SCIENCE CENTER

ONEIDA-HERKIMER-MADISON BOCES

Program Overview

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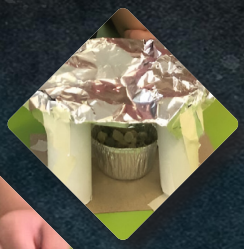

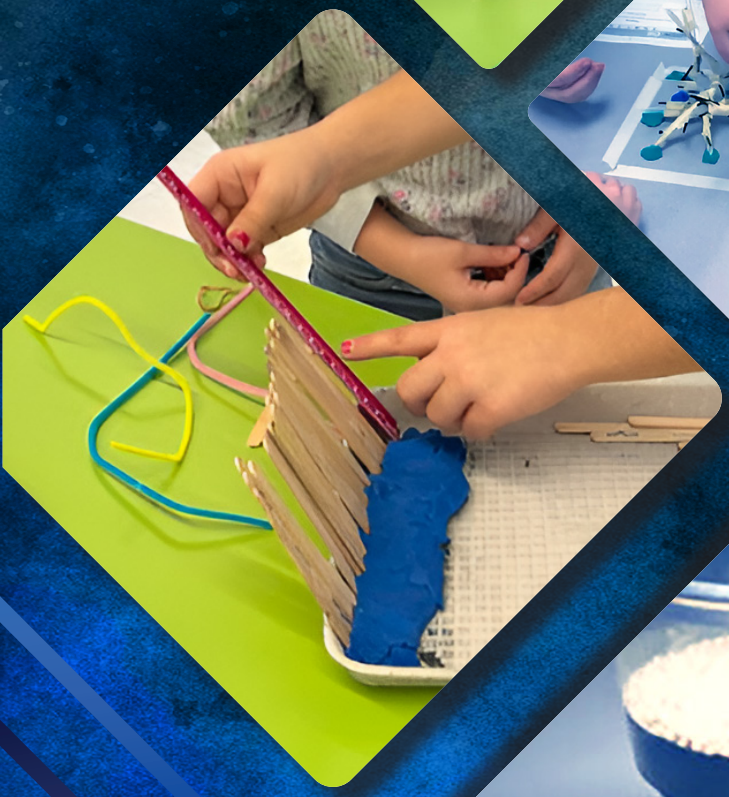

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ONEIDA-HERKIMER-MADISON BOCES

Oneida-Herkimer-Madison BOCES Science Center

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WHO WE ARE

By partnering with teachers in a teacher led, BOCES facilitated model the OHM BOCES Science Center supports schools in transforming educational opportunities throughout districts. In focusing on student learning through STEAM-based inquiry and engineering experiences we strive to inspire the next generation of scientists, engineers, and innovators and to help students develop the skills they need to succeed in a rapidly changing world.

The OHM BOCES Science Center offers science kits and digital resources for students in grades K-5. Using hands-on experience, these kits are aligned to the New York State Science Learning Standards. Other important aspects of this service are staff development and technical assistance, in-depth kit workshops for new teachers and those who change grade levels, content development through workshops and curriculum review.

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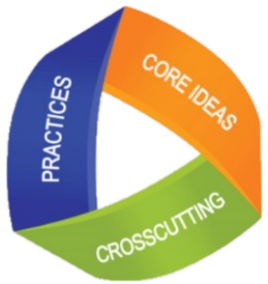
HOW OUR CURRICULUM IS CREATED



In-district teachers (teacher developers) collaborate and team with our science curriculum specialists to build, revise and refine our OHM Science Center curriculum. The goal of OHM Science Center is to meet the needs of students, to provide them with the necessary skills that will help students successfully complete and meet the Performance Expectations required by New York State. This includes Three Dimensional Learning through Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas which is the backbone of our curriculum.

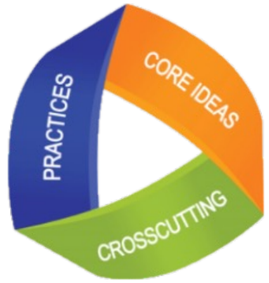
Curriculum materials are offered through the Agilix Buzz learning management system. Educators have access to lesson plans, presentation files, workbooks, journals, tutorial videos, student videos, as well as Spanish workbooks and presentation files.

Three Dimensional Learning is the core of the OHM Science Center curriculum that involves the blending of three dimensions to create performance expectations for what students should be able to do by the end of a grade or grade band. The integration of content and application reflects how science is practiced.

Disciplinary Core Ideas are grouped in four domains: physical science, life science, earth and space sciences, technology and science applications. Disciplinary core ideas identify the content students learn.

Practices describe the behaviors students will engage in as they investigate and create models and theories about phenomena. Practices are “what students do," or how they learn.

Crosscutting concepts are applied across all domains of science. They link the different science domains since they provide an organization of how students think. Crosscutting concepts describe what students are to look for (how they think) while investigating to interrelate knowledge between multiple science fields.



Teachers and students are exposed to the Three Dimensional icons within the lesson plans, presentations and workbooks as visual alignment cues.

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts
Asking Questions	Earth and Space Sciences	Patterns
Developing and Using Models	Life Sciences	Cause and Effect
Planning and Conducting Investigations	Physical Sciences	Scale, Proportion and Quantity
Analyzing and Interpreting Data	Engineering and Design	Systems and System Models
Mathematics and Computation		Energy and Matter
Constructing Explanations		Structure and Function
Engaging in Argument from Evidence		Stability and Change
Obtaining, Evaluating and Communicating Information		

Each of the OHM Science Center kits are aligned to the New York State P-12 Science Learning Standards.

