2nd Grade Science

Pacing Guide and Unpacked Standards

GROVEPORT MADISON SCHOOLS

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Groveport Madison Science Pacing Guide

2	Science Inquiry and Application	Life Science	Physical Science	Earth & Space Science
1st 9 wks	**Thinking Like a Scientist** Intro to Science 3 weeks	**Interactions Within Habitats (2.LS.1)** Living things cause changes on Earth. 6 weeks		
2nd 9 wks	**Thinking Like a Scientist** (continue to integrate)	**Interactions Within Habitats (2.LS.2)** Organisms alive today result from their ancestors, some may be extinct. 3 weeks **Interactions Within Habitats (2.LS.1)** Living things cause changes on Earth. 6 weeks		
3rd 9 wks	**Thinking Like a Scientist** (continue to integrate)			**The Atmosphere (2.ESS.1)** The atmosphere is primarily made up of air. 4 weeks **The Atmosphere (2.ESS.2)** Water is present in the atmosphere. 4 weeks **The Atmosphere (2.ESS.3)** Long and short term weather changes occur due to changes in energy. 5 weeks.
4th 9 wks	**Thinking Like a Scientist** (continue to integrate)		**Changes and Motion (2.PS.1)** Forces change the motion of an object. 5 weeks	**The Atmosphere (2.ESS.3)** Long and short term weather changes occur due to changes in energy. 4 weeks

Ohio's Learning Standards- Clear Learning Targets
Science, Grade 2

2.ESS.1

THE ATMOSPHERE

The atmosphere is primarily made up of air.

Vocabulary

Direction
Air pressure
Barometer
Hurricane
Speed
Tornado
Warm front
Wind
Anemometer
Cold front
Molecules
Temperature
Volume
Weather vane
Windsock

Essential Understandings:

- Air has properties that can be observed and measured.
- The transfer of energy in the atmosphere causes air movement, which is felt as wind.
- Wind speed and direction can be measured.

Essential Skills:

The students can identify the properties of air (has weight [mass] and takes up space [volume]).

The students can observe and measure the properties of air.

The students can measure the speed and direction of wind.

The students can describe how the transfer of energy in the atmosphere causes air movement, which is felt as wind.

Misconceptions

- For examples of misconceptions that young children have about air and the atmosphere, and resources to address misconceptions through investigation, visit **http://amasci.com/miscon/opphys.html**.

- A common misconception regarding air and atmosphere is that air is nothing. It is important to provide activities for students that show properties of the atmosphere and air. For ways to allow students to demonstrate that air actually has mass* and takes up space (volume),

- visit **http://weather.about.com/od/lessonplanselementary/ht/air_has_mass.htm.**

Instructional Strategies and Resources

-Discovery Education: www.discoveryeducation.com
A First Look: Weather (only the "How Wind Affects Weather" segment [2:05]), Weather: Changes and Measurement (only the "Wind" segment [1:57]), Hands-On Weather: Part 02 (only the "A Look at Air Pressure" [2:00] and the "A Look at Wind" [1:26] segments

-"Weather for Kids" www.sciencekids.co.nz/weather.html

- Weather Whiz Kids Lessons on Wind www.weatherwizkids.com/weather-wind.htm

- What's in the Wind www.weatherwizkids.com/experiments-wind.htm

- Make an Anemometer www.weatherwizkids.com/experiments-anemometer.htm

- Air Takes Up Space and Has Mass http://www.gsseser.com/nie/PDFs/AirPressure.pdf

- What is Air? http://www.pbs.org/teachers/ecoinvestigators/lessonplans/air/what-is-air/

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

- Use everyday materials to allow students to experiment and make their own weather instruments. The process of testing and evaluating the instrument is even more important than the resulting product.

- Connecting students to current weather discoveries and events are ways to generate interest in the science behind the event. Accurate scientific articles and journals about weather, air, atmosphere and wind can help students relate what they are learning in the classroom to the world around them.

Career Connections

Meteorologist, Weather Forecaster/Reporter, Engineer, Wind Turbine Technician, Professor

Prior Knowledge	**Future Knowledge**
Grade 1: N/A	**3.ESS.1:** Earth's nonliving resources have specific properties**.**

Ohio's Learning Standards- Clear Learning Target
Science, Grade 2

2.ESS.2

THE ATMOSPHERE

Water is present in the atmosphere.

