

Kindergarten Science

Pacing Guide and Unpacked Standards



**GROVEPORT
MADISON**
SCHOOLS

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Resources: School District U-46, of Chicago, IL, The Ohio Department of Education,
Columbus City Schools, Common Core Institute and North Carolina Department of Public Instruction.

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Groveport Madison Science Pacing Overview

K	Science Inquiry & Application	Life Science	Physical Science	Earth & Space Science
1st 9 wks	Thinking Like a Scientist Intro to Science 3 weeks	Physical and Behavioral Traits of Living Things (K.LS.1) Living things have specific characteristics and traits. 6 weeks		
2nd 9 wks	Thinking Like a Scientist (continue to integrate)		Changes and Motion (K.PS.1) Objects and materials can be sorted and described by their properties. 5 weeks Properties of Everyday Objects & Materials (K.PS.2) Some objects & materials produce sound. 4 weeks	
3rd 9 wks	Thinking Like a Scientist (continue to integrate)			Daily and Seasonal Changes (K.ESS.1) Weather changes are long term and short term. 6 weeks Daily and Seasonal Changes (K.ESS.2) The moon, sun, and stars are visible at different times of the day or night. 3 weeks
4th 9 wks	Thinking Like a Scientist (continue to integrate)	Physical and Behavioral Traits of Living Things (K.LS.2) Living things have physical traits and behaviors which influence their survival. 9 weeks		

Ohio's Learning Standards- Clear Learning Targets

Science, Kindergarten

K.ESS.1

DAILY AND SEASONAL CHANGES

Weather changes are long-term and short-term.

Vocabulary

Air	Day
Earth	Night
Rain	Snow
Stars	Sun
Ice	Living
Long-term	Moon Positions
Non-living	Precipitation
Seasons	Temperature
Weather	
Wind	

Essential Understandings:

- Weather changes occur throughout the day and from day today.
- Air is a nonliving substance that surrounds Earth and wind is air that is moving.
- Wind, temperature and precipitation can be used to document short-term weather changes that are observable.
- Yearly weather changes (seasons) are observable patterns in the daily weather changes.

Note: The focus is on observing the weather patterns of seasons. The reason for changing seasons is not appropriate for this grade level; this is found in grade 5.

Essential Skills:

- The students can observe and ask questions about the natural environment.**
- The students can plan and conduct simple investigations.**
- The students can employ simple equipment and tools to gather data and extend the senses.**
- The students can use appropriate mathematics with data to construct reasonable explanations.**
- The students can communicate about observations, investigations, and explanations.**
- The students can review and ask questions about the observations and explanations of other.**

Misconceptions

-Misconceptions about weather and weather observations at this age often stem from children’s literature and expressions (Old Man winter, raining cats and dogs, raining buckets, fog like pea soup). Reading stories that include accurate representation of weather events can be a good start to addressing misconceptions.

-Collecting and discussing weather data on a regular basis will help to clarify weather at this age. For examples of age-appropriate, scientifically accurate storybooks about rain and wind, visit <http://www.magnet.fsu.edu/education/community/scienceinliterature/picturebooks.html>.

-NASA lists common misconceptions for all ages about the sun and the Earth, including weather and seasons, at <https://pwg.gsfc.nasa.gov/istp/outreach/sunearthmiscons.html>

Instructional Strategies and Resources

-Start a weather station inside/outside the classroom

-Children need to be encouraged to experiment with ways to measure weather and how to measure weather accurately. Asking effective questions as children are trying different methods is an important part of understanding what the child knows pertaining to measuring weather. Allow children to make their own tools to measure weather using everyday materials. Weather tools, such as windmills, windsocks or rain gauges, can be very creative and artistic products that can actually measure the weather.

-Videos, DiscoveryEd: Weather: Changes and Measurement (Segment 2) Magical Mother Nature: The Four Seasons (All Segments)

-SMARTBoard Lessons: Watching the Weather

-Contact a local tv station to have a meteorologist speak to the class

Career Connections

Meteorologist, Landscaper, Construction worker, Truck driver, Travel Agent/Tour Guide

Prior Knowledge

Pre-K: N/A

Future Knowledge

Grade 1: N/A

Ohio's Learning Standards- Clear Learning Targets

Science, Kindergarten

K.ESS.2

DAILY AND SEASONAL CHANGES

The moon, sun and stars can be observed at different times of the day or night.