Life Science	Earth and Space Sciences	Physical Science
Kindergarten		
SKK.3 Relationships in an Ecosystem K-LS1-1, K-ESS3-1, K-ESS2-2, K-ESS3-3, K-2-ETS1-1, K-2-ETS1-2, K-2-ETS1-3 **SKK.4 The 5 Senses** P-LS1-2	**SKK.2 Weather and Climate** K-PS3-1, K-PS3-2, K-ESS2-1, K-ESS3-2, K-PS1-1	**SKK.1 Objects in Motion** K-PS2-1, KPS2-2
Grade 1		
SK1.4 The Human Body 1-LS1-1 **SK1.3 Animals and Survival** 1-LS1-1, 1-LS1-2, 1-LS3-1	**SK1.2 Our Sun and the Night Sky** 1-ESS1-1, 1-ESS1-2	**SK1.1 Light, Sound & Communication** 1-PS4-1, 1-PS4-2, 1-PS4-3, 1-PS4-4, K-2-ETS1-1, K-2-ETS1-2, K-2-ETS1-3
Grade 2		
SK2.3 The Diversity of Life 2-LS4-1, 2-LS2-2 **SK2.4 Plants** 2-LS2-1, 2-LS2-2	**SK2.2 The Dynamic Earth** 2-ESS1-1, 2-ESS2-1, 2-ESS2-2, 2-ESS2-3, K-2-ETS1-1, K-2-ETS1-2, K-2-ETS1-3	**SK2.1 The Nature of Matter** 2-PS1-1, 2-PS1-2, 2-PS1-4, 2-PS1-4, K-2-ETS1-1, K-2-ETS1-2, K-2-ETS1-3
Grade 3		
SK3.3 Life Cycles in Nature 3-LS1-1, 3-LS3-1, 3-LS3-2, 3-LS4-2, -5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3 **SK3.4 Adaptations and Survival** 3-LS2-1, 3-LS4-1, 3-LS4-3, 3-LS4-4, 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3	**SK3.2 Global Climate** 3-ESS2-1, 3-ESS2-2, 3-ESS3-1, 3-ESS2-3	**SK3.1 Forces in Physics** 3-PS2-1, 3-PS2-2, 3-PS2-3, 3-PS2-4, 3-5-ETS1-1, 2-5-ETS1-2, 3-5-ETS1-3
Grade 4		
SK4.4 Structures and Functions of Life 4-LS1-1, 4-LS1-2, 4-PS4-2, 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3	**SK4.3 Shaping Our Earth** 4-ESS1-1, 4-ESS2-1, 4-ESS2-2, 4-ESS3-2	**SK4.1 Understanding Energy** 4-PS3-1, 4-PS3-2, 4-PS3-3, 4-PS3-4, 4-ESS3-1, ,3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3 **SK4.2 Waves** 4-PS4-1, 4-PS4-2, 4-PS4-3, 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3
Grade 5		
SK5.4 The Energy of Life 5-PS3-1, 5-LS1-1, 5-LS2-1	**SK5.3 Space Systems** 5-PS2-1, 5-ESS1-1, 5-ESS1-2 **SK5.2 Earth’s Systems** 5-ESS2-1, 5-ESS2-2, 5-ESS3-1	**SK5.1 Chemistry in Our World** 5-PS1-1, 5-PS1-2, 5-PS1-3, 5-PS1-4

Title of Unit	Suggested Unit Length	Instructional Sessions	Description
SKK.1 Objects in Motion NYSSLS: Forces and Interactions: Pushes & Pulls	**6 Weeks**	**12 Lessons** 	This kindergarten storyline on pushes and pulls starts with students examining images of phenomenal forces. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: what is motion and what can make an object move faster or change direction?
SKK.2 Weather and Climate NYSSLS: Weather and Climate	**7 Weeks**	**14 Lessons** 	This kindergarten storyline on weather starts with students examining images of phenomenal weather conditions. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: how weather can be described, exploring why things get hot or cold, why weather is different throughout the year, and why is it important to predict weather?
SKK.3 Relationships in an Ecosystem NYSSLS: Interdependent Relationships in Ecosystems: Animals, Plants, and their Environment	**8 Weeks**	**15 Lessons** 	This kindergarten storyline on relationships starts with students examining images of phenomenal plants and animals. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: what are the parts of an ecosystem, what do plants and animals need to survive, how do living things interact and what can people do to help an ecosystem?
SKK.4 The Five Senses NYSSLS: Interdependent Relationships in Ecosystems: Animals, Plants, and their Environment	**4 Weeks**	**8 Lessons** 	This kindergarten storyline on relationships starts with students examining images of phenomenal human senses. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: what are senses, how does each sense help you through the day, and how do animals use their senses?

