

4 Fully Integrated STEM Units

STEM PLANS

Lessons & Activities



SCROLL
to take a look inside!

4 UNITS INCLUDED WITH SCOPE AND SEQUENCE



4 Weeks



5 Weeks



6 Weeks

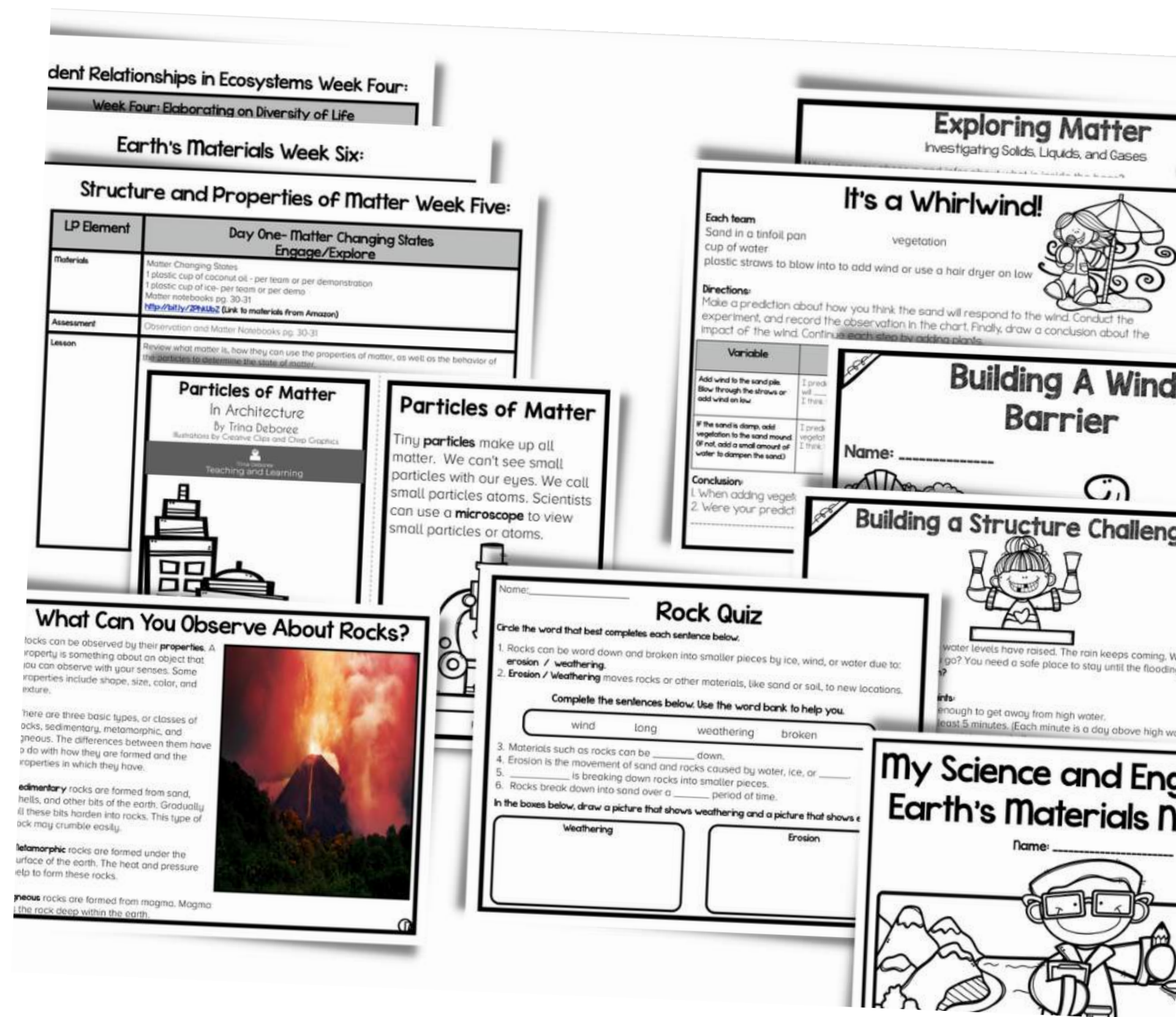


5 Weeks

**List of Materials Included for Each Unit
Simple Materials Needed (Most you will have on hand)**

INTEGRATED DONE FOR YOU STEM LESSON PLANS

- ♥ Integrates Reading, Science, Technology, Engineering, and Math
- ♥ **95** Lesson Plans
- ♥ **16** Science Explorations
- ♥ **10** STEM Challenges
- ♥ **27** Original Nonfiction Text
- ♥ **5** Assessments
- ♥ **4** Student Notebooks



Take a closer Look!