Vocabulary

Light	Sky
Stars	Sun
Atmosphere	Axis
Closer	Cooler
Farther	Heat
Opposites	Planets
Rotation	Solar System
Warmer	

Essential Understandings:

- The moon, sun and stars appear in different positions at different times of the day or night.
- Sometimes the moon is visible during the night, sometimes the moon is visible during the day and at other times, the moon is not visible at all.
- The observable shape of the moon changes in size very slowly throughout each day of every month.
- The sun is visible only during the day.
- The sun's position in the sky appears to change in a single day and from season to season.
- Stars are visible at night, some are visible in the evening or morning and some are brighter than others.

Essential Skills:

- The students can observe, explore, describe, and compare patterns in the sky.**
- The students can plan and conduct simple investigations.**
- The students can employ simple equipment and tools to gather data and extend the senses.**
- The students can use appropriate mathematics with data to construct reasonable explanations.**
- The students can communicate about observations, investigations, and explanations.**
- The students can review and ask questions about the observations and explanations of other.**

Misconceptions

-AAAS offers a narrative section on The Universe that explains the importance of introducing the sun, moon and stars through observation and discusses common misconceptions of K-2 students at <http://www.project2061.org/publications/bsl/online/index.php?chapter=4#A1>.

-Beyond Penguins and Polar Bears is an online magazine for K-5 teachers. It lists a number of misconceptions held by students regarding the sun and seasons, including that the sun is actually moving across the sky, rather than understanding it is the Earth that is moving. For more information, visit <http://beyondpenguins.nsd.org/issue/column.php?date=May2008&departmentid=professional&columnid=professional!misconceptions>.

-NASA lists common misconceptions for all ages about the sun and the Earth at <https://pwg.gsfc.nasa.gov/istp/outreach/sunearthmiscons.html>

Instructional Strategies and Resources

-Field trip to COSI's planetarium.

-DiscoveryEd: A First Look: The Sky Above (Segments 3 & 11)

-SMARTBoard Lessons: Predictions Based on Patterns

-Observing the sun, moon and shadows, both inside and outside and then asking effective questions about the observations can help plan further investigation. Asking questions about what happens when ... or what happens if ... can encourage children to predict, experiment and explore with shadows or observed changes in the sun or moon.

-There are many different ways to explore how shadows are formed and what effects changes in the size of shadows. At this age, it is important to allow children to test out their own ideas and explain what they are doing as they experiment. Effective questioning and student-led investigation can support the use of inquiry and the understanding of factors that are needed to change the size and shape of shadows.

-NSTA offers a number of science modules (SciPacks) for teachers. This SciPack inquiry module addresses teaching about the sun and energy at an early-childhood level.

Career Connections

Astrologist, Climatologist, Government Researcher, Museum Planetarium Director

Prior Knowledge

Pre-K: N/A

Future Knowledge

Grade 1: N/A

Ohio's Learning Standards-Clear Learning Targets

Science, Kindergarten

K.PS.1

PROPERTIES OF EVERYDAY OBJECTS AND MATERIALS

Objects and materials can be sorted and described by their properties.

Vocabulary

Cold	Hot
Categories	Classify/Classifying
Different	Fewer
Groups	Heavier
Lighter	Longer
Materials	Properties
Same	Sets
Sort	Temperature

Essential Understandings:

- Objects can be sorted and described by the properties of the materials from which they are made.
- Some of the properties can include color, size and texture.

Essential Skills:

The students can observe, explore, describe, and compare the properties of objects and materials.