*Note: Unit length is determined based on the following time allotted for science instruction

- K-1: Three 20-minute sessions per week

Title of Unit	Suggested Unit Length	Instructional Sessions	Description
SK1.1 Light, Sound & Communication NYSSLS: Waves: Light & Sound	**7 Weeks**	**14 Lessons** 	This 1st grade storyline on light and sound starts with students examining images of phenomenal sights and sounds. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: what senses are needed to see and hear, how does sound travel, what makes objects visible, how can light change, how can the sun be helpful and harmful, and how can I communicate using light and sound?
SK1.2 Our Sun and the Night Sky NYSSLS: Space Systems: Patterns and Cycles	**9 Weeks**	**17 Lessons** 	This 1st grade storyline on space systems starts with students examining images of phenomenal space patterns. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: how does sunlight change, when are other stars visible, when is the moon visible, and what patterns can I see when looking at the sun, moon and stars from where I live?
SK1.3 Animals and Survival NYSSLS: Structure, Function & Information Processing	**6 Weeks**	**11 Lessons** 	This 1st grade storyline on structure starts with students examining images of phenomenal animals. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: how do animals use their body coverings to help them, how do animal behaviors and similarities to their parents help them survive, and how can humans use different animal characteristics to invent new things?
SK1.4 The Human Body NYSSLS: Structure, Function & Information Processing	**6 Weeks**	**11 Lessons** 	This 1st grade storyline on structures starts with students examining images of phenomenal human actions. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: what are human needs and wants, how does the human body work, how does the brain send messages to our body, why do people get sick, and how do our body systems work together?

*Note: Unit length is determined based on the following time allotted for science instruction

- K-1: Three 20-minute sessions per week

Title of Unit	Suggested Unit Length	Instructional Sessions	Description
SK2.1 The Nature of Matter NYSSLS: Structure and Properties of Matter	**7 Weeks**	**14 Lessons** 	This 2nd grade storyline on properties of matter starts with students examining images of phenomena. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: how can we describe the different properties of matter, what can matter do, and how can matter be changed?
SK2.2 The Dynamic Earth NYSSLS: Earth's Systems: Processes that Shape the Earth	**9 Weeks**	**18 Lessons** 	This 2nd grade storyline on Earth's systems starts with students examining images of natural phenomena. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: what are landforms, how are landforms created, and how can erosion be prevented?
SK2.3 The Diversity of Life NYSSLS: Interdependent Relationships in Ecosystems	**7 Weeks**	**15 Lessons** 	This 2nd grade storyline on relationships starts with students examining images of phenomenal animals. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: how do living and non-living things interact in habitats, how can plants and animals survive in different environments, what can we do to take care of the environment, how are animals dependent on natural resources, and how do adaptations help an animal survive in its environment?
SK2.4 Plants NYSSLS: Interdependent Relationships in Ecosystems	**5 Weeks**	**11 Lessons** 	This 2nd grade storyline on plants starts with students examining images of phenomenal plants. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: how do seeds grow, what are the parts of a plant and their job,and what does a plant need to grow?

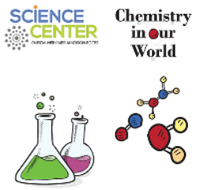
*Note: Unit length is determined based on the following time allotted for science instruction
- 2-3: Three 30-minute sessions per week

Title of Unit	Suggested Unit Length	Instructional Sessions	Description
SK3.1 Forces in Physics NYSSLS: Forces and Interactions	**5 Weeks**	**16 Lessons** 	This 3rd grade storyline on forces starts with students examining images of phenomenal forces. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: how changing a force can explain motion, how a force can be measured, how can the attraction, force and strength of magnets be changed, and how can we design a vehicle that moves using magnets?
SK3.2 Global Climate NYSSLS: Weather and Climate	**6 Weeks**	**19 Lessons** 	This 3rd grade storyline on weather and climate starts with students examining images of phenomenal weather conditions. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: what makes water special, what is weather and how do we measure weather conditions, how do we predict weather, what are the effects of extreme weather in different climates, and how can people prepare for different weather disasters?
SK3.3 Life Cycles in Nature NYSSLS: Inheritance and Variation of Traits: Life Cycles and Traits	**7 Weeks**	**11 Lessons** 	This 3rd grade storyline on life cycles and traits starts with students examining images of phenomenal animals. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: what patterns can be found In life cycles, why don't all living things look the same, how does the environment influence living things and how does the environment affect life cycles?
SK3.4 Adaptations and Survival NYSSLS: Interdependent Relationships in Ecosystems	**6 Weeks**	**16 Lessons** 	This 3rd grade storyline on relationships starts with students examining images of phenomenal human and natural impacts. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: how do humans change and impact the environment, what are natural environmental changes and impacts leading up to how we know the existence of organisms that have not survived some of these changes?

*Note: Unit length is determined based on the following time allotted for science instruction
- 2-3: Three 30-minute sessions per week

Title of Unit	Suggested Unit Length	Instructional Sessions	Description
SK4.1 Understanding Energy NYSSLS: Energy	**4 Weeks**	**13 Lessons** 	This 4th grade storyline on energy starts with students examining images of phenomenal energy sources. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: what is energy and where does it come from, how can energy change and how do we use energy?
SK4.2 Waves NYSSLS: Waves and Information	**4 Weeks**	**15 Lessons** 	This 4th grade storyline on waves starts with students examining images of communication phenomena. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: what is a wave, how do we use our senses to observe what information is carried in a wave, and what are the limits of wave communication?
SK4.3 Shaping Our Earth NYSSLS: Earth's Systems: Processes that Shape the Earth	**4 Weeks**	**13 Lessons** 	This 4th grade storyline on Earth's systems starts with students examining images of natural phenomena. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: what causes erosion, how can we tell the Earth has changed over time, what forces cause earthquakes and volcanic eruptions, and how does an earthquake affect humans?
SK4.4 Structures and Functions of Life NYSSLS: Structure, Function & Information Processing	**4 Weeks**	**13 Lessons** 	This 4th grade storyline on structures starts with students examining images of plant and animal phenomena. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: how do plants survive, grow and reproduce, and how do animals use memories and sensory inputs so survive?