Lesson Plans



Structure and Properties of Matter Week Five:

LP Element	Day One- Matter Changing States Engage/Explore
Materials	Matter Changing States 1 plastic cup of coconut oil - Materials listed 1 plastic cup of ice- per team Matter notebooks pg. 30-31 http://bit.ly/2PhkUbZ (Link to materials from Amazon)
Assessment	Observation and Matter Notebook pg. 30-31 Assessment Included
Lesson	Review what matter is, how the particles to determine the Lesson background provided for teacher {Students have been building upon their understanding of matter by describing including the concepts to describe certain matter. A good review is this time, a Review EQs. Are effect state. Tell student materials might one another effects the changes of matter. Use your materials monitor to gather supplies. Tell them to carry the cups by themselves. They want them to grasp the cups and allow their body heat to warm the coconut oil. Next allow students to observe with their eyes the substance. Fill in the chart or what they see, write what they see, and fill in the state of matter.

Structure and Properties of Matter Week Five:

LP Element	Day One- Matter Changing States pg. 30-31
Lesson	Next, heat up the substance. You may wish to do this with a microwave in a demo or you may wish to allow students to actually do it! But it is messy. You will want to have them record the observations. Have each team to hold the substance the observations have been recorded. Finally, allow students to cool the substance. Students should see the solid of the substance melt quickly. It takes a little more time to cool. Finally, as a final review: Allow students to share results. Discuss how temperature impacts the physical properties of matter. Physical changes in matter changes but it does NOT change the identity of the matter. Physical changes matter remains the same. And review EQs.

Lesson Contains:

- Essential Questions
- 5 E Model
- High Engagement Strategy
- Final Review



16 Critical Thinking Science Explorations Kids love them!

SAMPLE

Scientist, Engineer, or BOTH

Read the phrase carefully to determine if the phrase is true for a scientist, an engineer, or true for both a scientist AND an engineer.

The products are explanations.	Go through a process or system.	The products are solutions.
Make recommendations to others.	Determine which design best solves the problem.	Plan and carry out investigations.
Develop and use models.	Analyze and understand data.	Figure out how things work and find practical solutions.
Share information.	Ask questions.	
Use observation to find answers to questions we have.	Identify where the problems are coming from.	
Engage in arguments from evidence.	Use tools.	
	Use math.	

Elephants Toothpaste!

Investigating the Effects of a Chemical Reaction on Matter

First Observations	State of Matter	Prediction Before an adult pours in the yeast and water	Observations after all is mixed	State of Substance

What Are Science Tools?

A tool is something that helps us do what we need to do. Scientists use a variety of tools to do investigations. Tools are used for collecting data, taking measurements, and recording observations.

Match the tool to the correct explanation.

A magnet attracts and repels substances.	Eye wear that protects the eyes during a science experiment or investigation from hazardous or dangerous materials.	Used to collect liquid samples. It is smaller than a beaker. It is open at one end and closed at the other.
An open container that has a pouring lip. It measures volume or the amount that is being held.	Can be used to take small amounts of liquid and move them to another container.	Can be used to grow samples of fern being studied. It is used under the microscope.
An electronic tool that performs tasks by processing and storing information.	A tool that magnifies objects or makes objects look larger than they are. Can be held with one hand.	A tool that magnifies at a much higher power than a hand lens. It magnifies smaller objects or makes smaller objects larger.
A tool that can be used to heat a substance.	A tool that is used to measure distance and the length of an object. In science, we use the metric system for measuring.	A tool used to measure temperature. It measures the temperature of air and most liquids.

Help Your Teacher! AGAIN!

In front of you or you and your partner:
 Science Mat with 2 cups A and B
 2 stirrers
 2 eye droppers
 hand lens (to share or each)

In the middle of your team:
 1/2 cup of water
 1/4 cup of vinegar

Test: Unknown Mixture A and Unknown Mixture B

Test One: Rub the substance between your fingers. How does it feel? Record the texture.
Test Two: Use a hand lens to look more closely at the substance. Can you see crystals? Yes or No?
Test Three: Use an eye dropper to add 3 full droppers of water to the substance. Stir with a stick for 30 seconds. What happens? Record observations.
Test Four: Use an eye dropper to add 10 drops of vinegar to the substance and water mixture. Stir with a stick for 30 seconds. What happens? Record observations.

Test	Unknown Mixture A	Unknown Mixture B
Texture (feel)		
Crystals (y/n)		
What happens with water?		
Vinegar?		

I think Mixture A contains _____ and _____ because _____
 I think Mixture B contains _____ and _____ because _____

It's a Whirlwind!

Each team
 Sand in a tinfoil pan
 cup of water
 plastic straws to blow into to add wind or use a hair dryer on low

Directions:
 Make a prediction about how you think the sand will respond to the wind. Conduct the experiment, and record the observation in the chart. Finally, draw a conclusion about the impact of the wind. Continue each step by adding plants.

