

1st Grade Science

Pacing Guide and Unpacked Standards



**GROVEPORT
MADISON**
SCHOOLS

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Groveport Madison Science Pacing Guide

1	Science Inquiry & Application	Life Science	Physical Science	Earth & Space Science
1st 9 wks	Thinking Like a Scientist Intro to Science 3 weeks	Basic Needs of Living Things (1.LS.1) Living things have basic needs which are met by obtaining materials from the physical environment. 6 weeks		
2nd 9 wks	Thinking Like a Scientist (continue to integrate)	Basic Needs of Living Things (1.LS.2) Living things survive only in the environments that meet their needs. 9 weeks		
3rd 9 wks	Thinking Like a Scientist (continue to integrate)			Sun, Energy, and Weather (1.ESS.1) The sun is the principal source of energy. 3 weeks Sun, Energy, and Weather (1.ESS.2) Water on Earth is present in many forms. 6 weeks
4th 9 wks	Thinking Like a Scientist (continue to integrate)		Motion and Materials (1.PS.1) Properties of objects and materials change. 5 weeks Motion and Materials (1.PS.2) Objects that can move in a variety of ways such as straight, zigzag, circular and back and forth. 4 weeks	

Ohio's Learning Standards- Clear Learning Targets Science, Grade 1

1.ESS.1

SUN, ENERGY, AND WEATHER

The sun is the principal source of energy.

Vocabulary

Heat	Light
Sun	Source
Absorb	Controls
Emit	Energy
Energy sources	Measurement
Solar energy	Temperature
Thermometer	
Variables	

Essential Understandings:

- Sunlight warms Earth's land, air and water.
- The amount of exposure to sunlight affects the amount of warming or cooling of air, water and land.

Essential Skills:

- The students can explain that the sun is a source of energy.**
- The students can observe and document the warming (from the energy of the sun) of the air using quantitative measurements.**
- The students can measure the time (and temperature) it takes for the sun to warm up an object or material.**
- The students can measure the time (and temperature) it takes for an object or material to cool down after it is taken out of the sunlight.**
- The students can explain the relationship between exposure to sunlight and temperature.**
- Students will identify the effects of the sun and shade on the same object.**

Misconceptions

- For examples of misconceptions about the sun and energy, and resources to address misconceptions through investigation, visit <http://amasci.com/miscon/opphys.html>.

Instructional Strategies and Resources

- Discovery Education: www.discoveryeducation.com
Hands-on Weather: Part 2- More Weather Experiments; Measuring Heat; A Look at How Land Heats Up; Weather: Changes and Measurement; The Sun and Earth (a segment of "Our Home in Space")
- SMARTBoard Lessons: The Sun, "Temperature, Temperature Vocabulary, and Weather" (SMART Notebook Lesson)
- Solar Energy International - Kid's Info (www.solarenergy.org)
- WeatherWizKids- <http://www.weatherwizkids.com>
- There are many different ways to measure heating and cooling from sunlight. At the early elementary level, it is important to allow children to explore the causes of temperature changes in materials as it relates to the sun. Background information about **solar heating** and solar energy can help develop research questions to encourage experimentation and investigation.
- Using **water, sun and wind** to explore energy is recommended for early elementary children. While the term and definition of energy is not appropriate for grade 1, exploring, experimentation and observations of energy (e.g., seeing and feeling air and water movement, feeling heat from sunlight) are encouraged.

Career Connections

Astronomer, Ecologist, Solar Energy Engineer, Solar Energy Systems Designer, Energy Service

Prior Knowledge

K: N/A

Future Knowledge

Grade 2: N/A

Ohio's Learning Standards- Clear Learning Targets
Science, Grade 1

1.ESS.2

SUN, ENERGY, AND WEATHER

Water on Earth is present in many forms.

Vocabulary

Earth	Ice
Ocean	Rain
Snow	Water
Fog	Fresh water
Gas	Hail
Lakes	Liquid
Matter	Physical change
Pond	River
Salt water	Sleet
Solid	Stream
Water vapor	Wetlands

Essential Understandings:

- The physical properties of water can change.
- These changes occur due to changing energy.
- Water can change from a liquid to a solid and from a solid to a liquid.

