college admissions determine what kind of learner the student is.

Student Transcript Features (one or two pages max)

Courses
Course names, as they appear on the transcript, should be descriptive—in term of both content area and level of academic challenge/rigor. Abbreviations should be avoided. Course titles should be independently recognizable and understandable, and an easy-to-understand legend, key, or glossary should be included if abbreviations or multiple course levels are used. In heterogeneous courses, individual achievement—accelerated attainment of standards, completion of an honors option—should be described.
Alternative Learning Achievements
Additional learning achievements—such as the completion of a dual-enrollment course, credit-bearing internship, or service-learning requirement—should be reported on the transcript and clearly described, especially if students are graded and earn credit or satisfy graduation requirements.

Grading System
The grading system, particularly the distinctions between grades and attainment levels, should be clearly and succinctly explained on the transcript. The description should also address how grades are determined. The grading system should be based on a recognizable scale, such as a 4.0 scale, to facilitate understanding. If space is an issue, include a link to a more detailed online description of the grading system. The Great Schools Partnership strongly recommends that schools adopt a proficiency-based grading system that is based on a 4.0 scale.

GPA
The GPA is aligned to the proficiency-based scale.

Class Rank, Honors, Awards, Academic Distinctions
Transcripts should report academic honors and notable academic awards and distinctions. While some schools or scholarship programs may require traditional class ranking, the Great Schools Partnership strongly recommends that schools adopt a Latin honors system that reports three levels of achievement: *Summa Cum Laude, Magna Cum Laude*, and *Cum Laude*.

Credits or Graduation Requirements
Clearly indicate.

Honors Options
Achievement of honors options and other advanced coursework in heterogeneously grouped courses should be clearly indicated and described.

Habits of Work

Revised 4/4/13
If a school uses “habits or work” (or HOW) standards and grades, the system should be described in the school profile. Schools may not want to report HOW grades on the transcript.

**Proposed Course Achievement Reporting Model**
When traditionally structured schools move to proficiency-based systems, their transcripts will look relatively familiar to college admissions professionals. The following conceptual transcript design—for discussion purposes—is for schools that use:

- Proficiency-based teaching, assessment, grading, and reporting.
- Heterogeneously grouped courses without tiered academic tracks.
- Multiple pathways in which students can achieve learning standards and satisfy graduation requirements outside of traditional academic courses.
- More flexible approaches to time in which students can take shorter or longer periods of time to achieve standards.

<table>
<thead>
<tr>
<th>Experience</th>
<th>Description</th>
<th>Grade</th>
<th>Credit</th>
<th>Duration</th>
<th>Attainment</th>
<th>Enrichment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course</td>
<td>English 10</td>
<td>3.5</td>
<td>1.00</td>
<td>Year</td>
<td>Accelerated</td>
<td>Honors</td>
</tr>
<tr>
<td>Course</td>
<td>English 11</td>
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<td>1.00</td>
<td>Year</td>
<td>Meets</td>
<td>Independent</td>
</tr>
<tr>
<td>Internship</td>
<td>Local Newspaper</td>
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<td>.50</td>
<td>Semester</td>
<td>Exceeds</td>
<td></td>
</tr>
</tbody>
</table>

**Experience**: Indicates the type of learning experience students completed (e.g., academic course, dual-enrollment course, independent study, internship, apprenticeship, etc.). A key should be included to describe in more detail what the short-hand terms, such as **Course** or **Internship**, specifically mean. For example:

- Course
- Dual enrollment
- Independent
- Internship
- Apprenticeship

**Description**: Course tile or brief description of the learning experience. A key to all terms should be included.
Grade: Final grade achieved. A key describing the grading system should be included.

Credit: Graduation credits earned.