Vocabulary
Clouds
Atmosphere
Condensation
Evaporation
Precipitation
Pollutants
Water Cycle

Essential Understandings:

- Water is present in the air as water vapor.
- When water vapor in the atmosphere cools, it forms clouds, fog, rain, ice, snow, sleet or hail.

Note: The emphasis at this grade level is investigating condensation and evaporation, not memorizing the water cycle itself.
Note: The emphasis is not in naming cloud types, but in relating the characteristics of the clouds with weather.

Essential Skills:

The students can observe and describe the states of water evident in the atmosphere.

The students can investigate and explain the processes of condensation and evaporation.

The students can express familiarity with the water cycle.

The students can relate which type of weather is associated with different types of clouds.

The students can explain how different types of pollutants enter waterways through different parts of the water cycle.

The students can discover what factors contribute to condensation and evaporation rates.

The students can describe how clouds are formed and how they move.

Misconceptions

- It is difficult for young students to understand fully the process of condensation and how clouds form. The misconception that clouds are like cotton and/or have a solid "feel" to them can be addressed by investigations and experiments that are directly related to condensation and cloud formation. For a classroom-exploration example of making clouds in a bottle that can demonstrate cloud consistency, see **http://eo.ucar.edu/kids/images/AtmoExp1.pdf**.

Instructional Strategies and Resources

-Discovery Education: www.discoveryeducation.com

A First Look: Water (Segments 4 and 5), The Importance of Water (Segments 2, 3, 4, and 5), Clouds, Weather, and Life

- "Weather Wiz Kids" (http://www.weatherwizkids.com/)

- "neoK12: Water Cycle" (http://www.neok12.com/Water-Cycle.htm)

- "Science Up-Close" (http://www.harcourtschool.com/menus/science/up_close2.html)

- Variations on the Cloud in a Jar demonstration http://eo.ucar.edu/webweather/cloudact1.html
http://weather.about.com/od/under10minutes/ht/cloudbottle.htm

- Teacher Info on Clouds and Fog http://www.usatoday.com/weather/wcloud0.htm

- Dancing to the Water Cycle LessonPlan http://www.coreknowledge.org/mimik/mimik_uploads/lesson_plans/1232/2_DancingWaterCycle.pdf

- Contact a local news station for information/classroom programs concerningweather.

- Providing specific examples that connect air temperature and changes in water prepares students for learning about the water cycle in later grades. Observing and experimenting with water and temperature (student-led exploration) strategies can help make this important connection. Though the water cycle itself should not be introduced at this grade level, the example illustrates how water gets into the atmosphere (evaporation) and then what happens when it is in the atmosphere (condensation).

Career Connections

Meteorologist, Weather Forecaster/Reporter, Water Scientist, Professor

Prior Knowledge	**Future Knowledge**
1.ESS.2: Water on Earth is present in many forms.	**3.ESS.3:** Some of Earth's resources are limited.

Ohio's Learning Standards- Clear Learning Target
Science, Grade 2

2.ESS.3

THE ATMOSPHERE

Long- and short-term weather changes occur due to changes in energy.

Vocabulary

Season	Weather
Wind	Weather pattern
Air pressure	Atmosphere
Barometer	Condense
Drought	Energy
Forecasting	Meteorologist
Precipitation	Radar
Temperature	Thermometer
Water cycle	

Essential Understandings:

- Changes in energy affect all aspects of weather, including temperature, precipitation amount and wind.

Essential Skills:

The students can define a weather front.

The students can observe how air and water relate to weather and weather changes.

The students can recall that weather changes occur due to energy changes.

The students can explain the relationship between wind/cloud changes and changes in weather.

The students can identify factors or characteristics that contribute to changes in weather.

Misconceptions

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

- For examples of misconceptions that young children have about energy, weather and the sun, and resources to address misconceptions through investigation, visit **http://amasci.com/miscon/opphys.html**.

Instructional Strategies and Resources

-Discovery Education: www.discoveryeducation.com
"Weather: Changes and Measurement," "The Four Seasons" (all segments), "A First Look: Weather" (segment 5)

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

- The National Center for Atmospheric Research provides support and educational materials for teachers and students to learn about the connection between the atmosphere and weather.