Variable	Prediction	Observe and Record
Add wind to the sand pile. Blow through the straws or add wind on low.	I predict that when I blow on the sand, the sand will _____ I think this because _____.	Draw what happened to the sand.
If the sand is damp, add vegetation to the sand mound (if not, add a small amount of water to dampen the sand).	I predict that when I blow on the wet sand and the vegetation, the sand will _____ I think this because _____.	Draw what happened to the wet sand and vegetation.

Conclusion:
 1. When adding vegetation to the sand dune, what happened? _____
 2. Were your predictions correct? _____ what did you learn? _____

Exploring Matter

Investigating Solids, Liquids, and Gases

What can you observe and infer about what is inside the bags?

Materials:
 • 3 treat bags (plastic, or felt bags work best) (with 3 balloons inside) labeled A, B, C
 • 3 plastic cups labeled A, B, C
 • Scissors

Steps:

Step One:
Gently squeeze bag A to feel what is inside. Record your answer in the table below.

Step Two:
Repeat Step One with bag B and bag C.

Step Three:
Infer from your observations whether the materials in each balloon is a solid, liquid, or a gas. Write your inferences in the table.

Step Four:
Place Cup A, Cup B, and Cup C in front of you.

Step Five:
Pull out the balloons from the bags. Cut off the top of each balloon and pour the materials in each balloon into the cup with the same label.

Step Six:
Observe the materials in each cup. Record your observations in the table.

Eyeballs in a Jar

Investigating the Movement of Solids and Liquids

What can you observe about the substances and marbles in three jars?

Mad Scientist Steve loves to play with eyeballs and brains. Steve observes the jars on the shelf. He wants to compare different jars so he will soon be able to have more than one eyeball and maybe a new brain! He also wants to know how things move, as he loves to watch things that are ooey and gooey.

Materials:
 • 3 jars with lids labeled A, B, C, each containing a marble.

Steps:

Step One:
Observe the liquid in jar A. Move the jar around in your hand. Record your observations in the table below.
Keep in mind: what happens to the liquid in the jar? How fast does it move? Does the liquid make a sound when you gently shake the jar? If it does, describe the sound.

Step Two:
Observe the marble in jar A. Record your observations in the table below.
Keep in mind: what happens to the marble when you move the jar? How fast does the marble move in the liquid?

Balloons and Matter

Investigating Solids, Liquids, and Gases

Balloon	Descriptive Words About what is inside (BEFORE opening it)	Predictions of what is inside: Solid, Liquid, or Gas	AFTER: Was your prediction correct? Yes or no	Observations AFTER you have opened the balloon
Balloon #1				
Balloon #2				
Balloon #3				
Balloon #4				
Balloon #5				

How Does Water Change on Earth?

In the middle of your team:
 1 cup of water of water with a plastic wrap lid
 1 ice cube
 2 paper towels
 Timer

Predict:
 Make a prediction about what you think will happen inside the cup with the ice cube on the lid.
 I think _____ because _____.

Observe:
 What do you notice about your cup during each 2-minute time frames? Write or draw your observations.

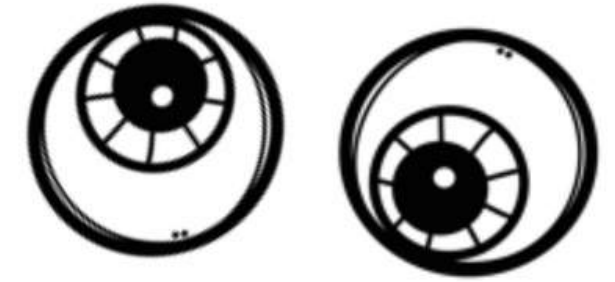
Time	My Observations
0 Min (Start)	
2 Minutes	
4 Minutes	
6 Minutes	

Close-Up Look at Investigation

Objective

Step Three:

Repeat Steps One and Two with the jar of brains (jar B).



ree:

Repeat Steps One and Two with jar C.

Relatable Scenario

Jar	Observations of Liquid/ or solid	Observations of Marble
(Liquid)		
B (Brains)		
(Liquid)		

Materials

Steps

Experiment

Observations

Reflection

“This is so incredibly thorough! I could not ask for better directions and information. It was easy to write plans with and each experiment is well thought out and clearly hits the mark. I will be purchasing more units in the future!”


↓ More

10 Open-Ended Critical Thinking STEM Challenges Using Simple Materials

SAMPLE

Building My Waterslide Challenge


Name: _____




Create a Pool

Challenge Criteria and Constraints:

- * Build a model of a swimming pool for at least 3 toy figurines.
- * Pool has to hold water for at least 10 minutes with **NO** leaks.
- * You have _____ minutes to complete your challenge.
- * You must work in a team of _____ person/people.
- * The water needs to be at least half-way up the sides of the pool.
- * You need a way for your toys to get into the pool from the ground.
- * Your pool needs room for at least 3 toy figurines to swim freely.
- * You may use as many or as few of the supplies as you would like to, but no additional items can be used.
- * At the end of the challenge, no one may be touching the pool, and it must hold water.



