Randolph Township School District
Randolph Elementary Schools

Science Curriculum
Second Grade

Science is about knowing; engineering is about doing. - Henry Petroski

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August 2020

Randolph Township School District
Randolph Elementary Schools
Second Grade- Science

Table of Contents

Mission Statement

We commit to inspiring and empowering all students in Randolph schools to reach their full potential as unique, responsible and educated members of a global society.

Randolph Township School District
Affirmative Action Statement

Equality and Equity in Curriculum

The Randolph Township School district ensures that the district's curriculum and instruction are aligned to the state's standards. The curriculum provides equity in instruction, educational programs and provides all students the opportunity to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

N.J.A.C. 6A:7-1.7(b): Section 504, Rehabilitation Act of 1973; N.J.S.A. 10:5; Title IX, Education Amendments of 1972

RANDOLPH TOWNSHIP BOARD OF EDUCATION
EDUCATIONAL GOALS
VALUES IN EDUCATION

The statements represent the beliefs and values regarding our educational system. Education is the key to self-actualization, which is realized through achievement and self-respect. We believe our entire system must not only represent these values, but also demonstrate them in all that we do as a school system.

We believe:

- The needs of the child come first
- Mutual respect and trust are the cornerstones of a learning community
- The learning community consists of students, educators, parents, administrators, educational support personnel, the community and Board of Education members
- A successful learning community communicates honestly and openly in a non-threatening environment
- Members of our learning community have different needs at different times. There is openness to the challenge of meeting those needs in professional and supportive ways
- Assessment of professionals (i.e., educators, administrators and educational support personnel) is a dynamic process that requires review and revision based on evolving research, practices and experiences
- Development of desired capabilities comes in stages and is achieved through hard work, reflection and ongoing growth

Randolph Township School District
Randolph Elementary Schools
Science~ Grade 2

Introduction

The Randolph Township School District is committed to providing students with the ability to solve real life problems through authentic learning tasks. The Second Grade Science Curriculum is aligned to the Next Generation Science Standards utilizing Cross-cutting Concepts, Science and Engineering Practices, and Disciplinary Core Ideas to facilitate growth within performance expectations. Throughout these units, students will engage in active learning through problem solving, sense making, and exploration of scientific phenomena. Students will identify problems and test solutions, explain the cause and effect relationship of matter, design solutions to scientific problems through data collections, and analyze relationships in an ecosystem. The engineering design process is the foundation for this student-driven curriculum. It provides students the opportunity to discover real-life problems, explore interest and passion in and beyond science and apply learning to the world they live in. Students will be given the opportunity to explore hydroponic tanks/towers to assist their community as an additional form of sustainability. Allowing students to take ownership of indoor gardening across the district, will allow them to contribute to their school's community while being active problem solvers.

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Curriculum Pacing Chart
Science ~Grade 2

SUGGESTED TIME ALLOTMENT (days)	UNIT NUMBER	CONTENT – UNIT OF STUDY
4 Weeks	**I**	**Engineering Design with Matter**
5 Weeks	**II**	**Matter and Its Interactions**
5 Weeks	**III**	**Earth's Surface Changes**
6 Weeks	**IV**	**Ecosystems**

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Science ~Grade 2
UNIT I: Engineering Design with Matter

<table>
<tr><td colspan="3">TRANSFER: Use the design process to systematically identify a relevant problem and develop the best solution.</td></tr>
<tr><td>STANDARDS / GOALS:</td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td rowspan="8">NJSLS-S
K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2-ETS1-2 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.

K-2-ETS1-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

2-PS1-2 Analyze data obtained from testing different materials</td><td>The shape and stability of structures of natural and designed objects are related to their function(s).</td><td>How can an engineer design an object using its properties to solve a problem?</td></tr>
<tr><td>Objects may break into smaller pieces and be put together into larger pieces or change shapes.</td><td>How can an object be assembled to make a different product?</td></tr>
<tr><td>Simple tests can be designed to gather evidence to support or refute ideas about causes.</td><td>How do engineers find the best solutions to a problem?</td></tr>
<tr><td>KNOWLEDGE</td><td>SKILLS</td></tr>
<tr><td>Students will know:

A design process helps engineers define a problem and plan, test, and share a solution with others.

