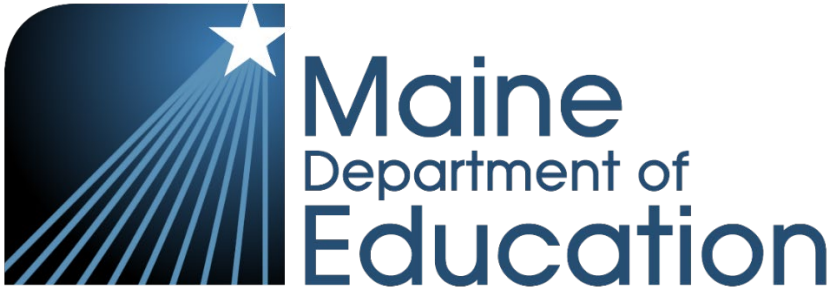
Achievement Level Descriptors (ALDs)

Maine Science Assessment

Grade 5

New Meridian Corporation

2022



Contents

What are ALDs?

- The Achievement Level Descriptors (ALDs) document is intended to be used as a guideline to describe the four levels of achievement, levels of student mastery of the Standards & Instruction - Science & Engineering, identified by the Maine DOE. This document is to support the effective teaching and assessment of Maine K–12 science and engineering instructional programs.

- The ALDs are written to align with the Next Generation Science Standards (NGSS) Topics. The NGSS topics are standards that are grouped to show the natural connections between the Disciplinary Core Ideas. To support the intent of the standards for science instruction and assessment in Maine, all Science and Engineering Practices (SEPs) and Cross-Cutting Concepts (CCC) can be used interchangeably with any of the Disciplinary Core Ideas (DCI), not just the ones found in the performance expectations. It is the intent that the SEP and CCC are selected to enhance the application of the DCIs to make sense of a phenomenon presented in a scenario.

General Achievement Levels for Maine

Level 1 Well Below State Expectations	Level 2 Below State Expectations	Level 3 At State Expectations	Level 4 Above State Expectations
The student's work demonstrates a minimal understanding of essential concepts in science. The student's responses demonstrate minimal ability to solve problems. Explanations are illogical, incomplete, or missing connections among central ideas. There are multiple inaccuracies.	The student's work demonstrates an incomplete understanding of essential concepts in science and inconsistent connections among central ideas. The student's responses demonstrate some ability to analyze and solve problems, but the quality of responses is inconsistent. Explanation of concepts may be incomplete or unclear.	The student's work demonstrates an adequate understanding of essential concepts in science, including the ability to make connections among central ideas. The student's responses demonstrate the ability to analyze and solve routine problems and explain central concepts with sufficient clarity and accuracy to demonstrate general understanding.	The student's work demonstrates a thorough understanding of essential concepts in science, including the ability to make multiple connections among central ideas. The student's responses demonstrate the ability to synthesize information, analyze and solve difficult problems, and explain complex concepts using evidence and proper terminology to support and communicate logical conclusions.

How to read this document and the process used by New Meridian

The NGSS topic is listed in the top left corner (and is a clickable link to the NGSS topic page). The ALD for each of the 4 levels of achievement (Well Below State Expectations; Below State Expectations; At State Expectations; Above State Expectations) runs along the top. The ALD statements are combinations of grade level DCIs (shown in orange and regular font), SEPs (shown in blue and underlined), and CCCs (shown in green and italicized). These are exemplar targets that have been constructed by New Meridian Science staff, with feedback from the ME DOE. Again, the intention is to demonstrate that any DCI can be combined with any SEP and any CCC for a particular topic and grade level. There are NOT ALDs for each individual Performance Expectation (PE).

The left column contains the exact text of the grade level DCIs included within a topic, pulled from the NGSS. For each grade, for most topics, each DCI for each topic is met at least once in at least one of the four achievement levels. The grade-level DCI, SEP, and CCC that were used are listed below each ALD. The SEPs are from the NGSS SEP matrix found here (starting on p. 17), and the CCCs are from the NGSS CCC matrix found here (pp. 15–17).