Note: Water as a vapor is not introduced until grade 2; the water cycle is reserved for later grades.

Essential Skills:

The students can understand that water changes states between a liquid and a solid.

The students can identify fresh water sources (i.e. lakes) and salt water sources (i.e. oceans).

Misconceptions

- A series of case studies of K-8 science classrooms by the Smithsonian and Harvard University can be found at

<http://www.learner.org/resources/series21.html>.

Teachers need to sign up to use this free site. The case study *Najwa and Pat–Grade 1* demonstrates engagement of special needs students in scientific inquiry. Strategies are provided to integrate students fully into the science investigations and activities.

Instructional Strategies and Resources

- Discovery Education: www.discoveryeducation.com

“A First Look: Solids, Liquids, and Gases” (Segments 1-6); “Water Smart: Water on Earth”; “Properties of Matter part 2

- SMART: (Search the Smart Exchange site (<http://exchange.smarttech.com>) for these specific titles) “Water Cycle” (SMART Notebook Lesson, submitted by TCNOE); “Water Cycle” (SMART Notebook Lesson, published by SMART Technologies); “The Water Cycle” (SMART Notebook Lesson, submitted by Jeni Marinello); “Water Cycle” (SMART Notebook dual users lesson); “A First Look: Solids, Liquids, and Gases” (Segments 1-6); “Water Smart: Water on Earth”; “Properties of Matter part 2

- Contact a local news station for weather information/school programs.

- Some examples of research questions to investigate through inquiry in the classroom or outside include: *How does the amount of water effect how fast water freezes? Why does a lake freeze faster and more completely than the ocean? Does hot water freeze faster or slower than cold water?*

- **The Ohio EPA** has an education site that provides information about wetlands in Ohio. The relationship between water, wetlands and changing seasons is an excellent way to learn about changing properties of water through natural observation.

- **The Primary GLOBE Program** offers teacher-programs and rich resource materials (including science-based storybooks) for K-4. Environmental stewardship and Earth systems science are emphasized.

Career Connections

Chemist, Engineer, Chef, Researcher, Heating and Cooling Specialist, Meteorologist

Prior Knowledge

K: N/A

Future Knowledge

2.ESS.2: Water is present in the atmosphere.

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 1

1.LS.1

BASIC NEEDS OF LIVING THINGS

Living things have basic needs, which are met by obtaining materials from the physical environment

Vocabulary

Air	Food
Water	Physical
Environment	Survival
Compare	Conclude
Sorting	Energy
Farmer	Forest
Habitat	Lake
Living	Needs
Non-living	Ocean
Orchard	Shelter

Essential Understandings:

- Living things require energy, water, and a particular range of temperatures in their environments.
- Living things acquire resources from the living and nonliving components of the environment.
- Plants get energy from sunlight. Animals get energy from plants and other animals.

Essential Skills:

The students can determine the difference between living and non-living things.

The students can understand that energy from the sun or food, nutrients, water, shelter, and air are some of the physical needs of living things in Ohio.

The students can learn the basic needs of living things and compare how needs and habitats are connected.

The students can learn where their food comes from.

Misconceptions

- Benchmarks for Science Literacy contains a detailed discussion of energy. Scroll to section heading E for detailed information of grade-appropriate exposure to energy. (<http://www.project2061.org/publications/bsl/online/index.php?chapter=4#E1>)
- Students may think that food must come from outside an organism. They may also think that fertilizers are actually plant food. They fail to understand that plants make sugars and starches through the process of photosynthesis and that light is essential for plant survival. Beyond Penguins and Polar Bears is an online magazine for K-5 teachers that provides information for misconceptions about plants. (<http://beyondpenguins.ehe.osu.edu/issue/polar-plants/common-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 these misconceptions. (<http://www.learner.org/courses/essential/life/session7/ideas.html>)

