



Park Hill School District

Building Successful Futures • Each Student • Every Day

2nd Grade Science Curriculum

Course Description: In 2nd grade, students have three domains of study; life science, earth and space science, and physical science. During the life science unit, students will study about what plants need to survive as well as how plants and animals depend on one another for existence (pollination). For the earth and space units, students will study the effects of weather, wind, and water. They will also study landforms and bodies of water. The physical science unit asks students to describe and classify different kinds of materials by their observable properties and intended purposes. The students will learn how some changes caused by heating or cooling can be reversed while some cannot. Finally, the students will study the water cycle.

Scope and Sequence:

Unit	Timeframe
1. Organisms- Needs and Interactions • Topic 1: What Plants Need • Topic 2: Animal and Plant Dependence	8 weeks
2. Dealing With Changes to Earth • Topic 1: Quick Changes to Land • Topic 2: Slow Changes to Land • Topic 3: Effects of Wind and Water	6-7 weeks
3. Mapping Land and Water • Topic 1: Mapping Our World • Topic 2: Forms of Water on Earth (Optional)	4 weeks
4. Selecting and Using Materials in the Design Process • Topic 1: Properties and States of Matter • Topic 2: Properties of Materials • Topic 3: Changes from Heat	6 weeks

Curriculum Revision Tracking

Spring 2018

- Emphasized and added Cross Cutting Concepts, Reordered some scopes, Prioritized lessons

Summer 2020

- Updated to STEMscope 3D

Spring 2023

- Combine Slow Changes to Land and Effects of Wind and Water
 - Explore 1 of Effects of Wind and Water moved to Slow Changes to Land
 - Remainder of Effects of Wind and Water -- optional

Spring 2024

- None

Unit 1: Organisms- Needs and Interactions

Subject: Science

Grade: 2nd

Name of Unit: Organisms- Needs and Interactions

Length of Unit: 40 days (approx. 20 teaching days + 20 additional for plant growth)

Overview of Unit: During this unit, students will be exploring many phenomena while learning the following concepts:

- Plants depend on water and light to grow.
- Plants depend on animals for pollination and to move seeds around.
- Some animals depend on plants for food.

****Note:** STEMscopes suggests planting 10 before the beginning of the unit. From experience, we suggest planting with students, allowing them to witness the growing process. Plants may not survive for the allotted 28 days. Ensure students have enough data points to develop conclusions about growth.*

*****Note:** This unit requires students to check in on plant growth every other day. On days that students are not checking in on a “Explore” activity, you may use this time to teach social studies reporting topics or rotate between “Explore: Water” and “Explore: Sunlight.”*

Anchoring Phenomena Event (to start the unit)

Students interact with a video of a boy eating an apple from a tree.

Anchoring Phenomena Driving Question

What do plants and animals need to survive, grow, and reproduce?

Mission Performance Task from Action Plan (to end the unit)

The student’s mission is to draw and label a restored habitat that was once destroyed by fire.

The scopes in this unit include the following:

- What Plants Need
- Animal and Plant Dependence
- Diversity of Living Things

The Verbs: What should students be doing?

- Plan: Think about
- Conduct an investigation: Do a project to answer a question
- Depend on: To need help from something
- Develop a simple model: Create a representation of something in real life
- Mimic: Copy something or someone
- Disperse: Spread out from the center of something
- Pollinating: Pollen being transferred from one part of a plant to another
- Depend on: To need help from something
- Communicating: Tell someone something

The Nouns: What key terms are found in the standard?

- Plant: A living thing that can produce its own food
- Sunlight: The energy from the Sun that plants need to make food
- Water: A liquid that all living things need to survive
- Animal: A living thing that can move and cannot produce its own food
- Seed: A plant can grow from it
- Function: What something does
- Design: A plan or drawing made to show how something should work or be made
- Physical Model: A representation of something found in real life
- Problem: A situation that needs to be changed or needs an answer
- Solution: An answer to a problem, why way to make the needed change
- Representation: a model or picture of something

Topic 1: What Plants Need

Suggested Length of Time: approx. 30 days (check-in:12-13 days)

Essential Questions (Student Wondering):

- What do plants need to grow?

Enduring Understanding (Learning Objectives/Performance Expectations):

- The student is expected to plan and conduct an investigation to determine if plants need sunlight and water to grow.

Standards Addressed

Priority:

Missouri Learning Standards

- 2.LS2.A.1 Plan and conduct investigations on the growth of plants when growing conditions are altered (e.g., dark vs. light, water vs. no water).