A situation that people want to change or create can be approached as a problem to be solved through engineering.

Before beginning to design a solution, it is important to clearly understand the problem.</td><td>Students will be able to:

Explain the steps of the design process.

Define a simple problem.

Identify inventions previously created and the problems solved by inventors.

Ask questions based on observations to find more information about the natural and/or designed world(s).</td></tr>
</table>

to determine which materials have the properties that are best suited for an intended purpose. **2-PS1-3** Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. **<u>ELA/ Literacy</u>** **RI.2.1** **W.2.6** **SL.2.5** **<u>Math</u>** **MP.2** **MP.4** **MP.5** **MD.D.10** **CASEL Core Competencies** **<u>Responsible Decision Making</u>** • Identifying problems • Analyzing situations • Solving problems • Evaluating • Reflecting • Ethical Responsibility **<u>Self -Awareness</u>** • Identifying emotions • Accurate self-perceptions	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. There is always more than one possible solution to a problem, it is useful to compare and test multiple design models. Sharing solutions can help others that are trying to solve similar problems. Different properties are suited to different purposes. A great variety of objects can be built up from a small set of pieces. **KEY TERMS:** engineer, design process, solution, strength, weakness, matter, property, solid, liquid, hydroponic tower, aquaponic tank	Develop a simple sketch, drawing, or physical model based on evidence to represent a proposed object or tool. Plan and conduct an investigation of multiple design models collaboratively utilize the engineer design process. Compare design strengths and weaknesses of multiple solutions. Analyze data from tests of model solutions to determine if it works as intended. Determine and implement necessary improvements to a design. Communicate the results of a design process in through writing, drawing, or taking pictures. Develop a claim and use evidence to support use of materials for developed solution. Use a variety of pieces from an object to create a new product.

• Recognizing strengths • Self-competence • Self-efficacy		

ASSESSMENT EVIDENCE: Students will show their learning by:

- Identifying a real-life problem and use the design process to solve the problem (Ex: Build a Better Lunchbox, and/or make improvements to a hydroponic tower/aquaponic tank)

KEY LEARNING EVENTS AND INSTRUCTION:

- Identify the process at which aquaponic tank and hydroponic tower functions.
- Identify inventions and the solutions that they solve. (i.e. hydroponics tower/tank, air conditioning unit, mechanical pencil)
- Determine how aquaponic tanks and hydroponic towers solves a community problem.
- Ask questions, make observations, and gather information to define a problem to be solved through a design process. (i.e. how do hydroponic towers can help a community?)
- Sketch/design a plan to solve a problem (i.e. sketch and build a hydroponic prototype)
- Analyze and compare multiple design solutions
- Compare strengths and weaknesses of design solutions (i.e. Make Your Lunchbox Better, hydroponic tower vs. aquaponic tank)
- Use observations as evidence to explain how an object made of small set of pieces can be taken apart and made into a new object
- Build objects from smaller pieces (i.e. Build a Better Bottle Holder, build a hydroponic tank)
- Synthesize data collected to communicate the results of a design process through writing, drawing, or taking photographs

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Science ~Grade 2
UNIT I: Engineering Design with Matter

SUGGESTED TIME ALLOTMENT	CONTENT -UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
4 Weeks	**UNIT I:** Engineering Design with Matter	**<u>Suggested Resources</u>** **Science Dimensions:** Leveled Readers *How Do Engineers Solve Problems?* On Level *How Do Engineers Solve Problems?* Extra Support *Ben's Engineering Project* Enrichment *What Can We Learn About Matter?* On Level *What Can We Learn About Matter?* Extra Support *Making Coins* Enrichment Student Workbook Unit 1 – Lesson 1 – Engineer It: What is a Design Process? Unit 1 – Lesson 2 – Engineer It: How Can We Compare Design Solutions? Unit 2 – Lesson 1 – What Are Properties of Matter? **BrainpopJr.** Solids, Liquids and Gases Sink or Float **Other Instructional Videos**