*Note: Unit length is determined based on the following time allotted for science instruction
- 4-5: Three 40-minute sessions per week

Title of Unit	Suggested Unit Length	Instructional Sessions	Description
SK5.1 Chemistry in Our World NYSSLS: Structures and Properties of Matter	**7 Weeks**	**19 Lessons** 	This 5th grade storyline on properties of matter starts with students examining images of phenomenal matter. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: what is matter, what tests can we conduct to identify matter, and how can matter change?
SK5.2 Earth's Systems NYSSLS: Earth's Systems	**5 Weeks**	**16 Lessons** 	This 5th grade storyline on Earth's systems starts with students examining images of phenomenal weather conditions. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to identifying the different earth systems and exploring the interactions of the systems. Students next examine how our lives are affected by the different systems and how the Earth is impacted by human activities.
SK5.3 Space Systems NYSSLS: Space Systems: Stars and the Solar System	**5 Weeks**	**16 Lessons** 	This 5th grade storyline on space systems starts with students examining images of phenomena. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead: to how does gravity affect objects, how is Earth similar to the Sun, and how is our location on Earth affected by Earth's movements?
SK5.4 The Energy of Life NYSSLS: Matter & Energy in Organisms and Ecosystems	**4 Weeks**	**13 Lessons** 	This 5th grade storyline on ecosystems starts with students examining images of animal phenomena. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to: what are the needs of all organisms, how does matter move among organisms, how do organisms use energy and how does energy flow in an ecosystem?

*Note: Unit length is determined based on the following time allotted for science instruction
- 4-5: Three 40-minute sessions per week

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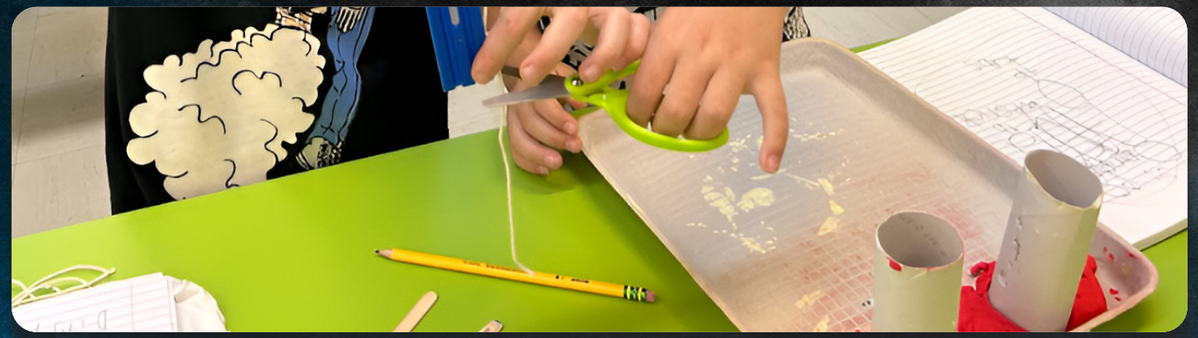