Instructional Strategies and Resources

- Discovery Education: www.discoveryeducation.com
- Living and Nonliving Things (12:00); Everybody Needs Food (all segments)
- SMARTBoard Lessons: Animal Needs; Dead or Alive; Plant Needs; What Is Real About Plants and Animals
- The Columbus and Franklin County Metro Parks <http://www.metroparks.net/>
- The Columbus Zoo and Aquarium www.columbuszoo.org
- The Franklin Park Conservatory www.fpconservatory.org
- The Toledo Zoo offers distance learning Life Science opportunities for animal adaptations. Children can begin to explore how animal traits play a role in survival.
- Observe a variety of living things in the wild or the classroom and ask questions about how they survive. *How do they get food? Where do they live? What do they use for shelter?* The **Ohio Department of Natural Resources** website also provides information about observing animals in the wild and promotes safety for children and wildlife. The **Guide to Using Animals in the Classroom** explains legally which organisms may be collected.
- Explore various plant life in the local environment. Document the conditions that support the plant. Ask: *Is the area moist? Is it dry? Does it get lots of sun or shade? What other types of plants are in the area?* The physical characteristics and habitat requirements for native trees in Ohio can be found on the **Ohio State Extention** website.

- 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. In *Beautiful Basics*, students list and organize needs of people, pets and wildlife.

Career Connections

Zoologist: studying and understanding animals and their behavior, Animal Care Worker: managing animals, knowing animal dietary needs, understanding animal behavior, Veterinarian: managing the health and wellness of all animals, prescribing and administering medications, and performing surgeries as needed, Zoo Maintenance Workers: maintaining the zoo grounds., Botanist: work with plants, Landscape Architect or Designer: designing animal habitats that are reflective of the animal's natural environment with plants and materials found in different biomes Biologist, Horticulturist, Florist, Farmer, Ecologist, Forest Ranger

Prior Knowledge

K.LS.1 Living things have specific characteristics and traits.

Future Knowledge

2.LS.1: Living things cause changes on Earth.

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 1

1.LS.2

BASIC NEEDS OF LIVING THINGS

Living things survive only in environments that meet their needs.

Vocabulary

Air	Food
Leaves	Water
Compare	Conclude
Observe	Predict
Basic needs	Weathering
Environment	Erosion
Germination	Habitat
Living/Nonliving things	
Needs	Nutrients
Organisms	Roots
Seasonal changes	Survival
Shelter	Space
Stem	

Essential Understandings:

- Resources are necessary to meet the needs of an individual and populations of individuals.
- Living things interact with their physical environments as they meet those needs.
- Effects of seasonal changes within the local environment directly impact the availability of resources

Essential Skills:

The students can observe how living things impact the environment in which they live and the environment impacts living things.

The students can understand the concept that although all living things have the same basic needs (air, water, food, living space, and shelter), the way those needs are met may be different.

The students can understand that humans and other animals have body parts that help them seek, find and take in food when they are hungry.

The students can recognize that seasonal changes can influence the health, survival and activities of organisms.

The students can recognize that all organisms cause changes in the environment where they live. These changes can very noticeable or slightly noticeable.

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.

Instructional Strategies and Resources

- ODE IMS Lessons: Characteristics and Structures of Life

- Discovery Education: www.discoveryeducation.com Animal Features and Their Functions

- **The Great Backyard Bird Count** is an opportunity to make observations, and collect and report data in a local environment to create a real-time snapshot of bird locations. Note the environmental conditions in the area when birds are spotted and when they migrate. Ask: *What do these environmental changes mean for the birds?*

- **Cornell Lab of Ornithology** sponsors a site to collect data for birds in the local environment by watching bird feeders to create a real-time snapshot of bird populations.

- **Wildlife Watch** is sponsored by the National Wildlife Federation. Students can identify and track plants and animals that are found locally and nationally. Information about the number of individuals spotted, pictures and personal stories can be recorded and shared on this site. Data can be used to determine what areas support what types of organisms and where organisms are thriving and barely surviving.

- **Near One Cattail: Turtles, Logs and Leaping Frogs** by Anthony D. Fredericks is a book resource recommended by the Ohio Resource Center and Americans for the Advancement of Science. The book can be used in conjunction with a host of activities for a nature study.

- *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 is available on the **ODNR Website**. If explicit connections between environment and organism survival are made, the following *Project Wild* activities could be helpful: in *Wildlife is Everywhere*

Career Connections

Biologist, Zoologist, Botanist, Horticulturist, Florist, Farmer, Landscape Architect, Ecologist, Veterinarian, Forest Ranger

Prior Knowledge

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

Future Knowledge

2.LS.2: All organisms alive today result from their ancestors, some of which may be extinct. Not all kinds of organisms that lived in the past are represented by living organisms today.