Disciplinary Core Ideas

- LS2.A: Interdependent Relationships in Ecosystems Plants depend on water and light to grow. (2-LS2-1)

Supporting:

Crosscutting Concepts and Science and Engineering Practices

- Planning and Carrying Out Investigations: Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1)
- Cause and Effect Events have causes that generate observable patterns. (2-LS2-1)

Detailed Description/Instructions:

5 E's	Suggested # of Days	Notes
Engage: Investigative Phenomena- Video	1 Day	Watch "Setup Video" before Preview materials list, preview

What do plants need to grow? APK: What Plants Need Agree or disagree with given statements Graphic Organizer: What Do Plants Need to Grow Draw a picture of what each plant looks like after 2 weeks. Hook: What is Wrong With My Plant? Students observe a dead/dying plant to determine what is wrong with it?		CER Write and answer essential question in student notebooks: What do plants need to grow? Materials: Dead plant
Explore Explore 1: Scientific Investigation - What Plants Need , Part 1 (sunlight) <i>Students perform an experiment to determine if plants need the right amount of sunlight to survive and thrive. (similar to DO 2)</i>	2 Days (check in and measure on even days for 28 days)	Day 1: Plant with Students Day 2: Student Journal & begin data recording Materials: - Student Journal or Science Notebook - Data Recording Table - Plastic cups - Lima beans - Potting soil *Be sure to fill cups $\frac{3}{4}$ full of dirt to allow for 50 mL of water. *Water plants with water every other day.
Explore Explore 2: Scientific Investigation- What Plants Need, Part 2 (water) <i>Students perform an experiment to determine if plants need a certain amount of water to survive and thrive. (similar to DO 1)</i>	2 Days (check in and measure on even days for 28 days)	Day 1: Plant with Students Day 2: Student journal & begin data recording Materials (print): - Student Journal - Data Recording Table - CER Explore 1 and Explore 2 can be done simultaneously **Water plants with water every other day.
Explore Explore 3: Inquiry Investigation- What Plants Need <i>Students work to design and conduct an investigation</i>	5 Days	Materials (print): - Student Journal - Student Checklist

<i>about the effects of sunlight or water on plants.</i>		• CER
Explain & Elaborate: Centers	2-3 Days	Required: STEMscopedia Picture Vocabulary Suggestions: • Explain: Communicate Career Connections: Arborist (materials required - not provided in tubs) Reading Science (partners)
Evaluate: CER and Open-Ended or Multiple Choice	1 Day	Print assessment
Mission Anchor Chart Give students the mission log after the completion of this scope.	1	See Anchoring Phenomena Event Teacher Guide for mission log directions and handouts

Topic 2: Animal and Plant Dependence

Suggested Length of Time: 10-14 days

Essential Questions (Student Wondering):

- I know some animals depend on plants, but do plants depend on animals?

Enduring Understanding (Learning Objectives/Performance Expectations):

- The student is expected to develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
- The student is expected to ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- The student is expected to develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- The student is expected to analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Standards Addressed

Priority:

Missouri Learning Standards

- 2.LS2.A.2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

Disciplinary Core Ideas

- LS2.A: Interdependent Relationships in Ecosystems: Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)
- ETS1.B: Developing Possible Solutions Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary to 2-LS2-2)

Supporting:

Crosscutting Concepts and Science and Engineering Practices

- Developing and Using Models: Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)
- Structure and Function The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)

Detailed Description/Instructions:

5 E's	Suggested # of Days	Notes
Engage: Investigative Phenomena- Video I know some animals depend on plants, but do plants depend on animals?	1 Day	Materials: animal and insect pictures, sticky note, seed pictures

APK:Animal and Plant Dependence Students choose animals and insects that disperse plant seeds to pollinate plants. Graphic Organizer- Plants and Animals Match animal and body parts to how it pollinates or moves seeds. Hook: Traveling Seeds Students explore ways to move a seed to a new location.		Notes: ● Print animal/insect pictures in color and laminate to use again.
Explore Explore 1: Activity Pollen and Seeds <i>Students test models of animal parts to see if they can help spread pollen or seeds.</i>	2-3 Days	Materials (print): ● Student Journal ● CER ● Scenario Cards (cut) Stations: ● Day 1: Pollen (journal) ● Day 2: Seed (scenario cards/journal) **May use CER as formative assessment.
Explore Explore 2: Activity- From Seed to Plant <i>Students observe animal pictures and determine what features help cause seed dispersal.</i>	1-2 Days	Materials (print): ● Color print one set of Animal Picture Cards and laminate per group (can be reused every year) ● Student Journal
Explore Explore 3: Engineering Solutions- Super Insect! <i>Students use their knowledge of animal structures that disperse pollen and seeds to build a super insect that will quickly pollinate plants and spread out their seeds.</i>	3-4 Days	Materials (print): ● Student Journal ● Student Rubric Day 1: Design Day 2-3: Build, Test, and Refine Day 4: Share and Critique ● Plus/Delta