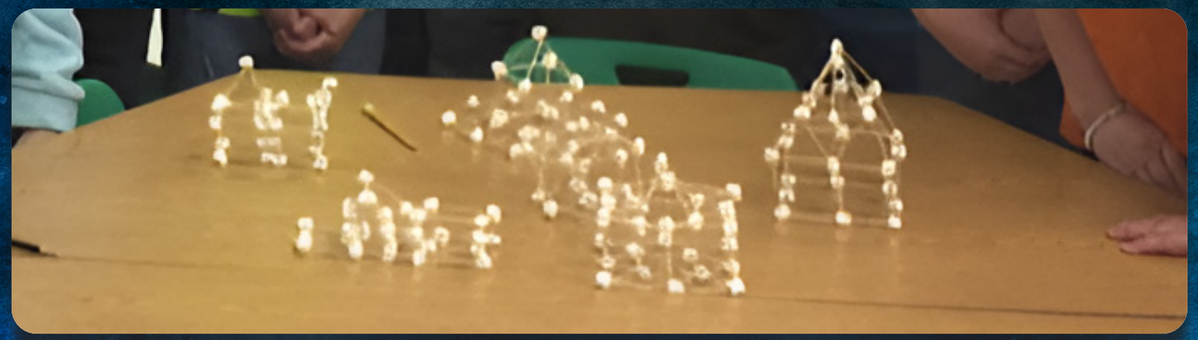

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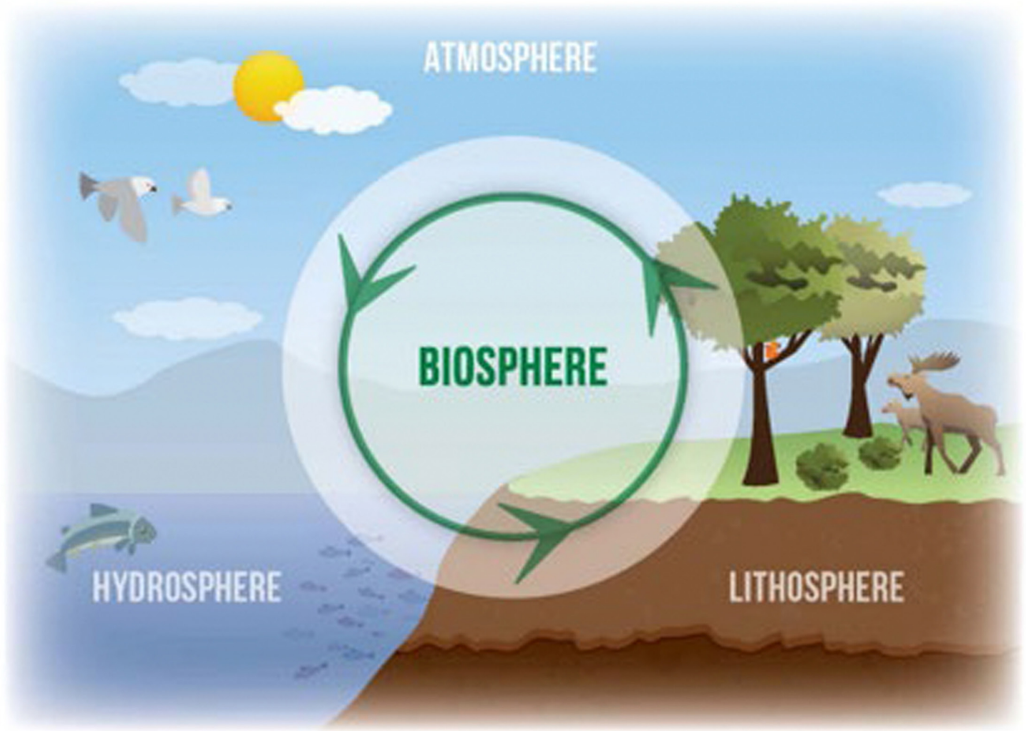
EARTH SCIENCE Teacher Guide GRADE 05

Earth Systems



DRIVING QUESTION STORYLINE

SK5.2 Earth Systems Driving Question Storyline

Anchoring Phenomena:
Earth Systems
Driving Question:
How are our lives affected by Earth's Systems?

Kit Driving Phenomena and Question.

SK5.2 Earth Systems Driving Question Storyline

Anchoring Phenomena:
Earth Systems
Driving Question:
How are our lives affected by Earth's Systems?

Explanation of science content.

Phenomena	Question	Investigation	Explanation	Connection
	What are the systems of the earth?	L1: Identify Earth's systems L2: Model the atmosphere L3: Determine wind interactions	Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes.	5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
	How does the hydrosphere interact with other systems?	L4: Review water cycle L5: Create a greenhouse L6: Model runoff	Earth's systems interact in multiple ways to affect Earth's surface materials and processes.	5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
	How much drinkable water is on earth?	L7: Graph Earth's water sources L8: Desalinization Challenge	Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.	5-ESS2-2. Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
	How is the earth impacted by a dripping faucet?	L9: Investigate water conservation.	Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air.	5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Real world phenomena.

Connection to Performance Expectation.

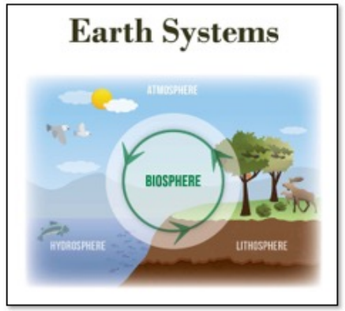
Steering questions to guide learning.

SK5.2 Earth Systems
Driving Summary

Anchoring Phenomena: Earth Systems
Driving Question: How are our lives affected by Earth's Systems?

Driving Question:
How are our lives affected by Earth's systems?

Anchoring Phenomena:



OVERVIEW:

This 5th grade storyline on Earth's Systems starts with students examining images of phenomenal weather conditions. Students are encouraged to ask questions about the phenomena to help guide the unit. Their questions lead to identifying the different earth systems and exploring the interactions of the systems. Students next examine how our lives are affected by the different systems and how the Earth is impacted by human activities?

Storyline:

Steering Question 1: What are the systems of the earth?

Lesson 1: Earth's Spheres (1 Day)	Students will examine the different systems (spheres) of Earth's natural world.
Lesson 2: Layers of the Atmosphere (1-2 Days)	Students will become experts for one layer of the atmosphere and share their understandings with their peers for complete knowledge of the atmosphere.
Lesson 3: What is Wind? (1 Day)	Students will analyze maps and draw models to describe the causes and effects of wind.

Lesson sequence and summaries.

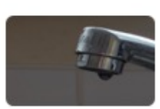
Anchoring Phenomena: Earth Systems
Driving Question: How are our lives affected by Earth's Systems?

Steering Question 2: How does the hydrosphere interact with other systems?

Lesson 4: Water Cycle (1 Day)	Students will model and describe the water cycle as an interaction between the atmosphere and hydrosphere.
Lesson 5: What is a Greenhouse? (5 Days)	Students will identify the impact of the water cycle to life on Earth.
Lesson 6: Runoff (1 Day)	Students will identify the impact of the hydrosphere on the geosphere.

Steering Question 3: How much drinkable water is on earth?