		NASA for Kids: Intro to Engineering: https://www.youtube.com/watch?v=wE-z_TJyziI "Crash Course Kids" What's an Engineer?:https://www.youtube.com/watch?v=owHF9iLyxic "Crash Course Kids" The Engineering Process: https://www.youtube.com/watch?v=fxJWin195kU "Crash Course Kids" Hunting for Properties: https://www.youtube.com/watch?v=ZZYnERZe3Cg&index=3&list=PLhz12vamHOnaY7nvpgtQ0SIbuJdC4HA5O **Scholastic Classroom Books** *Shape* by Pluckrose *What Is Matter?* by Curry *What's It Like* by Scott *Why is Soap So Slippery?* by Ripley *Made with Glass* by Cherrington *A Buzz Is Part of a Bee* by Lunn *Bicycle Book* by Gibbons *Construction Zone* by Hudson *Cross a Bridge* by Hunter *Pierre the Penguin* by Marzollo *List and Shift* by Scott

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Science ~Grade 2
UNIT II: Matter and Its Interactions

TRANSFER: Analyze and critique the effects change has on matter.

STANDARDS / GOALS:	**ENDURING UNDERSTANDINGS**	**ESSENTIAL QUESTIONS**
<u>NJSLS-S</u> **2-PS1-1** Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. **2-PS1-4.** Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. **2-ESS2-3.** Obtain information to identify where water is found on Earth and that it can be solid or liquid. **<u>ELA/Literacy</u>** **W.2.8** **RI.2.1** **RI.2.8** **2.G.A.2** **<u>Math</u>** **MP.2** **MP.4**	Matter can be categorized by its properties.	What are the properties of matter?
	Heating and cooling causes matter to change.	How does matter change?
	Some changes to matter can be undone, while others cannot.	How do different changes effect matter?
	KNOWLEDGE	**SKILLS**
	Students will know: Matter occurs in different forms. Matter can be described and classified by its observable properties. Materials are best suited for a purpose based on their properties of matter.	**Students will be able to:** Classify objects in regards to their state of matter. Determine that states of matter can change (i.e. liquid to solid and vice versa). Describe the properties of matter. Categorize items by their properties. Identify what properties cause each material to best suited for a solution.

2.MD.D.10 **2.NBT.A.4** **2.OA.A.1** **CASEL Core Competencies** **<u>Relationship Skills</u>** • Communication • Social engagement • Relationship-building • Teamwork	Heating or cooling a substance may cause changes that can be observed. Materials are best suited for a purpose based on their properties of matter. Heating or cooling a substance may cause observable changes. Sometimes these changes are reversible, and sometimes they are not. Scientists create experiments to test their theories. Water is found in the ocean, rivers, lakes, and ponds. **KEY TERMS:** solid, liquid, heat, freeze, reversible, irreversible, mix, transpiration	Recognize and describe that heating and cooling cause matter to change. Manipulate matter to test the effects of heating and cooling on an object. Describe the properties of matter. Identify what properties cause each material to best suited for a solution. Recognize and describe that heating and cooling cause matter to change. Manipulate matter to test the effects of heating and cooling on an object. Explain and support with evidence the difference between irreversible and reversible changes to solids and liquids. Demonstrate how everyday objects exhibit irreversible and reversible changes. Construct an argument with evidence to summarize how irreversible and reversible changes affect their everyday lives. Identify bodies of water as they occur as solids or liquids on Earth.

ASSESSMENT EVIDENCE: Students will show their learning by:

- Writing an informational piece regarding the heating or cooling of matter using scientific evidence.
- Explaining and developing a model of a natural occurrence of matter change using scientific evidence and terms.

KEY LEARNING EVENTS AND INSTRUCTION:

- Identify the states of matter and how matter can change states frequently (i.e. transpiration in plants when overheated and creates water vapor on plant leaves - evaporation, water bottle perspiring)
- Explore and list properties (i.e. shape, texture, hardness, flexibility, and color) of matter to describe an object (i.e. describing and comparing different plants in a hydroponic tower based on their properties)
- Use evidence to describe how heating and cooling matter may cause changes that can be observed (i.e. water freezing in hose or rain collector barrel, frost on plants, drooping plant caused by heat)
- Construct an argument with evidence that some changes to matter can be reversed (i.e. reviving a dying plant, frost on plants)
- Construct an argument with evidence that some changes to matter are irreversible (i.e. animals eating plants, wildfires, nutrient solution dissolving in hydroponic tower)
- Explore where solids and liquids are found in the natural world (i.e.- preparing a garden for winter, benefits of an indoor garden)
- Explore the question: Why do certain bodies of water freeze and others do not?

