



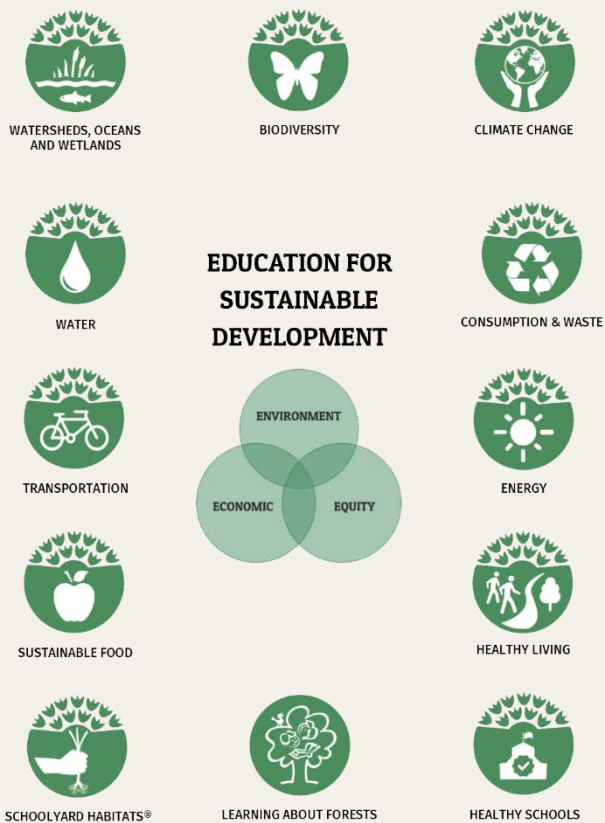
Pathways to Sustainability

Alignment to NGSS – First Grade

The performance expectations in first grade help students formulate answers to questions such as: “What happens when materials vibrate? What happens when there is no light? What are some ways plants and animals meet their needs so that they can survive and grow? How are parents and their children similar and different? What objects are in the sky and how do they seem to move?” First grade performance expectations include PS4, LS1, LS3, and ESS1 Disciplinary Core Ideas from the NRC Framework.

Students are expected to develop understanding of the relationship between sound and vibrating materials as well as between the availability of light and ability to see objects. The idea that light travels from place to place can be understood by students at this level through determining the effect of placing objects made with different materials in the path of a beam of light. Students are also expected to develop understanding of how plants and animals use their external parts to help them survive, grow, and meet their needs as well as how behaviors of parents and offspring help the offspring survive. The understanding is developed that young plants and animals are like, but not exactly the same as, their parents. Students are able to observe, describe, and predict some patterns of the movement of objects in the sky. The crosscutting concepts of patterns; cause and effect; structure and function; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas.

In the first grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.





Pathways to Sustainability Alignment to NGSS

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The National Wildlife Federation's Eco-Schools USA program has aligned their program Pathways of Sustainability to the Next Generation Science Standards, NGSS. As a part of the Eco-Schools Seven Step Framework, linking to the curriculum is a priority. This alignment is designed to highlight the natural connections between the NGSS and the Eco-Schools USA program.

Our program icons are used to denote pathway connections to the NGSS Performance Expectations and alignment to the Common Core State Standards, CCSS, English Language Arts, ELA and Mathematics.

Green STEM is an initiative of NWF's Eco-Schools USA program and is focused on identifying best practice in the STEM fields as it relates to environment-based learning. These elements include:

- Project, problem and place-based learning
- Utilizing the school, both inside and outside, as a learning laboratory
- Interdisciplinary approach
- Innovation space
- A commitment to stewardship
- An inclusive culture, where all students can learn, participate and take action



STRUCTURE, FUNCTION AND INFORMATION PROCESSING

Students who demonstrate understanding can:

- 1-LS-1-1.** 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-LS-1-2.** Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
- 1-LS-1-3.** Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.



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SUSTAINABLE FOOD



WOW

Whether it is your Certified Schoolyard Habitat™, the trees that surround your school, or your Sustainable Food garden(s), each and all can be used to transform your students into citizen scientists. Project Budburst, <https://budburst.org> through story and active observation students collect and record real data used by scientists across the country. This experiential learning opportunity allows students to observe the similarities and differences between young seedlings and parent plants. This time outside also gives students the opportunity to observe schoolyard wildlife, including insects, birds and small mammals and rodents. These first hand experiences will help to bridge the pathways needed to create lasting connections to long term memory.

Driving Questions – Examples

- How can our class identify a common problem at school and design a solution using plant or animal protective adaptation(s)?
- How can our class create a fieldguide for teachers to use with their students to identify the different stages of growth for our most common native trees, flowers, birds and butterflies?