Lesson 7: Got Water? (1 Day)	Students will graph the amounts and distribution of salt and fresh water on the earth.
Lesson 8: Desalinization Challenge (3-4 Days)	Students will design and build a contraption that will desalinize salt water.



Steering Question 4: How does the hydrosphere interact with other systems?

Lesson 9: Water Conservation (1 Day)	Students will develop a way to measure the amount of water wasted by a dripping faucet and create plausible solutions.

Materials can easily be gathered and set up for student use.

SK5.2 Earth Systems
Teacher Material Prep

Anchoring Phenomena: Earth Systems
Driving Question: How are our lives affected by Earth's Systems?

Lesson	Advanced Prep	Material Prep	Curriculum Resources
Intro			• Driving Phenomena Presentation
1	• Glue or tape • Scissors		
2	• Scissors • Glue or tape		
3	• Colored Pencils	• Global Wind Pattern Map	• Video: https://video.link/w/Gep3c • Animation: Https://earth.nullschool.net/#current/
4	• Water • Ice	• Plastic wrap • Glass beaker • Rubber band	
5	• Water	• Deli containers • Large plastic bags • Seeds • Soil	
6	• Water	• Sand • Foil loaf pans • Sponges • Measuring cups	
7	• Colored pencils	• Salt and Freshwater Posters	
8	• Water	• Loaf pans • Salt • 8 spoons • Plastic wrap • Marbles • 1 oz cups • Tape • Cotton Swabs	
9	• Water • Sink or bottles with holes to represent a dripping faucet	• Timers • Measuring cups • Bottle with hole	

Video links and websites are provided for easy whitelisting.

SK5.2
Earth Systems
Grade - 5

Greenhouse

Lesson: 05

Lesson Summary

Students will identify the impact of the water cycle to life on Earth.

Standards

NYSSLS: 5-ESS2-1: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

Science and Engineering Practices:	Kit Disciplinary Core Ideas:	Crosscutting Concepts:
2: Developing and Using Models 3: Planning and Carrying Out Investigations 4: Analyzing and Interpreting Data 5: Mathematics and Computational Thinking 6: Constructing Explanations and Designing Solutions	ESS2.A.2 Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. Winds and clouds in the atmosphere determine patterns of weather.	1: Patterns 2: Cause and Effect 4: Systems and Systems Models 7: Stability and Change

At a Glance

Learning Goals	Students will be able to identify the impact of the water cycle on life on Earth.
Performance Goals	Students will create a mini greenhouse to observe the water cycle and its effect on the growth of plants.
Essential Question	How does the water cycle impact life on Earth?

Vocabulary

- Transpiration

Resources

OHM BOCES Kit:
- 16 deli containers
- 8 large plastic bags
- 20 seeds of same plant (10 for each cup)
- 40 ml of water per cup
- Soil

Teacher Provided
- Water

Background Information

When a bag is placed over the plant, the water vapor will condense on the bag and become droplets of liquid water. Water vapor is invisible, we only know water is being cycled because we can see the liquid condensation on the bag. The water added to the plant will continue to be cycled. The plant without the bag over it will be given the same amount of water, the same amount and type of seeds, and the same amount of soil. The water for this plant will be absorbed by the roots but because there is no bag, the water will evaporate from the soil and transpire from the leaves and be released into the air. The soil in the uncovered plant will become drier over time. The seeds will take a few days to show sprouts.

Presenting the Lesson

Opening:

Scenario:
Your class went on a field trip to a flower shop. You walked through the fields and greenhouses and notice that the plants and flowers were much bigger and full in the greenhouse. Why is that?

Cause and Effect
Students predict why greenhouse plants are so large.

Activity:

Brainstorm:
Research:
What do you know about the water cycle?
What do you know about plant growth?

Question to Test:
How does the water cycle affect the growth of plants differently in an open environment versus a closed environment?

Obtaining Evaluating and Communicating Information
Students will share what they know about the water cycle

ESS2.A.2
Earth's major systems are the geosphere (solid

Each Lesson plan provides the NYSSLS Performance Expectation that is being addressed along with the thinking concepts and practices applied.

Vocabulary and material resources are pointed out for preparation ease.

Color coding identifies each of the three learning dimensions to encourage strong discussions.

Workbooks combine reading skills with science content for science literacy to incorporate ELA into science.

Essential questions viewable for students to better achieve the learning goal.

Icons depict the thinking concepts and practices student will apply.

Student friendly formatting.

LESSON 02

ESSENTIAL QUESTION: How can the layers of the atmosphere be identified and described?

Layers of the Atmosphere

Scientists divided the Earth's atmosphere into layers based on changes in air temperature. Starting from the Earth's surface, the layers are the troposphere, stratosphere, mesosphere, thermosphere, and exosphere.

TROPOSPHERE: Weather patterns on Earth are driven by the unequal heating of the surface by sunlight. The Sun is the ultimate source of energy that drives wind, rain and storms across the entire planet. The troposphere is layer of the atmosphere closest to the surface where these weather conditions exist. The troposphere extends up to about 7 to 12 miles (10-15 km) above the Earth's surface where birds, clouds, and planes would be found. The altitude of this layer is greater above the equator than it is at the North and South Poles. This is due to the warmer temperatures at the equator. Almost all weather occurs in the troposphere because this is where all the water vapor is located. Both temperature and air pressure decrease as you move away from the surface to the top of this layer. The top of the troposphere is called the tropopause, the boundary between this layer and the next. At this level of the atmosphere all water vapor turns to ice and it cannot rise any farther.