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Science ~Grade 2
UNIT II: Matter and Its Interactions

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
5 Weeks	**UNIT II: Matter and Its Interactions**	**<u>Suggested Resources</u>** **Science Dimensions** Leveled Readers: *What Can We Learn About Matter?* On Level *What Can We Learn About Matter?* Extra Support *Making Coins* Enrichment Student Workbook: Unit 2 – Lesson 2 - How Do Heating and Cooling Change Matter? Unit 2 – Lesson 3 - How Does Matter Change? Unit 2 – Lesson 4 - How Are Objects Put Together? Unit 4 – Lesson 1 - Where Is Water Found on Earth? **Safari Montage (Use video chapters as needed)** All About Solids, Liquids, and Gases Changing States of Matter: Freezing **BrainpopJr** Physical and Chemical Changes Changing States of Matter **Instructional Videos** NASA for Kids: Frozen: https://www.youtube.com/watch?v=lIWKDq03dMs

		Water Water Everywhere: Crash Course Kids #14.2: https://www.youtube.com/watch?v=SkAhB-8CtZg My Ice Pops - Sid The Science Kid - The Jim Henson Company: https://www.youtube.com/watch?v=mh8rZnrB6UE Google Earth: https://www.google.com/earth/ **Scholastic Classroom Books** *Look How It Changes!* by Young *Solids, Liquids, and Gases* by Garrett *A Cool Drink of Water* by Kerley *Follow the Water From Brook to Ocean* by Dorres *The Magic School Bus at the Waterworks* by Cole *Nat Geo Kids: Water* by Stewert *Snow* by Donaldson

RANDOLPH TOWNSHIP SCHOOL DISTRICT

Science ~Grade 2

UNIT III: Earth's Surface Changes

<table>
<tr><td colspan="3">TRANSFER: Collect data and information to develop a solution to a scientific problem.</td></tr>
<tr><td rowspan="6">STANDARDS / GOALS:

<u>NJSLS-S</u>

2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

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

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

<u>ELA/Literacy</u>
W.2.7
W.2.8
RI.2.1
SL.2.2

<u>Math</u>
MP.2
MP.4
MP.5</td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td>Weathering by wind, water, ice, and plants causes Earth's surface to change quickly.</td><td>What changes on earth happen slowly?</td></tr>
<tr><td>Severe weather and natural disasters cause Earth's surface to change quickly.</td><td>What changes on earth happen quickly?</td></tr>
<tr><td>Erosion changes the shape of land over time.</td><td>How can we prevent wind and water from changing land?</td></tr>
<tr><td>KNOWLEDGE</td><td>SKILLS</td></tr>
<tr><td>Students will know:

Some events, such as volcanos and earthquakes, cause changes to the Earth's surface quickly.</td><td>Students will be able to:

List events that can cause changes to the Earth's surface quickly (i.e. earthquakes, volcanoes, landslides, hurricanes, floods).

Research and describe the changes made to the Earth's surface due to natural disasters.

Debate and model a natural disaster that changes the Earth's surface quickly.</td></tr>
</table>

2.NBT.A **2.MD.8.5** **CASEL Core Competencies** **<u>Social Awareness</u>** • Perspective-taking • Empathy • Appreciating diversity • Respect for others	Some events, such as erosion caused by wind or water, make changes to the Earth's surface slowly.	List changes caused by wind and water that can cause changes to the Earth's surface slowly (i.e. weathering and erosion). Research and describe the changes made to the Earth's surface due to wind, water and plants. Debate and model erosion caused by wind or water that changes the Earth's surface slowly.
	A windbreak stops the wind from changing land overtime.	Research the purpose and various types of windbreaks. Construct a model windbreak system. Collect and analyze data from use of developed windbreak system.
	Weathering is a process that breaks rocks into smaller pieces.	Develop a claim on the purpose of a windbreak system as it relates to wind erosion. Observe and record observable evidence of weathering. Explore the effects of different types of precipitation and its effects on Earth.
	There is more than one possible solution to a problem, it is useful to compare and test designs.	Develop a claim on observations of weathering, support claim with evidence. Identify a solution to a long term problem caused by erosion.
	One can represent the shapes and kinds of land and water in any area.	Gather information to identify and illustrate different solutions to wind or water erosion.