Pathways to Sustainability Alignment to NGSS

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STRUCTURE, FUNCTION AND INFORMATION PROCESSING - CONTINUED

SCIENCE AND ENGINEERING PRACTICES

- Constructing Explanations and Designing Solutions
- Obtaining, Evaluating and Communicating Information

CONNECTIONS TO NATURE OF SCIENCE

- Scientific Knowledge is Based on Empirical Evidence

DISCIPLINARY CORE IDEAS

- LS1.A** Structure and Function
- LS1.B** Growth and Development of Organisms
- LS1.D** Information Processing
- LS3.A** Inheritance of Traits
- LS3.B** Variation of Traits

CROSCUTTING CONCEPTS

- Patterns
- Structure and Function

CONNECTIONS TO ENGINEERING, TECHNOLOGY AND APPLICATIONS IN SCIENCE

- Influence of Science, Engineering and Technology on Society and the Natural World

Connections to other DCIs in this grade: N/A

Articulation of DCIs across grade-bands: **K.ETS1.A** (1-LS1-1); **3.LS2.D** (1-LS1-2) **3.LS3.A** (1-LS3-1); **3.LS3.B** (1-LS3-1); **4.LS1.A** (1-LS1-1); **4.LS1.D** (1-LS1-1); **4.ETS1.A** (1-LS1- 1)



STRUCTURE, FUNCTION AND INFORMATION PROCESSING - CONTINUED

Common Core State Standards

ELA/Literacy

- RI.1.1** Ask and answer questions about key details in a text. (1-LS1-2),(1-LS3-1)
- RI.1.2** Identify the main topic and retell key details of a text. (1-LS1-2)
- RI.1.10** With prompting and support, read informational texts appropriately complex for grade. (1-LS1-2)
- W.1.7** Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). (1-LS1- 1),(1-LS3-1)
- W.1.8** With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-LS3-1)

Mathematics

- MP2** Reason abstractly and quantitatively. (1-LS3-1)
- MP.5** Use appropriate tools strategically. (1-LS3-1)
- 1.NBT.B.3** Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols $>$, $=$, and $<$. (1-LS1-2)
- 1.NBT.C.4** Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. (1-LS1-2)
- 1.NBT.C.5** Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. (1-LS1-2)
- 1.NBT.C.6** Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. (1-LS1-2)
- 1.MD.A.1** Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-LS3-1)



SPACE SYSTEMS: PATTERNS AND CYCLES

Students who demonstrate understanding can:

1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted.

1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year.



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A tremendous opportunity exists to connect students to the natural world when observing patterns and cycles as they relate to the sun, moon, and stars. Plan a nighttime event, a family track walk followed by the local astronomy club/department or museum hosting a “star party”. Work with the local community to help students begin to understand the patterns and cycles in the sky. Students likely think the moon and stars are not present during the school day. Take time to work through misconceptions.

This is also an opportunity to take your students outside and allow them to take pictures stationary things. Have students do this once a week or twice a month, same day and time of the week and at the same angle. Do this for a semester. Create a digital photo/flip book, placing the photos in order first to last. Students will be able to observe how daylight changes throughout the weeks and months. Another option – take a picture of your class, using the same criteria. Either way students will be able to identify patterns and predict future changes.

Driving Questions – Examples

- What plants can our class/team include in our schoolyard habitat that will provide a variety of options for animals to adapt to changes in weather?
- How can our class/team create a guide to safely playing and learning in nature in a variety of weather?



SPACE SYSTEMS: PATTERNS AND CYCLES - CONTINUED

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
<ul style="list-style-type: none"> • Planning and Carrying Out Investigations • Analyzing and Interpreting Data 	<p>ESS1.A The Universe and its Stars</p> <p>ESS1.B Earth and the Solar System</p>	<ul style="list-style-type: none"> • Patterns <p>CONNECTIONS TO NATURE OF SCIENCE</p> <ul style="list-style-type: none"> • Scientific Knowledge Assumes an Order and Consistency in Natural Systems

Connections to other DCIs in this grade: N/A

Articulation of DCIs across grade-bands: **3.PS2.A** (1-ESS1-1); **5.PS2.B** (1-ESS1-1),(1-ESS1-2) **5-ESS1.B** (1-ESS1-1),(1-ESS1-2)

Common Core State Standards

ELA/Literacy

- W.1.7** Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). (1-ESS1-1) (1-ESS1-2)
- W.1.8** With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-1) (1-ESS1-2)

Mathematics

- MP.2** Reason abstractly and quantitatively. (1-ESS1-2)
- MP.4** Model with mathematics. (1-ESS1-2)
- MP.5** Use appropriate tools strategically. (1-ESS1-2)
- 1.OA.A.1** Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
- 1.MD.C.4** Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)



Pathways to Sustainability

Alignment to NGSS

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K-ESS3 EARTH AND HUMAN ACTIVITY

Students who demonstrate understanding can:

- K-ESS3-1.** Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.
- K-ESS3-2.** Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.
- K-ESS3-3.** Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.