STRATOSPHERE: This layer extends from the tropopause up to about 31 miles (50 km) above the Earth's surface. You may not find commercial planes at this altitude, but military planes and weather balloons are to be found. The stratosphere is warmer at the top than it is at the bottom. Temperature increases as you go up in altitude. This increase is due to the presence of the ozone layer in the stratosphere which absorbs much of the sun's ultraviolet light. This is important because it protects life on earth from the harmful effects of these rays. Without the ozone, life could not exist on earth. Air pressure continues to decrease with altitude in the stratosphere. The top of the stratosphere is called the stratopause.

LESSON 05

ESSENTIAL QUESTION: How does the water cycle impact life on Earth?

Mini Greenhouse

Scenario:

Your class went on a field trip to a flower shop. You walked through the fields and greenhouses and notices that the plants and flowers were much bigger and full in the greenhouse. Why is that?

Brainstorm:

Research:

What do you know about the water cycle?

What do you know about plant growth?

Question to Test:

How does the water cycle affect the growth of plants differently in an open environment versus a closed environment?

SK5.2 Earth's Systems Assessment

Anchoring Phenomena: Earth's Systems

Driving Question: How are our lives affected by Earth's Systems?

Sinkholes are common where the rock below the land surface can naturally be dissolved by groundwater moving through them. As the rock dissolves, spaces and caverns develop underground. Sinkholes usually stay intact for a while until the underground spaces just get too big. If there is not enough support for the land above the spaces, then a sudden collapse of the land surface can occur.

There are many reasons for a sinkhole to form:

- Rainfall gets into rocks below the surface and breaks them down over time
- Rocks beneath the surface are sometimes carried away by moving water and a hole forms.
- Sediments containing sand get into open spaces and break down the rocks creating a larger space.
- Groundwater, in contact with the atmosphere (water / water vapor) causes movement in the rocks and/or soil and creates large openings underground and eventually the ground above collapses.
- Humans can add to the development of sinkholes through construction, groundwater pumping, and new drainage patterns created.

Below are sinkholes that formed in Utica, New York where a new hospital was being built.

1. Which of the above reasons is most likely why there are sinkho in Utica, New York?

2. Use the evidence about sinkholes above to describe the interac least two of Earth's Systems.

Scenario based assessments written with real world phenomena.

SK5.2 Earth's Systems Assessment Key

Anchoring Phenomena: Earth's Systems

Driving Question: How are our lives affected by Earth's Systems?

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- Rainfall gets into rocks below the surface and breaks them down over time
- Rocks beneath the surface are sometimes carried away by moving water and a hole forms.
- Sediments containing sand get into open spaces and break down the rocks creating a larger space.
- Groundwater, in contact with the atmosphere (water / water vapor) causes movement in the rocks and/or soil and creates large openings underground and eventually the ground above collapses.
- Humans can add to the development of sinkholes through construction, groundwater pumping, and new drainage patterns created.

Below are sinkholes that formed in Utica, New York where a new hospital was being built.

1. Which of the above reasons is most likely why there are sinkholes under the roads in Utica, New York?
   Humans can add to the development of sinkholes through construction, groundwater pumping, and new drainage patterns created.

2. Use the evidence about sinkholes above to describe the interaction between at least two of Earth's Systems.
   The geosphere was disturbed by the digging deep into the rocks. This caused a large water saturated area (hydrosphere) to sink and open up.

SCIENCE CENTER

ONEIDA-HERKIMER-MADISON BOCES

Professional Development

The OHM BOCES Science Center provides professional development on curriculum, investigations, pedagogy and NYSSLS information. Please contact elemscienceteam@oneida-boces.org for customized trainings or visit our website to view regional trainings at oneida-boces.org/science.

Curriculum Kit Training
o Grade Specific Curriculum Kit Training
o Navigating curriculum on Buzz
o Driving phenomena presentation to hook students
o Lesson by lesson demonstration of activities and expectations
o Assessment
o Q & A

Think Like a Scientist
The "Think Like a Scientist" mini unit has been created in response to our focus on demystifying the practices and crosscutting concepts. Everyday examples are used to promote relevance before having the opportunity to apply to the kit specific content. The resource has been created to be adaptable for implementation. There is no one way to use it. Join the OHM Science Center to learn at least three ways to incorporate Think Like a Scientist in your classroom. This session is targeted for K-5 science kit users and/or administrators.

What is NYSSLS?
The format of the New York State Science Learning Standards (NYSSLS) can require some time to break down. This session will walk through the framework and how to read a NYSSLS document. Through the discussion, participants will be able to consider how traditional information sharing will transition to student experience and sense making. This session is available P-12.

Investigations
Step by step walk through of investigation, including: arrival, advanced preparations, setup, classroom options, teaching strategies, expectations, grading options and completion.

Three Dimensionalize your Lessons
Bring your lesson plans! The OHM Science Center Team will review the NYSSLS shifts and Three Dimensional Learning. Attendees will learn how to align their lessons to NYSSLS and 3D Learning. This session is available P-12.