The reference DCIs are located below the tables and are the DCIs from either the "Above State Expectations" ALD (Grade 5 is MS, and MS is HS), or the "Well Below State Expectations" ALD (Grade 5 is Grades 2–4, MS is Grade 5, and HS is MS). These DCIs are referenced in regard to topic progression.

Example ALD table showing progression of DCIs:
The DCI alone is not what determines the achievement level, rather it is the combination of the 3 dimensions. So, for each exemplar DCI, all other achievement levels could be possible if combined with different SEPs or CCCs. These documents just give the 4 exemplars, rather than the progression of a single dimension across all 4 achievement levels.

Topic 5.Structure and Properties of Matter	**Well Below** **State Expectations**	**Below** **State Expectations**	**At State** **Expectations**	**Above** **State Expectations**
Topic DCIs **PS1.A: Structure and Properties of Matter** • Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. • Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) • The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. **PS1.B: Chemical Reactions** • When two or more different substances are mixed, a new substance with different properties may be formed. • No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.)	Represent data to reveal *patterns that indicate* that materials can be identified based on their properties, and those properties are suitable for different purposes.			
		Use evidence (measurements) to support an explanation that matter is conserved when substances are mixed, even if a new substance is formed, *given that the total weight of the starting substance(s) is equal to the weight of the new substance(s).*		
			Plan an investigation to show that gases are made of particles that *are too small to be seen* but can be detected in other ways.	
				Support an argument that a new substance *has formed when* different substances are mixed.
	Grade Level DCI, SEP, and *CCC*			
	PS1.A SEP4 (Evaluate) *CCC1 (Patterns)*	PS1.A SEP3 (Investigate) *CCC3 (Scale, Proportion, and Quantity)*	PS1.A PS1.B SEP6 (Reason Scientifically) *CCC3 (Scale, Proportion, and Quantity)*	PS1.B SEP7 (Evaluate) *CCC2 (Cause and Effect)*

Grade 5
Physical Science Topics

Topic 5.Structure and Properties of Matter	**Well Below** **State Expectations**	**Below** **State Expectations**	**At State** **Expectations**	**Above** **State Expectations**
Topic DCIs **PS1.A: Structure and Properties of Matter** • Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. • Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) • The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. **PS1.B: Chemical Reactions** • When two or more different substances are mixed, a new substance with different properties may be formed. • No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.)	Represent data to reveal *patterns that indicate* that materials can be identified based on their properties, and those properties are suitable for different purposes.	Use evidence (measurements) to support an explanation that matter is conserved when substances are mixed, even if a new substance is formed, *given that the total weight of the starting substance(s) is equal to the weight of the new substance(s).*	Plan an investigation to show that gases are made of particles that *are too small to be seen* but can be detected in other ways.	Support an argument that a new substance *has formed when* different substances are mixed.
	Grade Level DCI, SEP, and *CCC*			
	PS1.A SEP4 (Evaluate) *CCC1 (Patterns)*	PS1.A SEP3 (Investigate) *CCC3 (Scale, Proportion, and Quantity)*	PS1.A PS1.B SEP6 (Reason Scientifically) *CCC3 (Scale, Proportion, and Quantity)*	PS1.B SEP7 (Evaluate) *CCC2 (Cause and Effect)*

Reference DCIs:

Well Below Expectations: Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. Different properties are suited to different purposes. (2, PS1.A)

Above State Expectations: Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS, PS1.B)