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CLIMATE CHANGE



CONSUMPTION & WASTE



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Climate Change and Schoolyard Habitats fit well with these Performance Expectations, but the other 4 pathways listed have a connection as well. **Remember, NWF does not support the teaching of climate change before grade 4.** That said, each of these PE's give students a foundation in which they are building their content knowledge and science literacy.

Consumption and Waste – specific to PE: K-ESS3-3 – More and more students are coming to us proficient in “recycling”, take this time to introduce and/or reinforce the complete cycle focusing on changing consumption behavior (rethinking, reduce) | reuse and repurpose what is consumed and last recycle what remains.

Biodiversity – specific to PE: K-ESS3-1 – utilizing the outdoor classroom for hands-on, minds-on interaction, with the natural world, will allow students to use models to represent the needs of plants and animals (including humans) in the place they live.

Transportation – specific to PE: K-ESS3-3 – What did it look like before my school was here? Google Earth (1995 to present) or HistoricAerials.com – Why did it change?

Water – K-ESS3-1 – Gaining knowledge related to the water needs of plants and animals help students better understand the need for water conservation in the future. Currently students are told not to waste water, but why? Lay the foundation now.

Driving Questions – Examples

- How can our class teach other students to prepare for severe weather conditions?
- What is the best way, our class can help the monarch butterfly?



K-ESS2 EARTH AND HUMAN ACTIVITY - CONTINUED

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
<ul style="list-style-type: none"> Asking Questions and Defining Problems Developing and Using Models Obtaining, Evaluating and Communicating Information 	<p>ESS23.A Natural Resources</p> <p>ESS3.B Natural Hazards</p> <p>ESS3.C Human Impacts on Earth Systems</p> <p>ETS1.A Defining and Delimiting Engineering Problems</p> <p>ETS1.B Developing Possible Solutions</p>	<ul style="list-style-type: none"> Cause and Effect Systems and Models <p>CONNECTIONS TO ENGINEERING, TECHNOLOGY AND APPLICATIONS IN SCIENCE</p> <ul style="list-style-type: none"> Influence of Science, Engineering and Technology on Society and the Natural World Interdependence of Science, Engineering and Technology

Connections to other DCIs in this grade: **K.ETS1.A** (K-ESS3-2),(K-ESS3-3)

Articulation of DCIs across grade-bands: **1.LS1.A** (K-ESS3-1); **2.ESS1.C** (K-ESS3-2); **2.ETS1.B** (K-ESS3-3); **3.ESS3.B** (K-ESS3-2); **4.ESS3.A** (K-ESS3-3); **4.ESS3.B** (K-ESS3-2); **5.LS2.A** (K-ESS3-1); **5.ESS2.A** (K-ESS3-1); **5.ESS3.C** (K-ESS3-3)

Common Core State Standards

ELA/Literacy

- RI.K.1 With prompting and support, ask and answer questions about key details in a text. (K-ESS3-2)
- W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (K-ESS3-3)
- SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-ESS3-2)
- SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail. (K-ESS3-1)

Mathematics

- MP.2 Reason abstractly and quantitatively. (K-ESS3-1)
- MP.4 Model with mathematics. (K-ESS3-1) (K-ESS3-2)
- K.CC Counting and Cardinality (K-ESS3-1) (K-ESS3-2)



Pathways to Sustainability

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K-PS3 ENERGY

Students who demonstrate understanding can:

K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.

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



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Students can use the outdoor environment to better engage and facilitate the learning process through heightened sensory perception. Experiential learning opportunities allow students to make concrete connections about the Earth's surface and between the Earth's properties relative to temperature.

Utilize student's natural curiosity of the natural world to design and build structures that will allow them to explore and make observation about temperature relative to a variety of Earth materials.

Driving Questions – Examples

- How can our class reduce the amount of sunlight that hits the outdoor learning space?
- What natural materials should be used in our edible food garden and garden pathways in an effort to reduce heat in those areas?



K-PS3 ENERGY - CONTINUED

SCIENCE AND ENGINEERING PRACTICES

- Planning and Carrying Out Investigations
- Constructing Explanations and Designing Solutions

CONNECTIONS TO NATURE OF SCIENCE

- Science Investigations Use A Variety of Methods

DISCIPLINARY CORE IDEAS

PS3.B Conservation of Energy and Energy Transfer

CROSCUTTING CONCEPTS

- Cause and Effect

Connections to other DCIs in this grade: N/A

Articulation of DCIs across grade-bands: **1.LS1.A** (K-LS1-1); **2.LS2.A** (K-LS1-1); **3.LS2.C** (K-LS1-1); **3.LS4.B** (K-LS1-1); **5.LS1.C** (K-LS1-1); **5.LS2.A** (K-LS1-1)

Common Core State Standards

ELA/Literacy

W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-LS1-1)

Mathematics

K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/”less of” the attribute, and describe the difference. (K-LS1-1)