Building a Structure Challenge



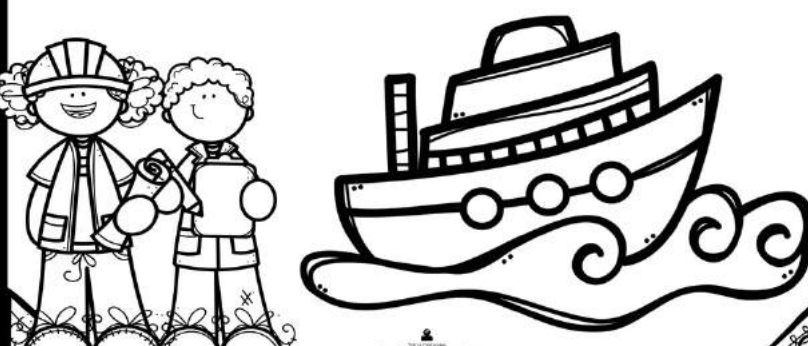
Problem:
It has been raining a lot. The water levels have raised. The rain keeps coming. What ever shall you do? Where will you go? You need a safe place to stay until the flooding stops.
How will you solve this problem?

Challenge Criteria and Constraints:

- * Build a structure that is tall enough to get away from high water.
- * Structure has to hold for at least 5 minutes. (Each minute is a day above high waters.)
- * You have _____ minutes to complete your challenge.
- * You must work in a team of _____ people.
- * The structure should be big enough to fit a family of 4. (4 toy figurines)
- * You need a way for your family to get up into the structure.
- * You may use as many or as few of the supplies as you would like to. Anything goes.
- * At the end of the challenge, no one may be holding the structure.


Building My Boat Challenge

Name: _____



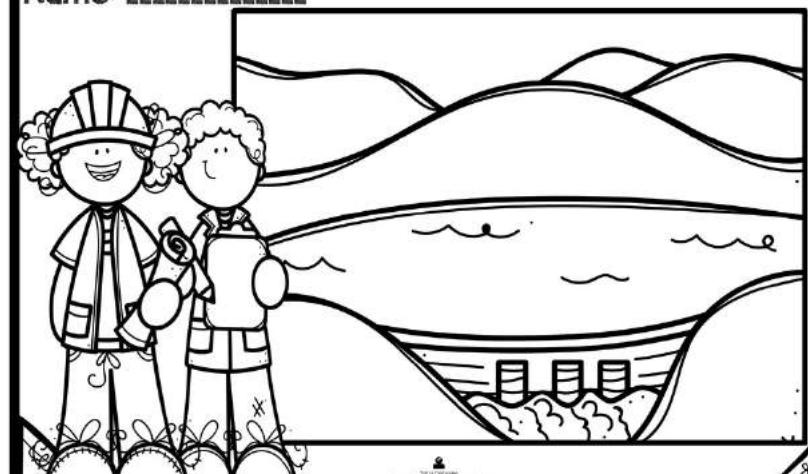
Building A Rock Slider

Name: _____



Building A Dam

Name: _____

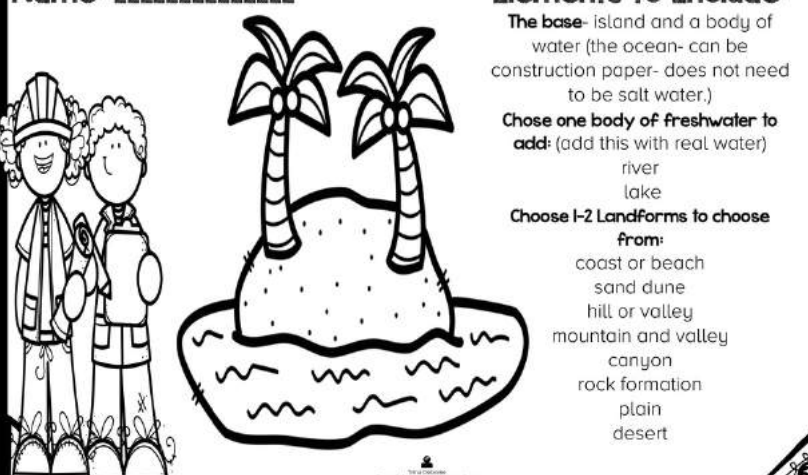


Building An Island

Name: _____


Elements to Include:

- The base-** island and a body of water (the ocean- does not need to be salt water.)
- Construction paper-** does not need to be salt water.)
- Chose one body of freshwater to add:** (add this with real water)
 - river
 - lake
- Choose 1-2 Landforms to choose from:**
 - coast or beach
 - sand dune
 - hill or valley
 - mountain and valley
 - canyon
 - rock formation
 - plain
 - desert



Reflect Upon and Improve My Solution

All About My Pollinator



The Problem My Pollinator Solved	How Did It Go?