Duration: General length of the learning experience. A key to all terms should be included, if necessary. For example:
- Year
- Semester
- Trimester
- Summer (session)
- Winter (session)

Attainment: Indicates when or to what degree students have achieved learning standards in a course or other learning experience. For example, students may achieve standards in an accelerated fashion (Accelerated, Highly Accelerated) or they may exceed standards at multiple levels (Exceeded, Highly Exceeded). Only positive or advanced achievement should be represented (i.e., a blank space will indicate that students met standards on time, over a longer period of time, or with additional support). A key to all terms should be included. For example:
- Accelerated
- Highly accelerated
- Meets
- Exceeds
- Highly Exceeds

Enrichment: Indicates when students have elected to pursue more challenging standards, coursework, or learning within the context of the learning experience. A key to all terms should be included. For example:
- Honors (option)
- Independent (study)
- Online (learning experience)
- Service (learning experience)
- Capstone (project)
### Learning Experience

<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
<th>Level of Proficiency</th>
<th>Duration</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009-10</td>
<td>English 9</td>
<td>3.5</td>
<td>Year</td>
<td>Honors</td>
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<tr>
<td></td>
<td>History 9</td>
<td>3.0</td>
<td>Year</td>
<td>Course</td>
</tr>
<tr>
<td></td>
<td>Geometry</td>
<td>3.0</td>
<td>Year</td>
<td>Course</td>
</tr>
<tr>
<td></td>
<td>Spanish I</td>
<td>3.5</td>
<td>Year</td>
<td>Course</td>
</tr>
<tr>
<td></td>
<td>Earth Science</td>
<td>3.0</td>
<td>Year</td>
<td>Course</td>
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<tr>
<td></td>
<td>Art 1</td>
<td>3.0</td>
<td>Year</td>
<td>Course</td>
</tr>
<tr>
<td>2010-11</td>
<td>English 10</td>
<td>3.5</td>
<td>Year</td>
<td>Course</td>
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<td></td>
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<td></td>
<td>Algebra II</td>
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<td>Semester</td>
<td>Course</td>
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<td></td>
<td>Spanish II</td>
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<td>Year</td>
<td>Course</td>
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<td></td>
<td>Chemistry</td>
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<td>Drama</td>
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<td>Semester</td>
<td>Course</td>
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<tr>
<td></td>
<td>Physics</td>
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<td>Semester</td>
<td>Course</td>
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<td></td>
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<td>Mountain Daily Sun (Newspaper)</td>
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<td>Semester</td>
<td>Internship</td>
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<td></td>
<td>Physical Education</td>
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<td>Semester</td>
<td>Internship</td>
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<td></td>
<td>Spanish IV</td>
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<td>Semester</td>
<td>Course</td>
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<td></td>
<td>Health</td>
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<td>Semester</td>
<td>Honors</td>
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<td></td>
<td>Psychology (AP)</td>
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### Graduation Cross-Curricular Skills

<table>
<thead>
<tr>
<th>Skill</th>
<th>Level of Proficiency</th>
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<tbody>
<tr>
<td>Clear and effective communicator</td>
<td>3.0</td>
</tr>
<tr>
<td>Self-directed and lifelong learner</td>
<td>3.25</td>
</tr>
<tr>
<td>Creative and practical problem solver</td>
<td>3.50</td>
</tr>
<tr>
<td>Responsible and involved citizen</td>
<td>3.75</td>
</tr>
<tr>
<td>Integrative and informed thinker</td>
<td>4.0</td>
</tr>
</tbody>
</table>

### Academic Summary

- **GPA:** 3.75
- **Magna Cum Laude**

### Grading System

- **1.0** - Does not meet standards
- **2.0** - Partially meets standards
- **3.0** - Meets standards
- **3.25 - 3.50** - Exceeds standards
- **3.75 - 4.0** - Exceeds standards with honors

### Graduation Requirements

- **Demonstrated Proficiency - Maine Guiding Principles**
  - English Language Arts
  - Mathematics
  - Science and Technology
  - Social Studies
  - Health Education and Physical Education
  - World Languages
  - Visual and Performing Arts
  - Career Education and Development

- **Additional Graduation Requirements**
  - Senior Project
  - Capstone Experience
  - Service Learning Requirement

---

*Student Proficiency is verified by numerous demonstrations pertaining to these skills, not one time events.*

---

*Revised 8.22.13*
**Graduation Standards Performance Summary**

<table>
<thead>
<tr>
<th>English Language Arts</th>
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<tbody>
<tr>
<td>Reading Comprehension</td>
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<tr>
<td>Reading Interpretation</td>
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<tr>
<td>Writing Range</td>
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<tr>
<td>Writing Research</td>
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<tr>
<td>Discussion</td>
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<tr>
<td>Algebra</td>
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<tr>
<td>Functions</td>
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<tr>
<td>Geometry</td>
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<td>Statistics and Probability</td>
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<table>
<thead>
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<tbody>
<tr>
<td>Standard 1</td>
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<td>Standard 3</td>
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<table>
<thead>
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<td>Standard 1</td>
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<table>
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<td>Standard 1</td>
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<td>Standard 3</td>
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<thead>
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</tr>
<tr>
<td>Standard 5</td>
<td>3.5</td>
</tr>
</tbody>
</table>