- Preparing to teach about the atmosphere requires keeping updated on new discoveries and innovative ideas to teach about air, wind and weather. Science Now is a free periodical science journal that details the latest atmospheric research for educators.

- Using scientifically accurate resources and data about the atmosphere and weather that is connected to Ohio can add relevancy and meaning to what is going on in the classroom. The Midwest Climate Center provides FAQs about weather and climate, on-going research projects and quality resources for elementary teachers.

- Newspapers can be used to provide actual real-time weather data to use in the classroom.

Career Connections

Meteorologist, Weather Forecaster/Reporter, Climatologist, Atmospheric Physicist, Professor

Prior Knowledge	**Future Knowledge**
1.PS.1: Properties of objects and materials can change.	**3.ESS.2:** Earth's resources can be used for energy..

Ohio's Learning Standards- Clear Learning Target
Science, Grade 2

2.LS.1

INTERACTIONS WITHIN HABITATS

Living things cause changes on Earth.

Vocabulary

Data	Evidence
Observe	Predict
Acid Rain	Adapt
Adaptations	Basic needs
Biome	Environment
Habitat	Living Things
Meadow	Shelter
Survive	Terrarium
Wetland	Wildlife
Woodland	

Essential Understandings:

- Living things function and interact with their physical environments.
- Living things cause changes in the environments where they live; the changes can be very noticeable or slightly noticeable, fast or slow.

Note: At this grade level, discussion is limited to changes that can be easily observed

Essential Skills:

The students can research a given animal and learn how its physical attributes help it to meet its needs.

The students can generalize that wildlife exists in every country on the planet.

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

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

Misconceptions

- 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.

- AAAS' Benchmarks 2061 Online, Chapter 15, 5e, Flow of Matter and Energy, illustrates that students may think that dead organisms simply rot away. They do not realize that material is converted into other materials by decomposing agents.

Instructional Strategies and Resources

- The Columbus Zoo and Aquarium www.columbuszoo.org

- The Franklin Park Conservatory http://www.fpconservatory.org/

- The Columbus and Franklin County Metro Parks http://www.metroparks.net/

- There are numerous webcams that showcase animals at zoological parks or in their natural environments.

- Design build and maintain a worm-composting bin. Journal changes in the system and make connections on what is happening in the bin to what is happening in nature.

- Design and maintain an ant farm. Journal changes in the system and make connections on what is happening in the ant farm to what is happening in nature.

- Observe a plot of land that has been abandoned and make predictions about how the appearance of that property will change if there is no human intervention. If possible, document the changes throughout the year.

- Explore a beaver's habitat in nature or through media. Document observations of the beaver's habitat. Encourage children to ask questions about the impact of the dam on the ecosystem. Ask: *How many other organisms are impacted by the presence of the dam? How does the dam impact the river or stream?*

- Growing Up WILD: Exploring Nature with Young Children is a curricular resource that is available only through attending their training sessions; the activities provided are aligned to Ohio's science standards. In *Wildlife is Everywhere*, children make observations and understand that wildlife is all around us. In Field Study Fun, children investigate a field study plot to observe plant and animal interactions over time. In *Wiggling Worms*, children learn about and observe earthworms.

- 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. In the activity Urban Nature Search, students make observations of habitats that are found around their schoolyard. This activity can be done seasonally to illustrate changes. In Surprise Terrarium, students use a classroom terrarium to observe animal behavior and interactions.

Career Connections Biologist, Zoologist, Ecologist, Ethologist, Botanist, Farmer, Horticulturist, Forest Ranger, Wildlife Researcher, Professor	
Prior Knowledge **1.LS.1:** Living things have basic needs, which are met by obtaining materials from the physical environment.	**Future Knowledge** **Grades 3:** N/A

Ohio's Learning Standards- Clear Learning Target

Science, Grade 2

2.LS.2

INTERACTIONS WITHIN HABITATS

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

Vocabulary

Hypothesis
Basic Needs
Environment
Extinct Fossil
Impression
Paleontologist
Scavenger
Skeleton

Essential Understandings:

- Some kinds of organisms become extinct when their basic needs are no longer met or the environment changes.

Essential Skills:

The students can evaluate the importance of fossils to our understanding of pre- history.

The students can identify conditions necessary for fossilization.

The students can create a possible scenario for formation of fossils.

