

**DRAFT SCIENCE ALTERNATE EXPECTATIONS: GRADE 4**

**Topic Bundle: Energy**

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 4-PS3-1.</b> Use evidence to construct an explanation relating the speed of an object to the energy of that object.</p>			
<p><b>EE.4-PS3-1:</b> Use evidence to identify an explanation relating the speed of an object to the energy of that object.</p>	<p><b>EE.4-PS3-H.1:</b> Use evidence to identify an explanation relating the speed of an object to the energy of that object.</p>	<p><b>EE.4-PS3-M.1:</b> Participate in an investigation to determine how the speed of an object is related to the energy of the object.</p>	<p><b>EE.4-PS3-L.1:</b> Recognize when an object moves faster it has more energy or when the object moves slower it has less energy.</p>

## Topic Bundle: Energy

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 4-PS3-2 and 4-PS3-3</b></p> <p><b>4-PS3-2.</b> Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</p> <p><b>4-PS3-3.</b> Ask questions and predict outcomes about changes in energy that occur when objects collide.</p>			
<p><b>EE.4-PS3-2-3:</b> Use observations to provide evidence that energy can be transferred from place to place by sound, light, heat, electric currents, or when objects collide.</p>	<p><b>EE.4-PS3-H.2-3:</b> Use observations to provide evidence that energy can be transferred from place to place by sound, light, heat, electric currents, or when objects collide.</p>	<p><b>EE.4-PS3-M.2-3:</b> Use everyday activities to show evidence that energy can be transferred to power electronic devices, to heat objects, or when objects collide.</p>	<p><b>EE.4-PS3-L.2-3:</b> Recognize an object is hot or cold (using qualitative observations) or when an electrical device is on or off.</p>

## Topic Bundle: Energy

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 4-PS3-4.</b> Apply scientific ideas to design, test and refine a device that converts energy from one form to another.</p>			
<p><b>EE.4-PS3-4:</b> Participate in constructing a device that converts energy from one form to another and identify the component parts or describe the energy conversion.</p>	<p><b>EE.4-PS3-H.4:</b> Participate in constructing a device that converts energy from one form to another and identify the component parts or describe the energy conversion.</p>	<p><b>EE.4-PS3-M.4:</b> Use a model or observations to identify evidence whether or not an electrical device is converting electrical energy.</p>	<p><b>EE.4-PS3-L.4:</b> Based on a demonstration, identify the results of an electrical device converting electrical energy to another form of energy.</p>

## Topic Bundle: Energy

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment.</b></p>			
<p><b>EE.4-ESS3-1: Combine information from multiple sources to describe that energy and fuels are derived from natural resources and that their uses affect the environment.</b></p>	<p><b>EE.4-ESS3-H.1:</b> Combine information from multiple sources to describe that energy and fuels are derived from natural resources and that their uses affect the environment.</p>	<p><b>EE.4-ESS3-M.1:</b> Describe that energy and fuels are derived from natural resources and that their uses affect the environment.</p>	<p><b>EE.4-ESS3-L.1:</b> Recognize sources of energy and fuels derived from natural resources.</p>

## Topic Bundle: Waves: Waves and Information

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 4-PS4-1.</b> Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.</p>			
<p><b>EE.4-PS4-1:</b> Use a model of waves to identify patterns in wave height and wavelength (spacing between waves peaks) and that waves can cause objects to move.</p>	<p><b>EE.4-PS4-H.1:</b> Use a model of waves to identify patterns in wave height and wavelength (spacing between waves peaks) and that waves can cause objects to move.</p>	<p><b>EE.4-PS4-M.1:</b> Use a model to determine how the motion of an object varies with the height of the wave or the length of the wave carrying it.</p>	<p><b>EE.4-PS4-L.1:</b> Recognize that a wave can cause an object to move.</p>

## Topic Bundle: Waves: Waves and Information

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<b>Michigan K-12 Science Content Standard: 4-PS4-3.</b> Generate and compare multiple solutions that use patterns to transfer information.			
<b>EE.4-PS4-3:</b> Use a method to show how a pattern can be used to send or receive information.	<b>EE.4-PS4-H.3:</b> Use a method to show how a pattern can be used to send or receive information.	<b>EE.4-PS4-M.3:</b> Extend a given pattern to send or receive information.	<b>EE.4-PS4-L.3:</b> Repeat a simple pattern that is used to send or receive information.

## Topic Bundle: Structure, Function, and Information Processing

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 4-PS4-2.</b> Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.</p>			
<p><b>EE.4-PS4-2: Participate in developing a model to describe that light reflecting from objects and entering the eye allows objects to be seen.</b></p>	<p><b>EE.4-PS4-H.2:</b> Participate in developing a model to describe that light reflecting from objects and entering the eye allows objects to be seen.</p>	<p><b>EE.4-PS4-M.2:</b> Use a model to describe that light reflecting from objects and entering the eye allows objects to be seen.</p>	<p><b>EE.4-PS4-L.2:</b> Use a model or demonstration to identify that light is needed to see objects.</p>

## Topic Bundle: Structure, Function, and Information Processing

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 4-LS1-1.</b> Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</p>			
<p><b>EE.4-LS1-1:</b> Use evidence to describe that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</p>	<p><b>EE.4-LS1-H.1:</b> Use evidence to describe that plants and animals have internal and external structures that support survival, growth, behavior, and reproduction.</p>	<p><b>EE.4-LS1-M.1:</b> Identify internal and external structures that serve specific functions within plants and animals.</p>	<p><b>EE.4-LS1-L.1:</b> Match external structures to a specific function.</p>