Centers	Explain & Elaborate	1-2 Days	Required: STEMscopedia Picture Vocabulary
	Evaluate: CER and Open-Ended or Multiple-Choice	1 Day	
	Mission Anchor Chart Give students the mission log after the completion of this scope.	1	See Anchoring Phenomena Event Teacher Guide for mission log directions and handouts

Engaging Scenario/Action Plan

Engaging Scenario/Action Plan

Give the students the Mission log after the completion of the first scope in the unit, and answer the questions to go with that scope. This can be led by the teacher, done in groups, or completed individually. This process should be repeated at the end of each scope. Consider creating an anchor chart that looks like the Mission Log to keep posted in the room

Action Plan:

Draw the restored habitat below. Remember to put only plants and animals that would live in a specific habitat in the picture. The picture should be neatly drawn. Each animal, pollinator, plant, and water source should be labeled. Color the habitat with the correct colors.

Unit 2: Dealing with Changes to Earth

Subject: Science

Grade: 2nd

Name of Unit: Dealing with Changes to Earth

Length of Unit: 6-7 weeks (27-34 days)

Overview of Unit: During this unit, students will be exploring many phenomena while learning the following concepts:

- Earth events can occur quickly or slowly.
- Engineering solutions can be designed to slow or prevent wind or water from changing the shape of the land.

Anchoring Phenomena Event (to start the unit)

Students interact with a video of an ice cream bar melting.

Anchoring Phenomena Driving Question

How do slow and fast changes to Earth affect the landscape?

Mission Performance Task from Action Plan (to end the unit)

Students will determine what slow and fast changes to a landscape are caused by mudslides, and come up with a prevention plan.

The scopes included in this bundle include the following:

- Quick Changes to Land
- Slow Changes to Land
- [Effects of Wind and Water](#)

The Verbs: What should students be doing?

- Use information: Use what you know
- Occur: to happen
- Observe: To see, feel, taste, hear, or smell something
- Compare multiple solutions: Observe the similarities and differences between different answers
- Test: Try different solutions to see which one is the best answer for a problem
- Prevent: Stop something from happening

The Nouns: What key terms are found in the standard?

- Evidence: Material that proves a point
- Earth events: Natural things that happen and change the shape of land
- Time period: An amount of time such as an hour, a day, a year, etc.
- Source: A place to get something, such as a book is a place to get information
- Wind: Moving air
- Water: A liquid that all living things need to survive
- Problem: A situation that needs to be changed or needs an answer
- Solution: An answer to a problem, the way to make the needed change
- Design: A plan to solve a problem

Topic 1: Quick Changes to Land

Suggested Length of Time: 10 to 12 Days

Essential Questions (Student Wondering):

- Is it possible for land to look different in a matter of days?

Enduring Understanding (Learning Objectives):

- The student is expected to use information from several sources to provide evidence that Earth events can occur quickly or slowly.
- The student is expected to ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- The student is expected to develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- The student is expected to analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Standards Addressed

Priority:

Missouri Learning Standards:

- 2.ESS1.C.1 Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
- 2.ESS2.A.1 Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.

Disciplinary Core Ideas

- ESS1.C: The History of Planet Earth Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.
(2-ESS1-1)

Supporting:

Crosscutting Concepts and Science and Engineering Practices

- Constructing Explanations and Designing Solutions: Make observations from several sources to construct an evidence-based account for natural phenomena.
(2-ESS1-1)
- Stability and Change Things may change slowly or rapidly.
(2-ESS1-1),(2-ESS2-1)

Detailed Description/Instructions:

5 E's	Suggested # of Days	Notes
Engage: Investigative Phenomena- Video Is it possible for land to look different in a matter of days? APK: Quick Changes to Land	1 Day	Watch "Setup Video" Notes: • May project images rather than print • Roadblock: Develop a list of causes.

Students observe pictures and make conclusions as to what caused the damages to the structures in each picture. Graphic Organizer:Name two quick changes to land. Give examples of how the landform can change shape after an environment event. Hook: Guess What Happened! Students compare two different pictures showing the same piece of land. They discuss the possible causes of the changes.		Materials: Before and After picture (1 per group or project for whole class)
Explore: Explore 1: Activity - Volcano Model Using a model, students observe how volcanic eruptions change the land around the volcano.	1-2 Days	Materials (print): - Student Journal or create in notebook - CER or add to notebook - Teacher Prep Required 1 Activity-some steps repeated several times Part 1 - May want to show the first slide of slideshow Part 2 - When repeating step you may show the other slides as a reference for students
Explore: Explore 2 :Activity- Land in Motion <i>Students model how landforms can be shaped through various environmental factors</i>	1-2 Days	Materials (print): - Student Journal or create in notebook - Teacher Prep Required Activity-some steps repeated several time - Part 1 - Discussion - Part 2 - Small Group Landslide Activity - Discussion