Ask My Questions

Engineers and scientists ask lots of questions. They also try to answer questions. Think about your problem. Now think like a scientist and an engineer.

1. What pollinators did you see in the video clip?

2. How did the pollinators get from one flower to another?

3. Why were these animals visiting the flowers?



Close-Up Look at STEM Challenge

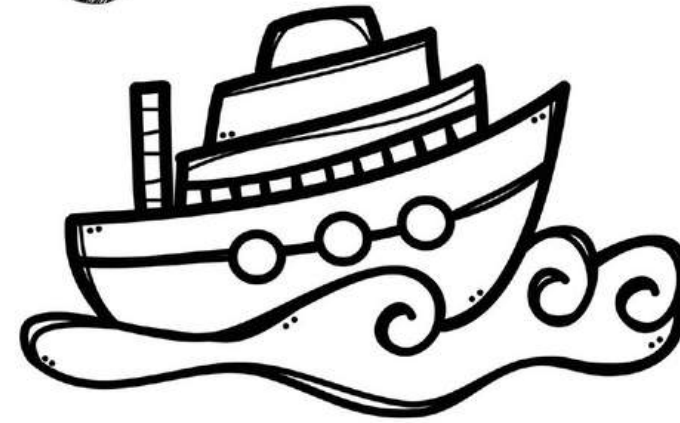
Problem

Challenge Criteria
& Constraints

Think Sheets

Work Through
Engineering Design
Process

Building a Boat Challenge



Problem:

You are stranded on a desert island. You are running out of food on your island. You need to get yourself and 5 other people across a large body of water (with sharks) to another island with more food. **How will you solve this problem?**

Challenge Criteria and Constraints:

- * Build a model of a boat for at least 5 toy figurines.
- * Boat has to hold float for at least 10 minutes with **no** sinking.
- * You have ____ minutes to complete your challenge.
- * You must work in a team of ____ people.
- * The water needs to hold weight and stay afloat.
- * Your boat must be made of household items.
- * You may use any household items that can be used in a boat.
- * At the end of the challenge, the boat must be able to float in water.

“Wonderful resource! Highly engaging.”
~ Stacey M.

Teaching and Learning

↓ More


Use parts of your Reading Block to cover nonfiction. Steal back your time!

SAMPLE

How Do Plants Grow?

By Trina DeBoree
Illustrations by Creative Clips

Trina DeBoree
Teaching and Learning



What is a Plant?

A plant is a living thing. It stays in one place. Plants grow and change, just like all living things.


All plants have the same basic needs. Plants need air, water, and sunlight. The sunlight is used for energy.

How Does a Plant Begin?

Plants depend on their habitats to provide resources they need to grow. If plants have what they need, they will develop through a life cycle.

Page 1

What Are Different Types of Habitats?






Water covers most of the Earth. Some plants and animals live in the water. Some of the water is salt water, like in the **ocean**. The ocean is home to many types of fish like dolphins and sharks, as well as **mammals**, animals that give birth to live young, like whales. Other kinds of plants and animals live in fresh water. Some **freshwater** animals include alligators and crocodiles.

Some kinds of plants and animals can never live in the water. They live on land. There are different kinds of land habitats. Some examples are **prairies**, **deserts**, and **forests**.

The desert is a habitat that gets very little rain fall. The animals and plants that live in the desert can survive without water for long periods of time.

4

How Can Farmers Reduce Soil Erosion?

Contour Planting	Terrace Farming	Wind Breaks
The best way to control erosion is to make sure the soil is covered by vegetation. The problem comes when farmers clear the land and plant crops in rows.	Water erosion can destroy topsoil making it difficult for plants to grow. One solution farms have to help prevent plants from being destroyed by erosion is to plant plants on the terrace.	Wind erosion can cause freshly plowed soil to blow away. Farmers have found solutions to lessen the effects of soil erosion caused by wind. One solution is to grow trees along the edges of freshly plowed fields. The rows of trees act as a barrier, protecting the land from fast blowing winds. The barrier of trees slows the effects of wind on the soil.
Farmers have found a way to help prevent erosion and still plant their crops in rows. They do this by shaping the rows the same way the land is shaped rather than in rows straight up and down. Contour planting helps keep the crops from being washed away by the rain.	Terraces, or steps, are built into the side of a large hill, and crops are planted on each level of the terrace. Planting on a terrace slows the flow of water and prevents the water from rushing quickly down the hill and washing away the soil.	
		

What Can You Observe About Rocks?


Rocks can be observed by their **properties**. A property is something about an object that you can observe with your senses. Some properties include shape, size, color, and texture.

There are three basic types, or classes of rocks, sedimentary, metamorphic, and igneous. The differences between them have to do with how they are formed and the properties in which they have.