Intro to SEP
One of the three dimensions of NYSSLS, Science and Engineering Practices (SEP's) describe the behaviors students will engage in as they investigate and create models and theories about phenomena. Practices are "what students do," or how they learn. Join the OHM Science Center to explore the 8 Science and Engineering Practices. We will walk through each SEP, their progressions, suggested implementations for each, and share examples. This session is available P-12.

Intro to CCC
One of the three dimensions of NYSSLS, Crosscutting Concepts are applied across all domains of science. They link the different science domains, providing common themes in categorizing and organizing how students think. Crosscutting Concepts describe what students are to look for while investigating to relate knowledge between multiple science fields. Join the OHM Science Center to explore the 7 Crosscutting Concepts. We will walk through each crosscutting concept, their progressions, suggested questioning prompts, and share examples. This session is available P-12.

Phenomena
Science begins with a phenomenon that causes an observer to question the natural or humanmade worlds, instills curiosity. A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and how it can be tested. Join the OHM Science Center to review best practices in utilizing this model to develop phenomena-based questions to steer your unit.

Write a CER
The process of Claim Evidence Reasoning (CER) is a writing framework to assist students in thinking like scientists by finding evidence and applying reasoning. This session will walk through the CER process including designing scaffolds and modifications. This session is available P-12.

NYSSLS Assessments
With the release of the prototypes and studied examples from the Next Generation Science Standard Implementing states, general expectations for the rigor and design of science assessments have been identified. This session will walk through several rubrics, including a locally adapted checklist to evaluate a science assessment. This session's resource can be used to review your local tests and quizzes. This session is available P-12.

Three Dimensional Science
This is a 5-hour course that will explore Three Dimensional Learning. Three Dimensional Learning is the blending of three dimensions to create performance expectations for what students should be able to do by the end of a grade or grade band. The integration of content and application reflects how science is practiced. In this course educators learn about and identify Disciplinary Core Ideas, Science and Engineering Practices, and Crosscutting Concepts within their own curriculum. This session is available P-12.

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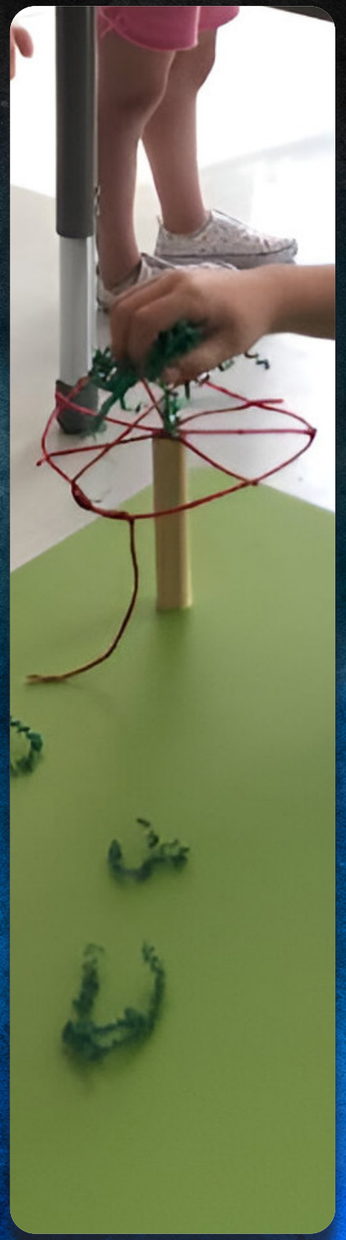

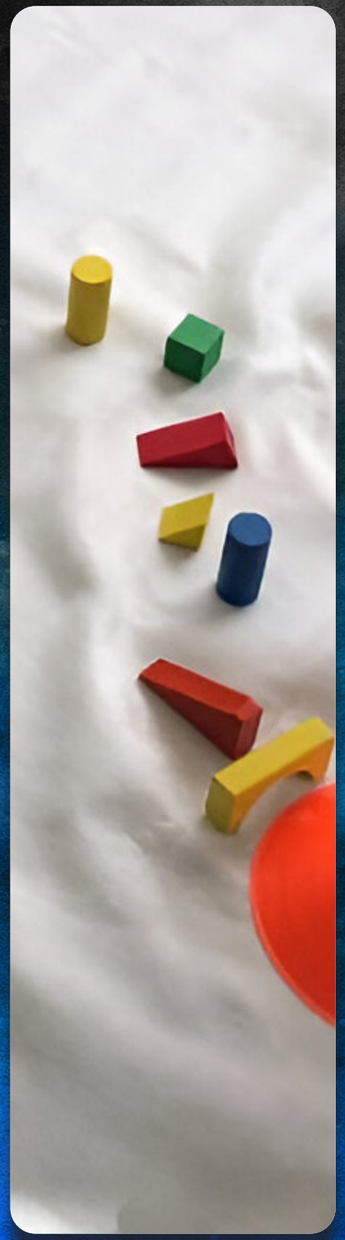

Oneida-Herkimer-Madison BOCES Science Center

www.oneida-boces.org/ohmscience

Our continuous improvement model prioritizes our BOCES facilitated, teacher led initiative, meaning all initiatives are led by teachers and support resources are created in response to a continuous feedback loop.

We hope the OHM enhancements make your science teaching experience easy and enjoyable.

Please visit the OHM BOCES Science Center website for additional information

oneida-boces.org/science

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PORTABLE PLANETARIUM*	
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*NOTE: Planetarium availiable within a100 mile radius of OHM BOCES

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