Explore: Explore 3: Engineering Solutions-Sturdy Structures <i>Students create a structure designed to withstand various natural disasters.</i>	3 Days	Materials (print): • Student Journal • Student Rubric • Sturdy Structures • Earthquake picture (project) Day 1: Design (Student Journal) Day 2: Build, Test, & Refine (materials) Day 3: Share & Critique
Explain and Elaborate Centers	1-2 Days	Required: • STEMscopedia • Picture Vocabulary
Evaluate: Open-Ended Response	1 Day	Print PDF *could cut and paste the pictures and journal the response in notebook
Mission Anchor Chart Give students the mission log after the completion of this scope.	1	See Anchoring Phenomena Event Teacher Guide for mission log directions and handouts

Topic 2: Slow Changes to Land

Suggested Length of Time: 8-10 Days

Essential Questions (Student Wondering):

- How can land change over millions of years?

Enduring Understanding (Learning Objectives/Performance Expectation):

- The student is expected to use information from several sources to provide evidence that Earth events can occur quickly or slowly.
- The student is expected to ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- The student is expected to develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- The student is expected to analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Standards Addressed

Priority:

Missouri Learning Standards:

- 2.ESS1.C.1 Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
- 2.ESS2.A.1 Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.

Disciplinary Core Ideas

- ESS1.C: The History of Planet Earth Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1)

Supporting:

Crosscutting Concepts and Science and Engineering Practices

- Constructing Explanations and Designing Solutions: Make observations from several sources to construct an evidence-based account for natural phenomena. (2-ESS1-1)
- Stability and Change Things may change slowly or rapidly. (2-ESS1-1),(2-ESS2-1)

Detailed Description/Instructions:

5 E's	Suggested # of Days	Notes
Engage: Investigative Phenomena- video How do we end up with rivers at the bottom of canyons?	1 Day	Watch "Set-up Video" Materials (print):

APK: Grand Canyon How do you think the Grand Canyon was formed? Graphic Organizer- Slow Changes Write two slow changes to land and give examples of how the slow changes can change land. Hook: Changing Chalk Students use chalk as a model of how the land changes.		• Student Journal (or project) Materials (print): • Student Journal
Explore Explore 1: Scientific Investigation- Slow Changes Students explore how wind and water change rocks and soil. (stations)	1-2 Days	Materials (print): • Student Journal • CER • Teacher Prep Required- see material list on STEMscopes
Explore (found in Effects of Wind and Water scope) Explore 1: Scientific Investigation- Stop the Erosion! <i>Students conduct an investigation comparing different ways to prevent wind and water erosion.</i>	1-2 Days	Materials (print): • Student Journal or Science Notebook • CER • CER Key Notes: • Prepare paint trays before you begin • May substitute hair dryer for table fans if desired • Rotate students through observing each model <i>or</i> do as a whole group lesson • Have students journal the effects while observing models, followed by a whole group share
Explore (optional) Explore 2 Engineering Solutions- Rain on the Rooftop <i>Students draw and design a model that will protect a flower bed and present the seeds from washing away.</i>	2-3 Days	Materials (print): • Student Journal • Teacher Prep Required

		• Soil Erosion Video <i>optional</i> Day 1: Preparation, The Problem, The Challenge Day 2: Build (a labeled drawing), Test, & Refine (student journal) Day 3: Share & Critique
Explain and Elaborate Centers	1-2 Days	Required: • STEMscopedia • Picture Vocabulary Suggestions: • Content Connection Videos
Evaluate: CER	1 Day	Print CER
Mission Anchor Chart Give students the mission log after the completion of this scope.	1	See Anchoring Phenomena Event Teacher Guide for mission log directions and handouts

Topic 3: Effects of Wind and Water (*optional scope*)

Suggested Length of Time: 9-12 Days

Essential Questions (Student Wondering):

- How can we prevent changes to land caused by wind or water?

Enduring Understanding (Learning Objectives):

- The student is expected to compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
- The student is expected to ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- The student is expected to develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- The student is expected to analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Standards Addressed

Priority:

Missouri Learning Standards

- 2.ESS2.A.1 Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.

Disciplinary Core Ideas

- ESS2.A: Earth Materials and Systems Wind and water can change the shape of the land. (2-ESS2-1).
- ETS1.C: Optimizing the Design Solution Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (secondary to 2-ESS2-1)

Supporting:

Crosscutting Concepts and Science and Engineering Practices

- Constructing Explanations and Designing Solutions: Compare multiple solutions to a problem. (2-ESS2-1)
- Stability and Change Things may change slowly or rapidly. (2-ESS1-1),(2-ESS2-1)
- Connections to Engineering, Technology, and Applications of Science: Influence of Engineering, Technology, and Science on Society and the Natural World-Developing and using technology has impacts on the natural world. (2-ESS2-1)
- Connections to Nature of Science Science:Addresses Questions About the Natural and Material World-Scientists study the natural and material world. (2-ESS2-1)