Sedimentary rocks are formed from sand, shells, and other bits of the earth. Gradually all these bits harden into rocks. This type of rock may crumble easily.

Metamorphic rocks are formed under the surface of the earth. The heat and pressure help to form these rocks.

Igneous rocks are formed from magma. Magma is the rock deep within the earth.

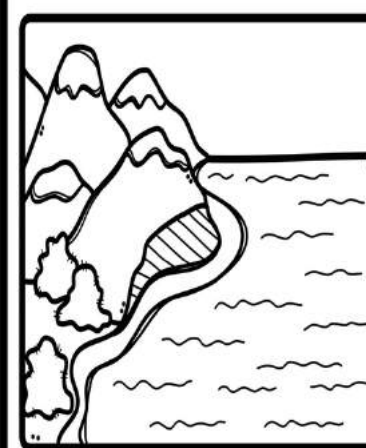


17

Earth's Materials

By Trina DeBoree
Illustrations by Creative Clips

Trina DeBoree
Teaching and Learning



Earth's Materials

Earth is made up of three important natural materials, such as **water**, **air**, and **land**. These materials help support the life of plants and animals on Earth.

We can learn history about our world from the materials on Earth. The materials tell a story through the changes we **observe** to the land. Volcanoes or earthquakes cause some of the changes we see on Earth. They can happen quickly.


Some changes occur over a long period of time. Water, wind, and rain can cause changes to land to happen over time.

Page 1

How Does Temperature Impact the States of Matter?

Physical Changes in Matter
By Trina DeBoree
Illustrations by Creative Clips


Trina DeBoree
Teaching and Learning



How Does Matter Change?

What do steam, water, and ice have in common? They are all water! How can that be possible? Well, water and other types of matter are able to change states. They can become solids, liquids, or gases.

Matter can come in different forms. Solids, liquids, and gases are forms of matter.



Page 1

How Can You Observe and Measure Properties of Matter?


Matter can be observed and measured by its properties. **Properties** are something about an object that you can observe with your **senses**.

There are many properties that you can observe. Some of the properties that you can observe are **texture** (how something feels), whether an object sinks or floats, the color, and the shape.

Measuring properties includes size or length, the weight, **volume** (how much space matter takes up), and **temperature** (how hot or cold something is). These properties need some tool in which to measure.

Questions:

1. What does the word volume mean? _____
2. What text evidence supports the idea that the properties of matter can be observed and measured? _____
3. Why did the author most likely write "How Can You Observe and Measure Properties of Matter?" _____



23

What is the Engineering Design Process?

The engineer design process is steps that an engineer follows to come up with a **solution** to a **problem**. Many times the solution involves designing a small copy of something, or a **model** that meets specific rules and accomplishes a task.

The Engineering Design Process Includes:

1. Asking questions to define the problem
2. Imagining (Brainstorming time! Sometimes imagining requires a little more research or further **investigation**.)
3. Planning (After brainstorming ideas, it is time to pick a solution you might like to explore. Think about how the solution might work and the materials you need to build it.)
4. Design/Create (Follow your plan and make your **invention**. You may need to make changes to it as you go along.)
5. Improve (Think about how you can make things better and what you need to make improvements.)

How Do You Think Like an Engineer?

Asking questions, imagining the possibilities about problems, planning how to tackle issues, building and creating solutions and improving upon ideas is thinking like an engineer. You do this more than you know!

Another way engineers think is by working with others. Working on a team allows every person to offer new information and this leads to even better ideas and solutions.

24

What is Scientific Inquiry?

Scientific inquiry is a process of science. This process includes:

1. Formulating questions that can be investigated. For example, why do bears sleep in caves?
2. Constructing investigations to answer the questions asked.
3. Gathering data or information to answer the questions.
4. Evaluating (or understanding) the data that was taken.
5. Communicating the evaluation (or the results).

How Do You Think Like a Scientist?

Thinking like a scientist requires being able to ask questions and being able to defend your thinking. Scientific argumentation is an important part of the scientific inquiry or thinking like a scientist. Defending your thinking brings validation (proving something is based on truth or facts) to the scientific knowledge you are presenting.

Scientists require creativity in their thinking about methods and processes, as well as in their questions and explanations. There are many different ways to do things, but it is important that you can tell why and how to come up with your questions and your solutions.

25

Close-Up Look at Nonfiction

Informational

Nonfiction Reading Standards

Questions

Student Thinking Required

How Can You Observe and Measure Properties of Matter?

_____ can be observed and measured by its properties. **Properties** are something about an object that you can observe with your **senses**.

There are many properties that you can observe. Some of the properties you can observe are **texture** (how something feels), whether an object floats, the color, and the shape.

Measuring properties includes size or length, the weight, **volume** (how much space matter takes up), and **temperature** (how hot or cold something is). These properties need some tool in which to measure.