## Topic Bundle: Structure, Function, and Information Processing

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 4-LS1-2.</b> 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.</p>			
<p><b>EE.4-LS1-2:</b> 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.</p>	<p><b>EE.4-LS1-H.2:</b> 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.</p>	<p><b>EE.4-LS1-M.2:</b> Use a model to sequence the sensory process of animals by showing there is an input of information, processing of information in the brain, and a response to the information.</p>	<p><b>EE.4-LS1-L.2:</b> Match the sense to the sense receptor (organ) limited to five senses (sight, hearing, touch, smell, taste).</p>

## Topic Bundle: Earth's Systems: Processes that Shape the Earth

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 4-ESS1-1.</b> Identify evidence from patterns in rock formations and fossils in rock layers to support possible explanations of Michigan's geological changes over time.</p>			
<p><b>EE.4-ESS1-1:</b> Identify evidence from patterns in rock layers to support that over time Michigan's landscapes change.</p>	<p><b>EE.4-ESS1-H.1:</b> Identify evidence from patterns in rock layers to support that over time Michigan's landscapes change.</p>	<p><b>EE.4-ESS1-M.1:</b> Identify the relative age (older or younger) rock layers based on their position.</p>	<p><b>EE.4-ESS1-L1:</b> Match rock layers with a change(s) in landscape.</p>

## Topic Bundle: Earth’s Systems: Processes that Shape the Earth

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 4-ESS2-1.</b> Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p>			
<p><b>EE.4-ESS2-1:</b> Make observations (qualitative or quantitative) to provide evidence of the effects of weathering and/or erosion by water (rain/ ice), wind, or vegetation.</p>	<p><b>EE.4-ESS2-H.1:</b> Participate in observations (qualitative or quantitative) to provide evidence of the effects of weathering and/or erosion by water (rain/ ice), wind, or vegetation.</p>	<p><b>EE.4-ESS2-M.1:</b> Sequence an erosion event (using three stages (e.g., before, during, after; or, first, next, last)).</p>	<p><b>EE.4-ESS2-L.1:</b> Recognize an erosion event or the result of an erosion event.</p>

## Topic Bundle: Earth's Systems: Processes that Shape the Earth

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 4-ESS2-2.</b> Analyze and interpret data from maps to describe patterns of Earth's features.</p>			
<p><b>EE.4-ESS2-2: Participate in creating a model to represent and identify Earth's features found on a map.</b></p>	<p><b>EE.4-ESS2-H.2:</b> Participate in creating a model to represent and identify Earth's features found on a map.</p>	<p><b>EE.4-ESS2-M.2:</b> Participate in creating a model (3-D, 2-D) to represent or identify an Earth feature.</p>	<p><b>EE.4-ESS2-L.2:</b> Identify an Earth feature from media.</p>

## Topic Bundle: Earth's Systems: Processes that Shape the Earth

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 4-ESS3-2.</b> Generate and compare multiple solutions to reduce the impacts of natural Earth processes on Michigan's people and places.*</p>			
<p><b>EE.4-ESS3-2:</b> Given a natural hazard, generate a solution and/or compare two solutions that reduce the impacts of natural hazards on Michigan's people and places.</p>	<p><b>EE.4-ESS3-H.2:</b> Given a natural hazard, generate a solution and/or compare two solutions that reduce the impacts of natural hazards on Michigan's people and places.</p>	<p><b>EE.4-ESS3-M.2:</b> Given a natural hazard, compare two solutions that reduce the impact of the natural hazard on humans.</p>	<p><b>EE.4-ESS3-L.2:</b> Identify the best solution that reduces the impact of a specific regional natural hazard on humans (personal safety).</p>

## Topic Bundle: Engineering Design

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
Michigan K-12 Science Content Standard: <b>3-5-ETS1-1</b> . Define a simple design problem reflecting a need or a want that includes a specified criteria for success and constraints on materials, time, or cost.			
<b>EE.3-5-ETS1-1: Determine a simple solution to a design problem that reflects a need or want.</b>	<b>EE.3-5-ETS1-H.1:</b> Determine a simple solution to a design problem that reflects a need or want.	<b>EE.3-5-ETS1-M.1:</b> Identify appropriate materials for a given solution to a design problem.	<b>EE.3-5-ETS1-L.1:</b> Participate in activities that demonstrate finding a solution to a simple design problem (in order) to identify one action/material.

## Topic Bundle: Engineering Design

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 3-5-ETS1-2.</b> 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.</p>			
<p><b>EE.3-5-ETS1-2:</b> Given a simple problem generate and/or compare possible solutions to the problem based on how well each solution is likely to meet the specified desired results.</p>	<p><b>EE.3-5-ETS1-H.2:</b> Given a simple problem generate and/or compare possible solutions to the problem based on how well each solution is likely to meet specified desired results.</p>	<p><b>EE.3-5-ETS1-M.2:</b> Given a simple problem, compare multiple solutions to identify the solution that meets specified desired results.</p>	<p><b>EE.3-5-ETS1-L.2:</b> Participate in testing and comparing two solutions to a simple problem to identify the solution that best meets specified desired results.</p>

## Topic Bundle: Engineering Design

Target Alternate Expectation	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
<p><b>Michigan K-12 Science Content Standard: 3-5-ETS1-3.</b> Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.</p>			
<p><b>EE.3-5-ETS1-3:</b> Describe changes needed to a given design to improve the design's ability to meet the desired results.</p>	<p><b>EE.3-5-ETS1-H.3:</b> Describe changes needed to a given design to improve the design's ability to meet the desired results.</p>	<p><b>EE.3-5-ETS1-M.3:</b> Determine whether or not an engineering design product meets the desired results.</p>	<p><b>EE.3-5-ETS1-L.3:</b> Identify whether a specific product is working (broken) or not.</p>