Detailed Description/Instructions:

5 E's	Suggested # of Days	Notes
Engage: Investigative Phenomena- Video How can we prevent changes to land caused by wind or water? APK: Students make observations of different landforms and discuss how they were formed. Graphic Organizer- Preventing Erosion Describe two ways to prevent erosion caused by wind and water. Hook: Students evaluate the quality of one soil-erosion solution.	1 Day	Materials: • Student Journal (print or project) • Effects of Wind and Water handout • Erosion pictures • aluminum plans • squirt bottles with water • googles • potting soil • straw • dusting cloth • toothpicks
Explore <i>(moved to Slow Changes to Land)</i> Explore 1: Scientific Investigation- Stop the Erosion! <i>Students conduct an investigation comparing different ways to prevent wind and water erosion.</i>	1-2 Days	Materials (print): • Student Journal or Science Notebook • CER • CER Key Notes: • Prepare paint trays before you begin • May substitute hair dryer for table fans if desired • Rotate students through observing each model <i>or</i> do as a whole group lesson • Have students journal the effects while observing models, followed by a whole group share
Explore Explore 2: Engineering Solution- Save the Beach House <i>Students design and construct a structure that protects</i>	4 Days	Materials (print): • Save the Beach handout • aluminum pan

<i>a beach house from wind and water erosion of the land it sits on.</i>		● small houses, blocks, toys, linking cubes ● sand ● fan ● water ● water bottles ● materials for barriers (fabric, sticks, cardboard, plastic bottles, etc) ● craft sticks
Explain and Elaborate Centers	1-2 Days	Required: ● STEMscopedia ● Picture Vocabulary Suggestions: ● Begin some students on Active Assessment
Evaluate: Active Assessment	1-2 Days	
Mission Anchor Chart Give students the mission log after the completion of this scope.	1	See Anchoring Phenomena Event Teacher Guide for mission log directions and handouts

Engaging Scenario/Action Plan

Engaging Scenario/Action Plan

Give the students the Mission log after the completion of the first scope in the unit, and answer the questions to go with that scope. This can be led by the teacher, done in groups, or completed individually. This process should be repeated at the end of each scope. Consider creating an anchor chart that looks like the Mission Log to keep posted in the room

Action Plan: Determine what slow and fast changes to landscape are caused by mudslides, and come up with a prevention plan.

Students finish mission log and complete Action Plan pages.

Unit 3: Mapping Land and Water

Subject: Science

Grade: 2nd

Name of Unit: Mapping Land and Water

****Connects with Maps and Measurement Tools Reporting topics in Social Studies****

Length of Unit: 16-20 days (4 weeks)

Overview of Unit: During this unit, students will be exploring many phenomena while learning the following concepts:

- Maps can show shapes and types of landforms and water in an area.
- Water on Earth is found in oceans, rivers, lakes, and ponds.
- Water on Earth exists as a liquid or as solid ice.

Anchoring Phenomena Event (to start the unit)

Students interact with a video of students following the directions of a recipe.

Anchoring Phenomena Driving Question

How can the shapes and types of landforms and water in an area be presented?

Mission Performance Task from Action Plan (to end the unit)

The student's mission is to create a map that includes icebergs, the coastline, islands, and any landforms visible from the ocean.

The scopes included in this bundle include the following:

- [Mapping Our World](#)
- [Forms of Water on Earth](#)

The Verbs: What should students be doing?

- Develop a model: Create a representation of something in real life
- Obtain information to identify: Find data to show
- Exist: To be somewhere

The Nouns: What key terms are found in the standard?

- Map: A drawing or picture that shows important things in an area
- Land: The solid part of the surface of Earth
- Bodies of Water: Ponds, lakes, oceans, and rivers
- Water: A liquid that all living things need to survive
- Solid: Has a definite shape
- Liquid: Can be felt with your hand and takes the shape of the container
- Ocean: A large body of water that is salty
- River: Water flowing or moving in a channel
- Lake: A large body of water with land all around it
- Pond: A small body of water with land all around it
- Ice: Frozen water
- Form: The shape of something or if something is liquid like water or solid like ice

Topic 1: Mapping Our World

Suggested Length of Time: 10-12 Days

Essential Questions (Student Wondering):

- How can flat maps show us where landforms are located?

Enduring Understanding (Learning Objectives):

- The student is expected to develop a model to represent the shapes and kinds of land and bodies of water in an area.

Standards Addressed

Priority:

Missouri Learning Standards

- 2.ESS2.B.1 Develop a model to represent the shapes and kinds of land and bodies of water in an area.