Questions:

1. What does the word volume mean? _____

2. What text evidence supports the idea that the properties of matter can be observed and measured? _____

3. Why did the author most likely write "How Can You Observe and Measure Properties of Matter?" _____




↓ More

5 Assessments Included

Formative assessment inside student notebooks.

What is Science and Engineering Safety?

It is very important to be safe in science and while building and designing. You can stay safe by following safety rules and using the correct tools to do the job. You should always listen closely to the directions. Be sure to pay attention to what you are doing. Most importantly **protect** yourself. Sometimes you will use tools like gloves, aprons, or goggles to protect yourself during science and engineering. These tools keep you clean and safe.



Questions:

1. Why is it important to have safety rules?

2. What does the word protect mean?

3. Why does an author use bold print?

24

Summative assessment included.

Interdependent Relationships in Ecosystems

Name: _____

1. A seed will not begin to grow without _____.
a. sunlight
b. water
c. soil
d. flov

2-LS2-1

2. Which charact
a. thic
b. gills
c. scal
d. sha

2-LS2-1

3. A scientist corr
following might s
a. the
b. the
c. the
d. the

2-LS4-1

Interdependent Relationships in Ecosystems

Name: _____

1. A seed will not begin to grow without _____.
a. sunlight
 b. water
c. soil
d. flowers

2-LS2-1

2. Which characteristic is common for animals that live in the desert?
a. thick hair
b. gills
 c. scaly skin
d. shallow roots

2-LS4-1

3. A scientist compares a desert plant and a grassland plant. Which of the following might she notice?
 a. the seed of the desert plant needs less water to grow.
b. the desert plant has larger leaves than the grassland plant.
c. the grassland plant has flowers and the desert plant does not.
d. the desert plant has roots and grassland plant does not.