Grade 5
Life Science Topics

Topic 5.Matter and Energy in Organisms and Ecosystems	**Well Below State Expectations**	**Below State Expectations**	**At State Expectation**	**Above State Expectations**
Topic DCIs **PS3.D Energy in Chemical Processes and Everyday Life** • The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). **LS2.A Interdependent Relationships in Ecosystems** • The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. **LS1.C: Organization for Matter and Energy Flow in Organisms** • Plants acquire their material for growth chiefly from air and water. **LS2.B: Cycles of Matter and Energy Transfer in Ecosystems** • Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.	Use observations to support an explanation that when the environment *changes*, organisms may not be able to survive and reproduce.	Use a model to describe that all *energy from food* was once energy from the sun.	Support an argument that *matter is transferred* among and within plants, animals, decomposers, and the environment.	Ask a question that can be investigated about the *effects of a newly introduced species* on an ecosystem.
	Grade Level DCI, SEP, and *CCC*			
	LS2.A SEP6 (Reason Scientifically) *CCC7 (Stability and Change)*	PS3.D SEP2 (Reason Scientifically) *CCC5 (Energy and Matter)*	LS2.B LS1.C SEP7 (Evaluate) *CCC5 (Energy and Matter)*	LS2.A SEP3 (Investigate) *CCC7 (Stability and Change)*

Reference DCIs:
Well Below State Expectations: When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (3, LS2.C)

Above State Expectations: Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS, LS2.C)

Grade 5
Earth and Space Science Topics

Topic 5.Earth's Systems	**Well Below** **State Expectations**	**Below** **State Expectations**	**At State** **Expectations**	**Above** **State Expectations**
Topic DCIs **ESS2.A: Earth Materials and Systems** • Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. **ESS2.C: The Roles of Water in Earth's Surface Processes** • Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. **ESS3.C: Human Impacts on Earth Systems** • Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.	Analyze and interpret data to determine that *the majority of water* found on Earth is salt water.	Use a model to show how the *hydrosphere and the atmosphere* interact to form or melt ice on Earth.	Use graphs and/or charts to compare alternative solutions to *environmental impacts* that have occurred as a result of human activities.	Use evidence to construct an explanation as to how the interactions between two of *Earth's major systems* lead to phenomena such as lake effect snow.
	Grade Level DCI, SEP, and *CCC*			
	ESS2.C SEP4 (Evaluate) *CCC3 (Scale, Proportion, and Quantity)*	ESS2.A SEP2 (Reason Scientifically) *CCC4 (Systems and System Models)*	ESS3.C SEP5 (Evaluate) *CCC7 (Stability and Change)*	ESS2.A SEP6 (Reason Scientifically) *CCC4 (Systems and System Models)*

Reference DCIs:
Well Below Expectations: Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2, ESS2.C)

Above State Expectations: Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes. (HS, ESS2.A)

Topic 5.Space Systems: Stars and the Solar System	**Well Below** **State Expectations**	**Below** **State Expectations**	**At State** **Expectations**	**Above** **State Expectations**
Topic DCIs **PS2.B: Types of Interactions** • The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. **ESS1.A: The Universe and its Stars** • The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. **ESS1.B: Earth and the Solar System** • The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.	Use data to evaluate claims about the *force of gravity pulling* all objects on Earth *downward*.	Represent data in tables or graphical displays to reveal *patterns* that indicate why one star/planet is brighter to one observer on Earth than to another.	Use a model to predict how the length and position of a shadow *will change based on* the time of day and the season.	Construct an explanation of observed *relationships* in the number of daylight hours and the months of the year in the Northern Hemisphere.
	Grade Level DCI, SEP, and *CCC*			
	PS2.B SEP7 (Evaluate) *CCC2 (Cause and Effect)*	ESS1.A SEP4 (Evaluate) *CCC1 (Patterns)*	ESSS1.B SEP2 (Reason Scientifically) *CCC2 (Cause and Effect)*	ESS1.B SEP6 (Reason Scientifically) *CCC2 (Cause and Effect)*

Reference DCIs:
Well Below Expectations: Pushes and pulls can have different strengths and directions, and can change the speed or direction of its motion or start or stop it. A change in motion of an object can depend on the effects of multiple forces. (K, PS2.A)

Above State Expectations: This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. (MS, ESS1.B)