Misconceptions

- Measurement is only linear.
- Any quantity can be measured as accurately as you want.
- The five senses are infallible. Children are dependent on observable information. If the information cannot be observed with the senses, students do not believe it exists (Kind, 2004)

Instructional Strategies and Resources

- DiscoveryEd: Science Facts and Fun: Everything is Something (Segment 1)
- Sorting and Using Materials, an interactive simulation from BBC Schools, allows children to test and sort common objects for their abilities to bend and to determine whether they are waterproof. Directions are read to the child when the speaker icon is clicked.
- Grouping and Changing Materials, an interactive simulation from BBC Schools, has children sort objects according to the materials from which they are made. Directions are read to the child when the speaker icon is clicked. The subsequent quiz is not aligned with the content statement.

Career Connections

Work at a department store, Work in a laboratory, Geoscientist

Prior Knowledge

Pre-K: N/A

Future Knowledge

1.PS.1: Objects and materials can be sorted and described by their properties.

Ohio's Learning Standards: Clear Learning Targets

Science, Kindergarten

K.PS.2

PROPERTIES OF EVERYDAY OBJECTS AND MATERIALS

Some objects and materials can be made to vibrate to produce sound.

Vocabulary

Cause and effect
High sounds
Instrument
Loud sounds
Low sounds
Part
Pitch
Soft sounds
Vibrating
Vibration
Volume
Whole

Essential Understandings:

- Sound is produced by touching, blowing or tapping objects.
- The sounds that are produced vary depending on the properties of objects.
- Sound is produced when objects vibrate.

Essential Skills:

The students can observe, explore, describe, and compare the properties of objects and materials in regard to the production of sound.

The students can observe and ask questions about the natural environment.

The students can create sound in a variety of ways, such as tapping, blowing, and plucking.

Misconceptions

- Sounds can be produced without using any material objects.
- Hitting an object harder changes the pitch of the sound produced.
- Human voice sounds are produced by a large number of vocal cords that all produce different sounds.
- Loudness and pitch of sounds are the same things.
- In wind instruments, the instrument itself vibrates (not the internal air column).
- Music is strictly an art form; it has nothing to do with science.

Instructional Strategies and Resources

- DiscoveryEd: Science Facts and Fun: Everything is Something(Segment 1)
- Sound and Hearing is an interactive simulation from BBC Schools that allows children to explore differences in sound. The directions can be read to the children by clicking on the speaker icons.
- Allow children to make their own musical instruments and test the different sounds that they make.
- Children should be given the opportunity to feel the vibrations.

Career Connections

Musician, Music teacher, Sound Engineers, Audio Engineers, Create sound effects for video games or television shows

Prior Knowledge

Pre-K: N/A

Future Knowledge

Grade 1: N/A

Ohio's Learning Standards- Clear Learning Targets

Science, Kindergarten

K.LS.1

PHYSICAL & BEHAVIORAL TRAITS OF LIVING THINGS

Living things have specific characteristics and traits.

Vocabulary

Animals
Characteristics
Fake
Nonliving
Real
Similarities
Food

Plants
Differences
Living
Pretend
Resemblances
True

Essential Understandings:

- Living things grow and reproduce.
- Living things are found worldwide.

Essential Skills:

The students can observe, explore, describe, and compare living things in Ohio.

The students can observe and ask questions about the natural environment.

Misconceptions

- Benchmarks for Science Literacy contain a detailed discussion of energy. Scroll to section heading E for detailed information of grade- appropriate exposure to energy.
- AAAS' Benchmarks 2061 Online, Chapter 15, 5a, Diversity of Life, states that children use criteria such as movement, breath, reproduction and death to determine whether things are alive.