		Gather information to identify and develop a model that represents major landforms and bodies of water on Earth.
	Different bodies of water have different characteristics. **KEY TERMS:** map, map title, map key, weathering, erosion, earthquake, volcano, landslide, hurricane, flood, glaciers	Compare and contrast bodies of water by creating a model of where they are found on Earth.

ASSESSMENT EVIDENCE: Students will show their learning by:

- Identifying examples of erosion and natural disasters, and their effects on Earth (i.e. explain how these environments can benefit from a hydroponic tower/tank).
- Creating models of erosion and natural disasters and debate their effects on Earth.
- Designing a solution to wind or water erosion.

KEY LEARNING EVENTS AND INSTRUCTION:

- Illustrate slow and quick changes of erosion on Earth
- Illustrate how to prevent wind and water from changing land
- Create models of bodies of water and landforms on Earth
- Define characteristics of different landforms and bodies of water on earth
- Analyze existing human solutions to erosion
- Explore erosion and its effects on the community
- Identify a solution to the effects erosion has on a community (i.e. benefits of hydroponic towers)
- Make observations from several sources to construct an evidence-based account for natural phenomena that occurs slowly (erosion) and quickly (volcanos and earthquakes)

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Science ~Grade 2
UNIT III: Earth's Surface Changes

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
5 Weeks	**UNIT III: Earth's Surface Changes**	**Suggested Resources** **Science Dimensions** Leveled Readers *Why are Resources Important?* On Level *Why are Resources Important?* Extra Support *All About Rocks* Enrichment Student Workbook Unit 5 - Lesson 1 - What Changes on Earth Happen Slowly? Unit 5 – Lesson 2 – What Changes on Earth Happen Quickly? Unit 5 – Lesson 3 – Engineer It: How Can We Prevent Wind and Water from Changing Land? **Safari Montage (Use video chapters as needed)** Bill Nye: Erosion Fierce Earth: Landslides Magic School Bus Rocks and Rolls **Brainpop Jr** Slow Land Changes **Other Instructional Videos** "Crash Course Kids" Weathering and Erosion: **https://www.youtube.com/watch?v=R-Iak3Wvh9c** Soil and Erosion: http://www.watchknowlearn.org/Category.aspx?CategoryID=2443

		Scholastic Classroom Books *Dirt* by Tomecek *Earthquakes* by Prager *The Magic School Bus Inside a Volcano* by Earhart *Scholastic Discover More Reader Level Three: Volcanos* by Brown *Volcanos* by Brown

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Science ~Grade 2
UNIT IV: Ecosystems

TRANSFER: Analyze the relationships between plants and animals in an ecosystem.

STANDARDS / GOALS:	**ENDURING UNDERSTANDINGS**	**ESSENTIAL QUESTIONS**
NJSLS-S **2-LS2-1.** Plan and conduct an investigation to determine if plants need sunlight and water to grow. **2-LS2-2.** Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. **2-LS4-1.** Make observations of plants and animals to compare the diversity of life in different habitats. **ELA/Language Arts** **W.2.7** **W.2.8** **SL.2.5** **Math** **MP.2** **MP.4** **2.OA.C.4**	Events have causes that generate observable patterns within an ecosystem.	How does a plant grow?
	The shape and stability of structures are related to their function(s).	How is the structure of a plant/seed dependent on its pollination or dispersal by animals?
	KNOWLEDGE	**SKILLS**
	Students will know: Different plants depend on various levels of water and light to grow and be healthy in their ecosystem. Characteristics of a habitat have direct impact on the vegetation.	**Students will be able to:** Research what various plants need to grow and be healthy. Plan and conduct an investigation to explore the needs of different plants. Analyze data and communicate results on plants and their need for varying levels of sunlight and water. Explain what characteristics of an environment have a positive impact on plant growth.