The students can understand how organisms are adapted to their environment and understand the relationships of modern and ancient communities with their environments.

Misconceptions

- Science Daily provides a rich source of information on the relationship between mammoths and elephants.

- The Annenberg Media series *Essential Science for Teachers:* Life Science: Session 2*: Children's Ideas* provides greater insight to misconceptions children hold about classifying living things and strategies to address those misconceptions.

Instructional Strategies and Resources

-The Ohio History Center https://www.ohiohistory.org/

- The Ohio Department of Natural Resources provides a list of Ohio's extinct species. Specific information about sphenopsid fossils is contained in the article Coal. These organisms can be compared to organisms that are living today. Have children note the differences between the species and compare the differences in each environment.

- Explore organisms that once lived in Ohio and no longer exist. *National Geographic* provides an article on the find of a giant cockroach fossil in Ohio. Science Daily provides a rich source of information on the relationship between mammoths and elephants.

- Several sites provide instructions for making fossils. The following sites provide background information for construction but do not meet the requirement of the content statement: **http://www.nps.gov/miss/forteachers/upload/brjfossils.pdf**.

Career Connections

Paleontologist, Biologist, Ethologist, Ecologist, Museum Curator

Prior Knowledge	**Future Knowledge**
1.LS.2: Living things survive only in environments that meet their needs.	**3.LS.1:** Offspring resemble their parents and each other.

Ohio's Learning Standards- Clear Learning Targets
Science, Grade 2

2.PS.1

CHANGES IN MOTION

Forces change the motion of an object.

Essential Understandings:

- Motion can increase, change direction or stop depending on the force applied.
- The change in motion of an object is related to the size of the force.
- Some forces act without touching, such as using a magnet to move an object or objects falling to the ground.

Vocabulary

Magnets
Motion
Speed
Weight
Attract
Force
Gravity
Magnetic
Poles
Position
Repel

Essential Skills:

The students can observe the relationship between forces andmotion.

The students can describe how motion can increase, change direction, or stop, depending on the force applied.

The students can explain how the change in motion of an object is related to the size of the force.

The students can observe and describe how some forces act without touching, such as using a magnet to move an object or objects falling to the ground.

Misconceptions

- 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.
- Only animate objects can exert a force. Thus, if an object is at rest on a table, no forces are acting on it.
- Force is a property of an object.
- An object has force and when it runs out of force, it stops moving.
- A force is needed to keep an object moving with a constant speed.
- Gravity only acts on things when they are falling.
- Only animate things (people, animals) exert forces; passive ones (tables, floors) do not exert forces.

Instructional Strategies and Resources

- Making Objects Move from NetLinks provides a strategy that emphasizes an inquiry approach to teaching and learning about different motions of objects.

- *Science in Focus: Forces and Energy* produced by Annenberg, is part of a series of videos on demand to help teachers improve their content knowledge about forces and energy. This particular segment focuses on forces and how they are related to, yet different from, work and energy. While children do not study work and energy until later, knowledge of these concepts can help teachers avoid perpetuating misconceptions.

- Magnets and Springs is an interactive simulation from BBC Schools that demonstrates two important concepts: change in motion depends on the amount of force, and some objects are attracted by magnets and others are not. The size of the magnet, the rotation of the magnet and the types of objects exposed to the magnet and the force that puts the magnet in motion can all be changed.

- *Pushes and Pulls* is an interactive simulation from BBC Schools in which children can investigate the effects of pushes and pulls on motion. The subsequent quiz is not aligned to the content statement.

- Observe attractions and repulsions involved with electrical (e.g., static electricity on a balloon or sweater) and magnetic forces (e.g., compass or bar magnet).

Career Connections

Engineer, Video Game Developer/Programmer, Physicist, Seismic Interpreter, Research Scientist, Crime and Intelligence Analyst, Professor.

Lead a discussion around the types of careers that design vehicles or devices that respond to or are impacted by force (e.g. airplanes, boats, trucks). Students will explore a career related to various types of transportation, including those connected to the military, through available resources in the school or classroom library. Then, they will depict their findings in a drawing.

Prior Knowledge	**Future Knowledge**
1.PS.2: Object can be moved in a variety of ways, such as straight, zigzag, circular and back and forth.	**3.PS.3:** Heat, electrical energy, light, sound and magnetic energy are forms of energy.