Disciplinary Core Ideas

- ESS2.B: Plate Tectonics and Large-Scale System Interactions Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2)

Supporting:

Crosscutting Concepts and Science and Engineering Practices

- Developing and Using Models: Develop a model to represent patterns in the natural world. (2-ESS2-2)
- Patterns Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3)

Detailed Description/Instructions:

5 E's	Suggested # of Days	Notes
Engage: Investigative Phenomena- Video How can flat maps show us where landforms are located? APK: Mapping Our World Students use images and explain what the landforms are. Graphic Organizer - Making A Map Draw and label how a landform or body of water is represented on a map. Hook:Map My School Students draw a map by observing their school.	1 Day	Materials (print): • Student Journal (project) ELL Strategy: List, Group, Label
Explore Explore 1: Activity- Map the Classroom <i>The teacher has models of landforms in the classroom</i>	1-2 Days	Teacher Prep Time Required Materials (print):

<i>and students create a map of the area.</i>		• Student Journal • CER Part 1: • Discussion • Classroom has become a model of an area of land Part 2: • Create Maps • Discussion • Add Key
Explore Explore 2: Engineering Solutions- Real Estate Model <i>Students construct a model of a neighborhood using criteria and constraints and representing landforms and bodies of water.</i>	3-4 Days	Materials (print): • Landform Cards • Student Journal Day 1: The Problem, The Challenge, Criteria and Constraints Day 2: Design, Build, Test, and Refine Day 3: Share & Critique **Double salt dough recipe for 6 groups. **Create salt dough a few days ahead of time or purchase playdough/clay.
Explain and Elaborate Centers	1-2 Days	Center ideas (print): • STEMscopedia • Picture Vocabulary • Content Connection Video
Evaluate: Open Ended Response	1 Day	Print CER
Mission Anchor Chart Give students the mission log after the completion of this scope.	1	See Anchoring Phenomena Event Teacher Guide for mission log directions and handouts

Topic 2: Forms of Water on Earth

Suggested Length of Time: 6-8 days

Essential Questions (Student Wondering):

- What are bodies of water like around the world?

Enduring Understanding (Learning Objectives):

- The student is expected to obtain information to identify where water is found on Earth and that it can be solid or liquid.

Standards Addressed

Priority:

Missouri Learning Standards

- 2.ESS2.C.1 Obtain information to identify where water is found on Earth and that it can be solid or liquid.

Disciplinary Core Ideas

- ESS2.C: The Roles of Water in Earth's Surface Processes Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3)

Supporting:

Crosscutting Concepts and Science and Engineering Practices

- Obtaining, Evaluating, and Communicating Information: Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3)
- Patterns Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3)

Detailed Description/Instructions:

5 E's	Suggested # of Days	Notes
Engage: Investigative Phenomena- Video What are the different bodies of water like around the world? APK: Students explain where the water in the oceans and rivers come from. Graphic Organizer: Our Water: Solid, Liquid, or Both Solid and liquid on Earth venn diagram Hook: Where's The Water Students identify the different forms and locations of water on a map.	½ Day	Materials: • Student Journal (print or project)
Explore	1 Day	Materials (print):

Explore 1: Scientific Investigation- Water All Around <i>Students create a model to show why water forms where it does.</i>		● Student Journal (print or Science Notebook) ● CER
Explore Explore 2: Research - Water on Earth <i>Students will gather information from multiple sources to learn about different bodies of water.</i>	2-3 Days	Materials (print): ● Water on Earth ● Books on topic ● Student Journal (print or Science Notebook) ● CER (per student--<i>option</i>)
Explain and Elaborate Centers	1-2 Days	Center ideas (print): ● STEMscopedia ● Picture Vocabulary
Evaluate: Open-Ended Response	1 Day	
Mission Anchor Chart Give students the mission log after the completion of this scope.	1	See Anchoring Phenomena Event Teacher Guide for mission log directions and handouts

Engaging Scenario/Action Plan

Engaging Scenario/Action Plan

Give the students the Mission log after the completion of the first scope in the unit, and answer the questions to go with that scope. This can be led by the teacher, done in groups, or completed individually. This process should be repeated at the end of each scope. Consider creating an anchor chart that looks like the Mission Log to keep posted in the room.

Action Plan: Create a map that includes icebergs, the coastlines, and any landform visible from the ocean.

Unit 4: Selecting and Using Materials in the Design Process

Subject: Science

Grade: 2nd

Name of Unit: Selecting and Using Materials in the Design Process

Length of Unit: approximately 31 days

Overview of Unit: During this unit, students will be exploring many phenomena while learning the following concepts:

- Matter can be described and classified by certain properties you can see and measure.
- Different properties are suited for different purposes.
- Changes in the properties of materials due to adding or taking away heat can sometimes be reversed; other times, they cannot be reversed.

Anchoring Phenomena Event (to start the unit)

Students interact with a video of workers sorting recycling material.

Anchoring Phenomena Driving Question

Based on their physical properties, what materials are best suited to protect food and provide shelter on a rainy-day camping trip?