2.MD.D.10 **CASEL Core Competencies** **<u>Self Management</u>** • Impulse control • Stress management • Self-discipline • Self-motivation • Goal setting • Organizational Skills	Plants depend on insects for pollination. Plants depend on animals to move their seeds around. There are many different kinds of living things in any area, and they exist in different places on land and in water. Humans can have a positive or negative effect on insect and animal habitats. **KEY TERMS:** nutrient, pollen, habitat, ecosystem, dispersal, seed, pollination, endangered animals	Identify multiple ways insects help plants pollinate. Design a simple model based on evidence to represent how insects help plants pollinate. Identify multiple ways animals help plants disperse seeds. Describe a habitat as meeting an animal's need for food, shelter and water. Summarize the plants and animals found in two different habitats. Compare and contrast the diversity of habitats. Research how people have affected insect and animal habitats. Recommend changes for negative effects on insect and animal habitats.

ASSESSMENT EVIDENCE: Students will show their learning by:

- Analyzing data collected and share findings from light and water experiment on plants. (i.e. collecting data from hydroponic tower/tanks)
- Developing a scale model that mimics the function of pollination and seed dispersal.
- Comparing and contrasting the diversity of different habitats.

KEY LEARNING EVENTS AND INSTRUCTION:

- Grow plants under various conditions to explore their needs for sunlight and water (i.e. explore plants growing in hydroponic tower/tank).
- Explore the different land and water habitats

- Construct a habitat that supports different living environments
- Investigate varying ways animals and insects aid in pollination and seed dispersal
- Explore various plants and animals in different habitats to determine adaptation
- Explore the cause and effect of endangered animals
- Analyze plant growth in an outdoor garden vs. a hydroponic tower/tank
- Explore the question: What types of plants need various levels of sunlight and water to grow?

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Science ~Grade 2
UNIT IV: Ecosystems

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
6 Weeks	**UNIT I: Ecosystems**	**<u>Suggested Resources</u>** **Science Dimensions** Leveled Readers *How Do Living Things Survive in Their Environment* On Level *How Do Living Things Survive in Their Environment* Extra Support *Meet the Amazing Monarch Butterfly* Enrichment Student Workbook Unit 3 – Lesson 1 – What Do Plants Need? Unit 3 – Lesson 2 – Engineer It: How Do Plants Depend on Animals? Unit 3 – Lesson 3 – What Plants and Animals Live in Water Habitats? Unit 3 – Lesson 4 – What Plants and Animals Live in Land Habitats? **Safari Montage (Use video chapters as needed)** All About Plant Pollination: Fruit, Flowers & Seeds Plant Reproduction Dispersal of Seeds by Animals and Plants Magic School Bus Goes to Seed **BrainpopJr**

		Forest Desert Artic Habitats Ocean Habitats Fresh Water Habitats Rainforest Parts of a Plant Plant Lifecycle **Other Instructional Videos** How plants disperse seeds: https://www.youtube.com/watch?v=rhp5k5ptSx0 Seed Dispersal for Kids: https://www.youtube.com/watch?v=j1hRxuy1ezQ Seed Song - How Seeds Move - Seed Dispersal https://www.youtube.com/watch?v=3CCOWHa-qfc Home Sweet Habitat: Crash Course Kids #21.1: https://www.youtube.com/watch?v=p15IrEuhYmo **Scholastic Classroom Books** *From Seed to Pumpkin* by Pfeffer *The Life and Times of the Peanut* by Micucci *The Magic School Bus Plants Seeds* by Relf *Nat Geo Kids: Apples for Everyone* by Esbaum *Seed, Soil, Sun* by Peterson *This Is the Sunflower* by Schaefer *Watch Me Plant a Garden* by Otten *Busy Honeybees* by Martin *A Day at the Apple Orchard* by Faulkner *Flip, Float, Fly* by Macken *Beachcombing* by Arnosky *The Family of Earth* by Schimmel *MSB Presents: The Rain Forest* by Jackson *Nat Geo Kids: Weird Sea Creatures* by Marsh *Nic Bishop Frogs* by Bishop

		A Place for Birds by Stewart *Pond Walk* by Wallace *Wangari's Trees of Peace* by Winter

Appendix A

Phenomenon Pictures and Questions

Unit I: Engineering Design with Matter

Launch the Unit:

Photo Credit:https://nfthydroponics.net/product/nutrient-film-technique-kit?gclid=Cj0KCQjwoub3BRC6ARIsABGhnyZG63tGErIXHNOKpgqSZy5ytXQYS1LEmlMCykLQT0oFkyVMICTgFFkaAknsEALw_wcB

What observations can you make about this image?
Why do you think someone designed this?
What problem can this solve?