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 1

1.PS.1

MOTION AND MATERIAL

Properties of objects and materials can change.

Vocabulary

Bendable	Changes
Color	Materials
Size	Stretchable
Weight	Objects
Characteristics	Predict
properties	investigate
Force	Length

Essential Understandings:

- Objects and materials change when exposed to various conditions, such as heating or cooling.
- Changes in temperature are a result of changes in energy.
- Not all materials change in the same way.

Essential Skills:

The students can understand that changes occur in objects and materials.

The students can explore with a wide variety of common materials in order to investigate different types of changes that occur when things are done to materials or matter.

The students can understand that materials are made of different kinds of matter and that properties change when certain actions are done to the material.

Misconceptions

- Although two materials are required for the dissolving process, children tend to focus only on the solid and they regard the process as melting. (Driver, Squires, Rushworth & Wood-Robinson, 1994, p . 8 0)
- Heat is a substance.
- Cold is the opposite of heat and is another substance.
- Melting/freezing and boiling/condensation are often understood only in terms of water
- When things dissolve, they disappear.
- Melting and dissolving are confused.
- Cold can be transferred.

Instructional Strategies and Resources

- **Kitchen Magician** is a game from PBS Kids that emphasizes how materials can change during cooking.
 - Discovery Education: www.discoveryeducation.com
- Blue Dragon, the: Slipping and Sliding (All Segments), How Things Move (All segments)
- SMARTBoard Lessons: “Force and Motion” (SMART Notebook Lesson), “On the Move” (SMART Notebook Lesson)
 - Forces and Motion (extra activities for the teacher) http://wings.avkids.com/Curriculum/Foces_Motion/index.html
 - COSI on Wheels <http://www.cosi.org/educators/outreach/cow>

Career Connections

Chemist, Engineer, Chef, Researcher, Heating and Cooling Specialist, Meteorologist

Prior Knowledge

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

Future Knowledge

Grade 2: N/A

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 1

1.PS.2

MOTION AND MATERIALS

Objects can be moved in a variety of ways, such as straight, zigzag, circular and back and forth.

Vocabulary

Circle	Curved
Down	Fast
Left	Pull
Push	Right
Slow	Speed
Straight	Up
Ziqzaq	Circular

Essential Understandings:

- The position of an object can be described by locating it relative to another object or to the object's surroundings.
- An object is in motion when its position is changing.
- The motion of an object can be affected by pushing or pulling. A push or pull is a force that can make an object move faster, slower or go in a different direction.
- Changes in motion are a result of changes in energy.

Essential Skills:

The students can understand that changing the position of an object is a result of pushing or pulling.

The students can demonstrate a knowledge of motion based on using different movements.

The students can investigate a variety of ways things move and what causes them to change speed, direction and/or stop.

Misconceptions

- The location of an object can be described by stating its distance from a given point, ignoring direction.
- The only natural motion is for an object to be at rest.
- If an object is at rest, no forces are acting on the object.

Instructional Strategies and Resources

- Discovery Education: www.discoveryeducation.com

Identifying Properties of Matter, Properties of Matter part 2, Two Chemical Experiments (Magic School Bus), How Things Move

- SMARTBoard Lessons: Categorize Objects, Solids, Liquids, Gases, Forces and Movement
- **Making Objects Move** provides a strategy that emphasizes an inquiry approach to teaching and learning about different motions of objects. It includes many questions for possible investigations that children can perform. The second part has an idea for a design project.
- *Force and Motion*, produced by Annenberg, is a series of videos designed for teachers to improve their knowledge of forces and motion and gives ideas for teaching the concepts to elementary learners. This particular segment demonstrates experiences with balls and inclined planes that can get first--grade children to **observe movement** and to make inferences about forces that start the balls moving.
- Have children choose a movement and race to the other side of classroom/gym.

Career Connections

Engineer (Structural, Automotive, Roller Coaster, Rocket), Professional Athlete, Gaming Programmer, Astrophysicist, Physicist, Professor, Construction Supervisor, Accident Reconstruction Investigator

Prior Knowledge

K: N/A

Future Knowledge

2.PS.1: Forces change the motion of an object.