Mission Performance Task from Action Plan (to end the unit)

The student's mission is to create lists of materials that have the ability to keep food and drinks cold; foods that do not change their state or shape when heat is added and then when they are recooled; and materials that, along with a backpack, could be used to make a shelter. The student will then create a blueprint of materials that could be taken on a rainy-day camping trip, and that fit in the backpack.

The scopes included in this bundle include the following:

- Properties and States of Matter
- Properties of Materials
- Changes from Heat

The Verbs: What should students be doing?

- Plan and conduct an investigation: Think about and do a project to answer questions
- Describe: Tell or write about what you can observe about something
- Classify: Put something in a group of like items
- Analyze data: Find the patterns in the data
- Suit: Able to be used for a purpose
- Test: Try different solutions to see which one is the best answer for a problem
- Make observations: To describe what you see, feel, taste, hear, or smell
- Construct an evidence-based account: Tell or write what you saw
- Disassemble: Take something apart
- Construct an argument: Say what you think and why

- Heating: Rising in temperature; getting hotter
- Cooling: Lowering in temperature/ getting colder
- Reverse: To go back

The Nouns: What key terms are found in the standard?

- Materials: Equipment and supplies for doing or making something
- Observable Properties: The look, feel, taste, sound, or smell of an object
- Matter: Stuff that everything is made of
- Solid: Has a definite shape
- Liquid: Can be felt with your hand and takes the shape of the container
- Temperature: How hot or cold something is
- Properties: The look, feel, taste, sound, or smell of an object
- Purpose: The reason that something is made
- Intended purpose: One named use for something
- Set: A group of things that go together
- Pieces: Parts of a set
- Substance: Something made of all one material such as water or copper

Topic 1: Properties and States of Matter

Suggested Length of Time: approx. 10 Days

Essential Questions (Student Wondering):

- How many different ways can we classify objects?

Enduring Understanding (Learning Objectives/Performance Expectations):

- The student is expected to plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

Standards Addressed

Priority:

Missouri Learning Standards

- K.PS1.A.1 Make qualitative observations of the physical properties of objects (i.e., size, shape, color, mass).
- 2. PS1.A.1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
- 2.PS1.A.2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
- 3.PS1.A.1 Predict and investigate that water can change from a liquid to a solid (freeze), and back again (melt), or from a liquid to a gas (evaporation), and back again (condensation) as the result of temperature changes.

Disciplinary Core Ideas

- PS1.A: Structure and Properties of Matter Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1).

Supporting:

Crosscutting Concepts and Science and Engineering Practices

- Planning and Carrying Out Investigations: Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-PS1-1)
- Patterns Patterns in the natural and human designed world can be observed. (2-PS1-1)

Detailed Description/Instructions:

5 E's	Suggested # of Days	Notes
Engage: Investigative Phenomena- Video Why do some things melt? APK: Students classify several images by their physical state of matter. Graphic Organizer: What's The Matter Write states of matter and physical properties. Hook: Sharing Properties Students describe the physical properties of various objects and compare objects with similar properties.	1 Day	Watch "Setup Video" By the end of the lesson, students should be able to classify several images by their physical state of matter.
Explore Explore 1: Activity - Melting Snowman (or Icecube) <i>Students explore changing states of matter by adding and taking away heat.</i>	1 Day	Materials: ● Melting snowman ● container ● heat lamp ● freezer ● thermometer ● balloons ● black felt ● orange felt ● salt ● water ● other liquids
Explore 2 : Activity - Mystery Balloons Students explore unknown objects and substances inside balloons in order to list their physical properties and determine their state of matter. (SAME AS DO 1 from 2.0)	1 Day	Materials: ● Prepare materials- see list on STEMscopes ● Suggestion: may cut shapes out of foam sheet *lots of prep

Explore 3: Inquiry Investigation- Properties and State of Matter <i>Students work to design and conduct an investigation about the observable properties of matter or the states of matter.</i>	3 Days	Materials: • Properties and States of Matter • Various materials
Explain & Elaborate: Centers	2 Days	Required: • STEMscopedia • Picture Vocabulary
Evaluate: CER	1 Day	Print PDF
Mission Anchor Chart Give students the mission log after the completion of this scope.	1	See Anchoring Phenomena Event Teacher Guide for mission log directions and handouts

Topic 2: Properties of Materials

Suggested Length of Time: 8-10 days

Essential Questions (Student Wondering):

- How do you decide what materials to make something out of?