Photo Credit: https://www.youtube.com/watch?v=k9M7egpL0GA

How are these to pictures related?
What observations can be seen?

Use to identity community problem in regard to indoor gardening:

Desert Photo Credit: https://www.livescience.com/23140-sahara-desert.html
Brunage Park Photo Credit:
https://www.mynestbuilder.com/blog/110569/There+Is+Still+Time+To+Go+Ice+Skating+On+The+Brundage+Park+Pond+In+Randolph

What do you think these environments face?
How can a hydroponic tower and aquaponic tank be helpful in these environments?

Unit II: Matter and Its Interaction

Launch the Unit:

Pipe Photo Credit: https://home.howstuffworks.com/home-improvement/plumbing/how-to-fix-pipes3.htm
Bottle Photo Credit: http://wt.kimiq.com/water-expands-when-frozen/

Questions to Ask Students:
What do you notice?
What caused this to happen?
Can this be un-done?
What is similar about these two photos?

Use to discuss types of changes and states of matter:

Photo Credit: https://www.ngssphenomena.com/snowtrees?rq=frozen

What do you notice in this picture?
How would you describe this picture?
What state of matter is present?
Do you think that this change can be undone if so how?

Unit III: Earth's Surface Changes
Launch the Unit:

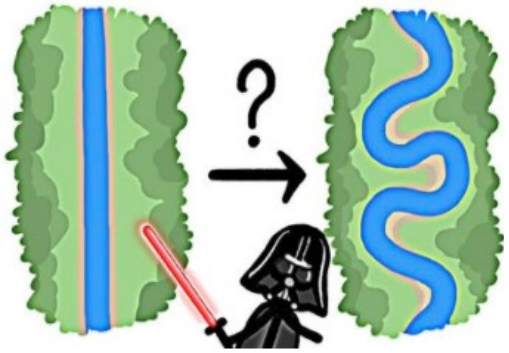

Photo Credit:
https://thewonderofscience.com/2ess21#phenomena

https://www.ngssphenomena.com/new-gallery-1/4m4sh1lvs4e18lplfxuyhq1xuq7cmc

Questions to Ask Students
How do these look different?
What do you think is happening over time?
What could be causing these changes?

**After discussing above pictures, play time-lapse video showing a river changing: https://www.ngssphenomena.com/changing-rivers?rq=erosion
What new thoughts do you have?

Watch video to explain why rivers change: https://youtu.be/8a3r-cG8Wic

Unit IV: Ecosystems

Launch the Unit:

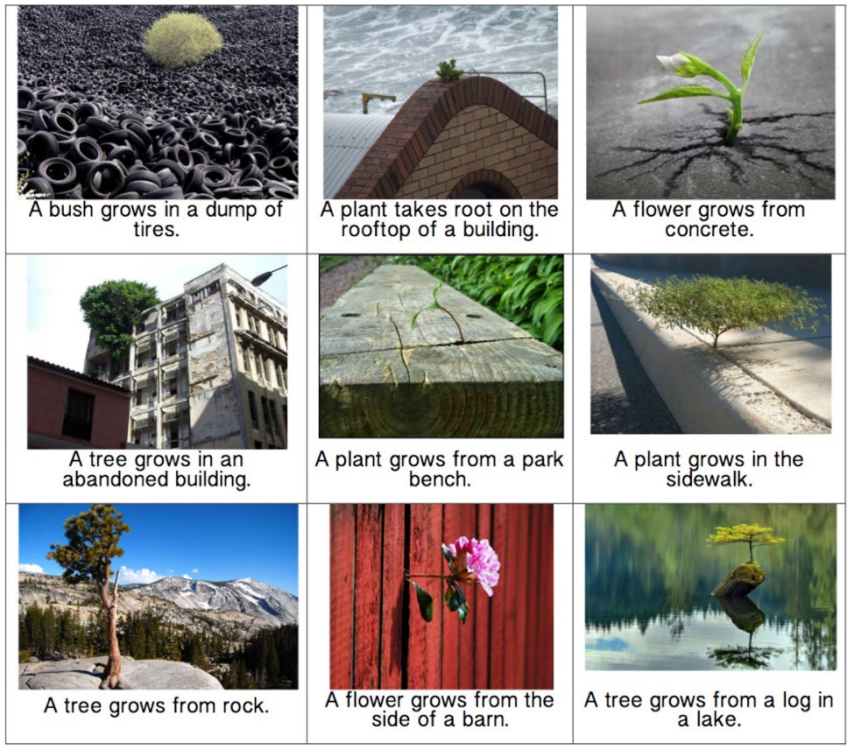

Photo Credit:
https://drive.google.com/file/d/0B3k2Pyjn5UzRZFpVZTlyRDdiNGM/view

Question to Ask Students:

How do you think a plant can grow in all of these places?
What does this tell us about what plants need to grow?
What do all of these photos have in common?

Use these images to launch discussion on seed dispersal:

Photo credit:

https://www.britannica.com/list/falling-far-from-the-tree-7-brilliant-ways-seeds-and-fruits-are-dispersed

https://www.imagingtheinvisible.com/photo_16028620.html

After, visit link to see a seed pod dispersing seeds: https://www.ngssphenomena.com/new-gallery-1/azwktehoyb5223vnt3iyp08zsw78qg

Questions to Ask Students

What do you notice about these photos?
What do these images have in common?
How does this help plants?

Appendix B

Resource Units

Unit I: Engineering Design with Matter

Possible Experiments:
DIY hydroponic water bottles, go through the design process with is, how it is related to the towers and tanks?

- Students can watch it grow and really compare designs and what worked and what didn't
- Students can add improvements to their own bottle as they grow the understanding of hydroponics (using sprout from the aquaponic tank)
- Students can track data

Resources:
https://newsela.com/read/arctic-farming/id/24018/?collection_id=339&search_id=3083c6c5-de92-41d7-aa20-4150b3dba36f

https://nfthydroponics.net/product/nutrient-film-technique-kit?gclid=Cj0KCQjwoub3BRC6ARIsABGhnyZG63tGErIXHNOK-pgqSZy5ytXQYS1LEmlMCykLQT0oFkyVMICTgFFkaAknsEALw_wcB

Video of how to build a hydroponic if needed:

- DIY Hydroponic Tower NFT System - https://www.youtube.com/watch?v=WpaeZLr0ZP0
- DIY Water Bottle Hydroponic System for Propagating and Herbs - https://www.youtube.com/watch?v=-flA5mTQ05A
- 2 Liter Bottle Hydroponics Tutorial by Epic Gardening - https://www.youtube.com/watch?v=BUpUfxqULXA
- Hydroponic Gardening - Grow Organic Plants Fast - https://www.youtube.com/watch?v=6kUm_I7bLYw

Unit II: Matter and Its Interactions

Possible Questions to Ask Students:
How do the different states of matter effect gardening?
Describing the properties of the different plants we grow and comparing them
What are reversible changes in a garden?
What are irreversible changes in a garden?

Resources**:**
Leaf Transpiration Experiment - https://www.youtube.com/watch?v=YeOw-wJR9fc
Transpiration in plants-Real life demo - https://www.youtube.com/watch?v=n52Z9qz4oOw

Video explaining the cycle of a hydroponic tower (can be used to discuss the changing states of matter) -
https://www.youtube.com/watch?v=l7EzYmO9u8M

Unit IV: Ecosystems

This experiment can be performed to show the effects variables have on plants:
https://docs.google.com/document/d/1dNw2J1yLOqAsQIIBgw08qNHPZRJ1mumN82dDLesrX6Y/edit

Visit this website to explore how seeds are dispersed. (One way to utilize this website, would be to make small groups of students and have them investigate one of the examples/pictures of seeds being dispersed and share their ideas.)
https://www.britannica.com/list/falling-far-from-the-tree-7-brilliant-ways-seeds-and-fruits-are-dispersed