Instructional Strategies and Resources

- DiscoveryEd: How Scientists Work: What Is Scientific Inquiry? (all segments) – for teacher background How Scientists Work: What is the Scientific Method? (all segments) – for teacher background
- SMARTBoard Lessons: Learning Colors, Warm and Cool Colors, Color Stories, How to Use a Ruler, Non-standard Measurement, Textures, Measuring Madness, Magnifying Glass Observations
- Observe a variety of living things in the wild or the classroom and ask questions about what makes them living. How do they get food? Where do they live? How do they take care of their young? If using classroom pets, NSTA has a position paper to provide guidance in the ethical use and treatment of animals in the classroom.
- The Ohio Department of Natural Resources provides information about observing animals in the wild while promoting safety for children and wildlife.
- Ohio's Outdoor Bill of Rights provides information about outdoor education experiences available for children with summaries of research that support helping children reconnect with nature. Ohio's parks have a variety of trails, nature centers and yearly activities to provide opportunities to study living things in the natural environment.
- ODNR-Division of Wildlife's A to Z Species Guide has photos, information, tracks and sounds of Ohio's wild animals
- Project Wild was developed through a joint effort of the Western Association of Fish and Wildlife Agencies and the Council for Environmental Education. This program helps students learn basic concepts about wild animals, their needs and importance and their relationships to people and the environment. The activity guides are available to educators free of charge when they attend a workshop. Information about upcoming workshops are available on the ODNR Website. In the activity Surprise Terrarium, students use a classroom terrarium to observe animal behavior and interactions.

Career Connections

Biological Engineer, Botanist, Conservationist, Horticulturalist, Plant Geneticist, Ecologist

<p>Prior Knowledge</p> <p>N/A</p>	<p>Future Knowledge</p> <p>1.LS.1: Living things have specific characteristics and traits.</p>
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Ohio's Learning Standards- Clear Learning Targets

Science, Kindergarten

K.LS.2

PHYSICAL & BEHAVIORAL TRAITS OF LIVING THINGS

Living things have physical traits and behaviors, which influence their survival.

Essential Understandings:

- Living things are made up of a variety of structures.
- Some traits can be observable structures.
- Some of these structures and behaviors influence their survival.

Vocabulary

Behavior
Characteristics
Differences Living
Nonliving
Observations
Similarities
Survival
Traits

Essential Skills:



The students can observe, explore, describe, and compare living things in Ohio.

Misconceptions

- Young children may give plants human characteristics such as eating, drinking or breathing. They may believe that plants need things that are provided by people. Beyond Penguins and Polar Bears is an online magazine for K-5 teachers that provide information for misconceptions about plants.
- The Annenberg Media series Essential Science for Teachers can be used to provide greater insight to misconceptions children hold about living things and energy. Classroom videos and lessons are provided to help students avoid misconceptions.

Instructional Strategies and Resources

- SMARTBoard lessons: Where Are the Animals?, Who Does Not Belong?
- Study the characteristics of the environment in which plants and animals thrive and see how they interact with one another. The Great Sunflower Project collects data on the number of wild bees found nationally. Sunflowers are grown to attract bees. Then a report is sent to the site sponsors stating the number of bees observed. Observe the growth of sunflowers and study their characteristics while observing how bees interact with the flowers. Children can then ask questions about what happens with the variation in the number of bees.
- The Ohio Department of Natural Resources provides information about observing animals in the wild. Have children observe the physical characteristics of plants and animals and determine how those traits are involved in each organism's survival. How do animals capture prey? How do birds get insects from the tree? Why do some birds have webbed feet and others do not? Those birds that do have webbed feet live in what type of environment? A Guide to Using Animals in the Classroom by the Ohio Department of Natural Resources provides guidance, explains legally which organisms may be collected and offers limited advice on use of animals in the classroom.
- NSTA has a position paper to provide guidance in the ethical use and treatment of animals in the classroom. These guidelines can be used for classroom pets and for helping children establish respect and proper care for animals.
- ODNR-Division of Wildlife's A to Z Species Guide has photos, information, tracks and sounds of Ohio's wild animals
- Project Wild was developed through a joint effort of the Western Association of Fish and Wildlife Agencies and the Council for Environmental Education. This program helps students learn basic concepts about wild animals, their needs and importance and their relationships to people and the environment. The activity guides are available to educators free of charge when they attend a workshop. Information about upcoming workshops are available on the ODNR Website. In the activity Surprise Terrarium, students use a classroom terrarium to observe animal behavior and interactions.

Career Connections

Farmer, Fisherman, Butcher, Zoologist, Naturalist, Forest Ranger

Prior Knowledge

Pre-K: N/A

Future Knowledge

1.LS.2: Living things have physical traits and behaviors, which influence their survival.