Enduring Understanding (Learning Objectives):

- The student is expected to analyze data obtained from testing different materials to determine which materials have the properties that are best suited for intended purpose.
- The student is expected to ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- The student is expected to develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- The student is expected to analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Standards Addressed

Priority:

Disciplinary Core Ideas

- 2-PS1.A.2 Structure and Properties of Matter: Different properties are suited to different purposes. (2-PS1-2),(2-PS1-3)

Supporting:

Crosscutting Concepts and Science and Engineering Practices

- Analyzing and Interpreting Data: Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2)
- Cause and Effect: Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)
- Connections to Engineering, Technology, and Applications of Science: Influence of Engineering, Technology, and Science on Society and the Natural World- Every human-made product is designed by applying some knowledge of the natural world and is built by using natural materials. (2-PS1-2)

Detailed Description/Instructions:

5Es	Suggested # of Days	Notes
Explore Investigative Phenomena- Video What characteristics should the fabric on a trampoline have? APK-Students think about how different properties are suited to different purposes. Graphic Organizer-Matter Serves a Purpose	1 Day	Materials: • Best for a Mess handout • Paintbrush • Straw • Tray • Ruler

Matter-Purpose-Physical Properties Hook: Painter's Delight Students will investigate which properties of materials are best suited for painting.		● Cotton Swab ● Dab of paint ● Construction paper
Explore Explore 1 Inquiry Investigation Soak It In! <i>Students observe the strength and absorbency to two different types of paper towels. (HOOK from 2.0)</i>	1 Day	Project "Student Handout" ● Hide paper towels and tissues before experience Materials: ● Paper towel- brand a & brand b ● Water ● Pennies
Explore Explore 2 Scientific Investigation- The Great Shoe Slide <i>Students discover the best type of shoes for walking on a smooth floor. (Do 1 from 2.0)</i>	3-4 Days	Note: use cafeteria or gym for open floor space that is smooth. Materials (Print): ● Student Journal ● Student CER Part 1 and 2 (Day 1): student journal and class data graph CER (Day 2): Formative assessment - may do as a whole group as you introduce CER (print)
Explore Explore 3: Engineering Solutions - Build a Monster!<i>Students use their knowledge of physical properties to build a toy that fits the toy company's criteria. (Do 2 from 2.0 Properties and States of Matter)</i>		Materials: ● Build a Monster handout ● tape ● craft sticks ● pipe cleaners ● straws ● yard ● rubber bands ● foam bowls ● foam plates ● foam sheets ● felt sheets

		● aluminum foil
Explain & Elaborate: Centers	1-2 Days	Required: ● STEMscopedia ● Picture Vocabulary
Evaluate: CER	1 Day	Materials (print): ● Argue: CER (one per student) ● Rubric for Teacher
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Topic 3: Changes from Heat

Suggested Length of Time: 6 to 8 days

Essential Questions (Student Wondering):

- Why can some changes caused by heating or cooling be reversed, while others cannot?

Enduring Understanding (Learning Objectives):

- The student is expected to construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

Standards Addressed

Priority:

Missouri Learning Standards

- 3.PS1.B.1 Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

Disciplinary Core Ideas

- PS1.B: Chemical Reactions Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)

Supporting:

Crosscutting Concepts and Science and Engineering Practices

- Engaging in Argument from Evidence: Construct an argument with evidence to support a claim. (2-PS1-4)
- Connections to Nature of Science Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena Scientists search for cause and effect relationships to explain natural events. (2-PS1-4)
- Cause and Effect Events have causes that generate observable patterns. (2-PS1-4)

Detailed Description/Instructions:

5 E's	Suggested # of Days	Notes
Engage: Investigative Phenomena- Video Can I change my egg back to the way it was before I cooked it? APK: Students observe two images and explain how the objects changed. Graphic Organizer- Hot and Cold Matter Table: Type of Matter, Changes From Heat, Changes with Cold, Can the Matter Be Returned? Hook: Fluff and Puff	1 Day	Notes: • Student Journal may be printed, projected, or done within Science Notebook

Students learn how heating and cooling a marshmallow changes its appearance?		
Explore Explore 1 Activity- Heat It Up! <i>Students discover the effect heat has on different materials.</i>	1 Day	Materials (print): • Student Journal (or Science Notebook) • CER <i>or</i> Notebook jotting Notes: • May be best to do as whole group, grade level, or share materials among teammates • Gather/prepare materials before you • gather supplies (some may need to be purchased-butter, ice) - o Prepare pancake batter - o Cut butter - o Gather muffin tins & fill with crayon, butter, batter, popcorn, rock
Explore Water Cycle Activity (not a part of STEMscopes)	1-2 Days	Website: https://thewaterproject.org/resources/lesson-plans/create-a-mini-water-cycle Making your own mini water cycle. The States of Water and The Water Cycle https://www.youtube.com/watch?v=TJoSuAVUGQA (may not need to watch all of the video)
Explain & Elaborate: Centers	1 Day	Required: • STEMscopedia • Picture Vocabulary Optional: • Content Connections Video
Evaluate: CER and Open-Ended Response Assessment or Multiple-Choice	1 Day	
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