**Type of Learning Experience**

**Course:** Learning took place in and was verified by a certified teacher in a regular high school course.

**Honors:** Learning took place in and was verified by a certified teacher in a regular high school course in which the student opted to engage in more rigorous course work.

**Dual Enrollment:** Learning took place in a college course that enabled the student to demonstrate proficiency of one or more graduation standards.

**Independent:** Learning took place in a student-designed and teacher-supported learning experience. The teacher verified the students’ proficiency of one or more graduation standards.

**Internship:** Learning took place in a work-environment after which a certified teacher verified proficiency of one or more graduation standards.
COLLEGIATE ENDORSEMENT OF PROFICIENCY-BASED EDUCATION & GRADUATION

Joining other institutions of higher education and the New England Secondary School Consortium to support of stronger academic preparation for postsecondary study, leading to increased collegiate enrollments and higher completion rates in our degree programs, we, the undersigned:

1. Endorse proficiency-based approaches to instruction, assessment, reporting, and graduation that establish universally high learning standards and expectations for all students in K–12 schools.

2. Accept a wide range of student transcripts if they meet our stated admissions requirements and provide a full and accurate presentation of what an applicant has learned and accomplished.

3. Pledge that applicants to our institutions with proficiency-based transcripts will not be disadvantaged in any way.

This endorsement recognizes that strong educational preparation benefits our students, our faculty, and our institution, and toward these ends we strongly support proficiency-based teaching practices, assessments, report cards, graduation decisions, and other strategies that can increase student preparation for higher education, modern careers, and lives of active, informed citizenship.

Agreed on this Day
October 24, 2012

Rosa S. Redonnett
Executive Director of Student Affairs

University of Maine
University of Maine at Augusta
University of Maine at Farmington
University of Maine at Fort Kent
University of Maine at Machias
University of Maine at Presque Isle
University of Southern Maine
Over the past decade, the movement to adopt proficiency-based approaches to teaching, learning, and graduating has gained momentum in New England, and throughout the country, as more educators, parents, business leaders, and elected officials recognize that high educational standards and strong academic preparation are essential to success in today’s world.

With some parents wondering about the effects that proficiency-based education will have on their children or the college-admissions process, the Consortium reached out to higher education institutions throughout the region. We asked them directly about their support of proficiency-based learning, and their response has been both affirming and inspiring.

To capture the sentiment of higher education, we developed the Collegiate Endorsement of Proficiency-Based Education and Graduation, which has been signed by a significant—and growing—number of colleges and universities. The text and provisions of the endorsement are as follows:

The Endorsement

Joining other institutions of higher education and the New England Secondary School Consortium in support of stronger academic preparation for postsecondary study, leading to increased collegiate enrollments and higher completion rates in our degree programs, we, the undersigned:

1. Endorse proficiency-based approaches to instruction, assessment, reporting, and graduation that establish universally high learning standards and expectations for all students in K–12 schools.
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This endorsement recognizes that strong educational preparation benefits our students, our faculty, and our institution, and toward these ends we strongly support proficiency-based teaching practices, assessments, report cards, graduation decisions, and other strategies that can increase student preparation for higher education, modern careers, and lives of active, informed citizenship.

Signatories

**Maine**

- Husson University
- Thomas College
- University of Maine
- University of Maine at Augusta

**Connecticut**

- Asnuntuck Community College
- Capital Community College
- Central Connecticut State University
- Charter Oak State College
New Hampshire
Granite State College
Great Bay Community College
Keene State College
Lakes Region Community College
Manchester Community College
Nashua Community College
NHTI-Concord's Community College
Plymouth State University
River Valley Community College
University of New Hampshire
White Mountains Community College

Vermont
Castleton State College
Community College of Vermont
Johnson State College
Lyndon State College
Vermont Technical College

Rhode Island
Community College of Rhode Island
Rhode Island College
University of Rhode Island