2-LS4-1

Page 1

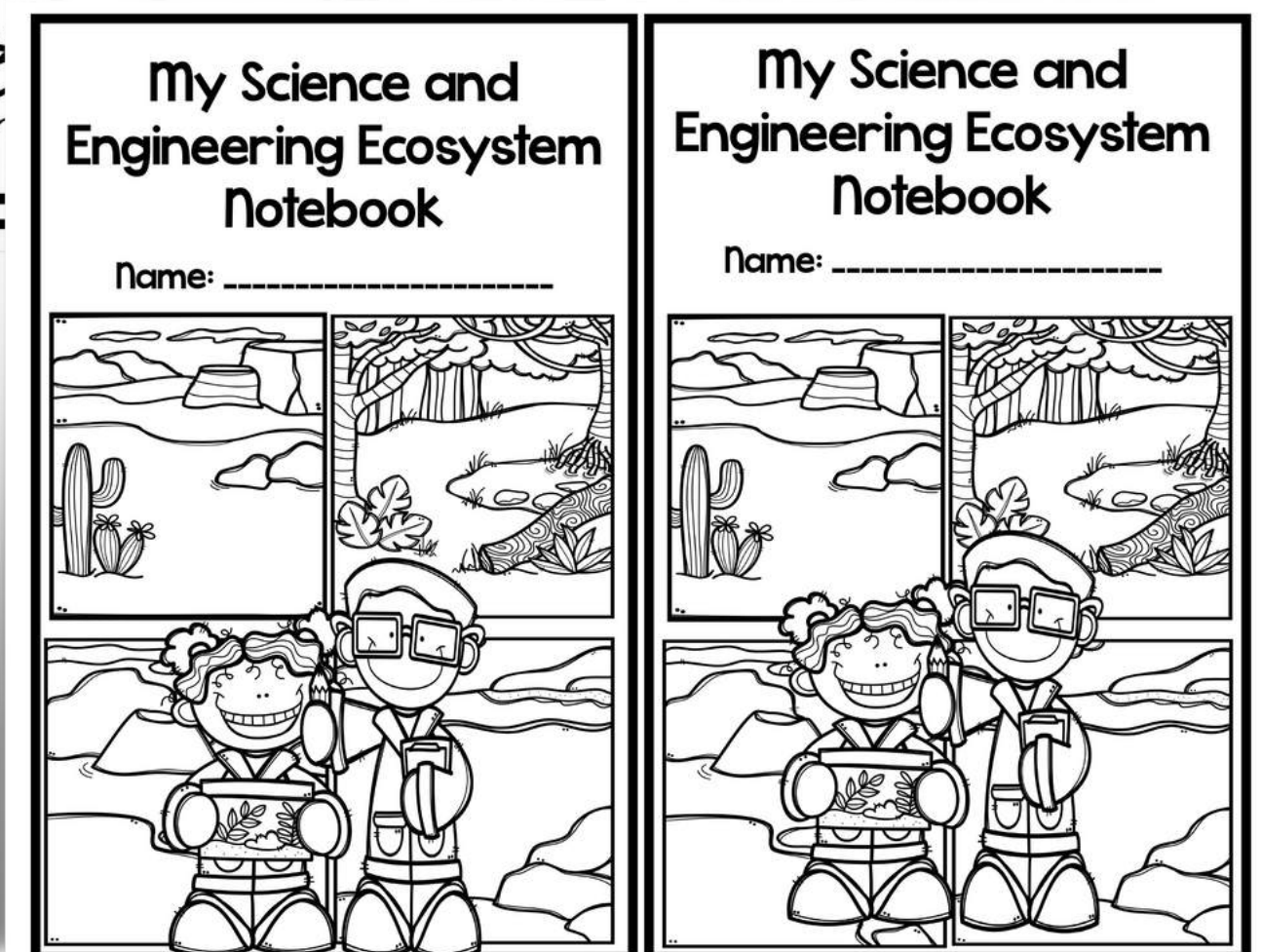
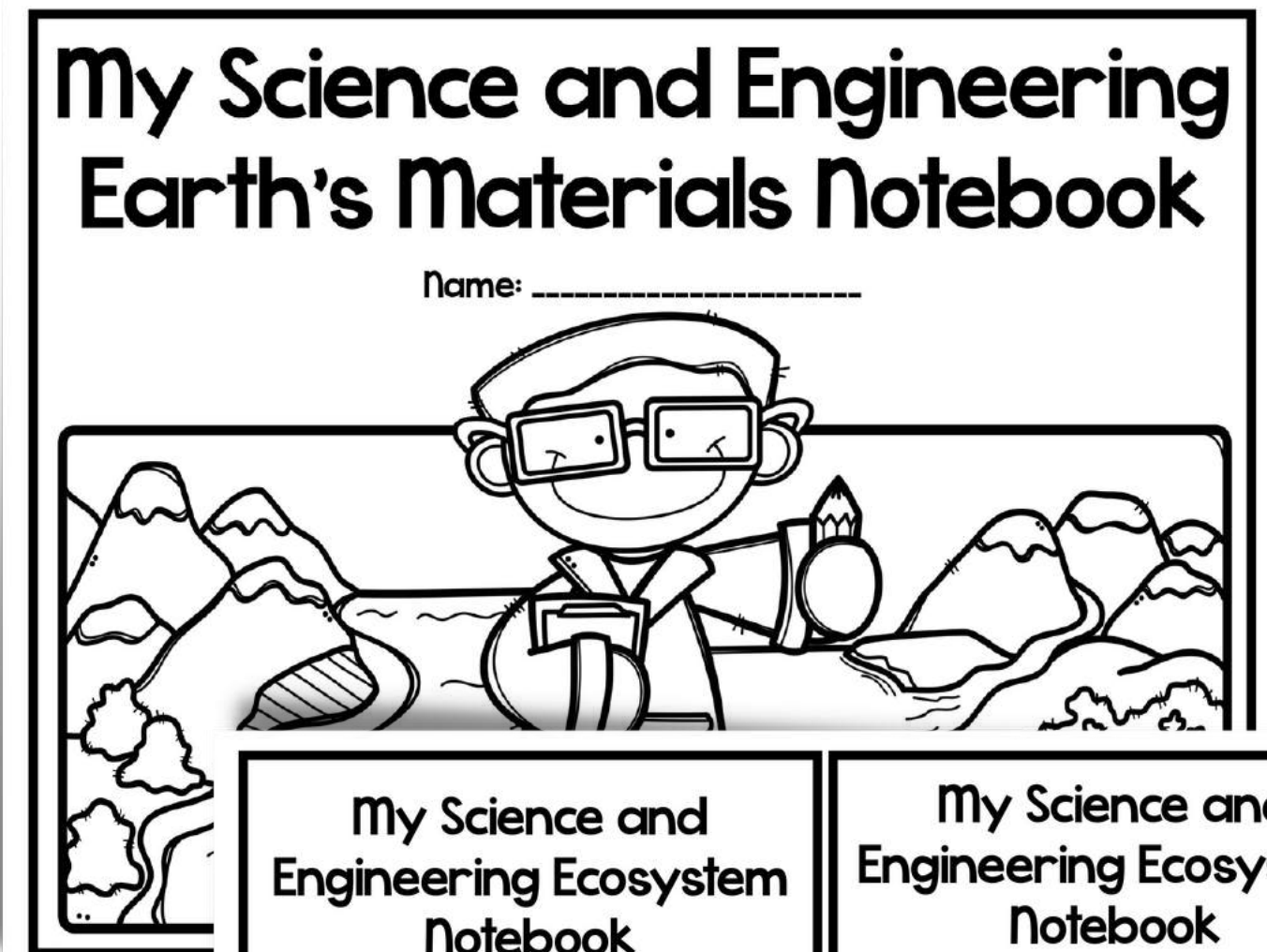
Lots of options inside each notebook.

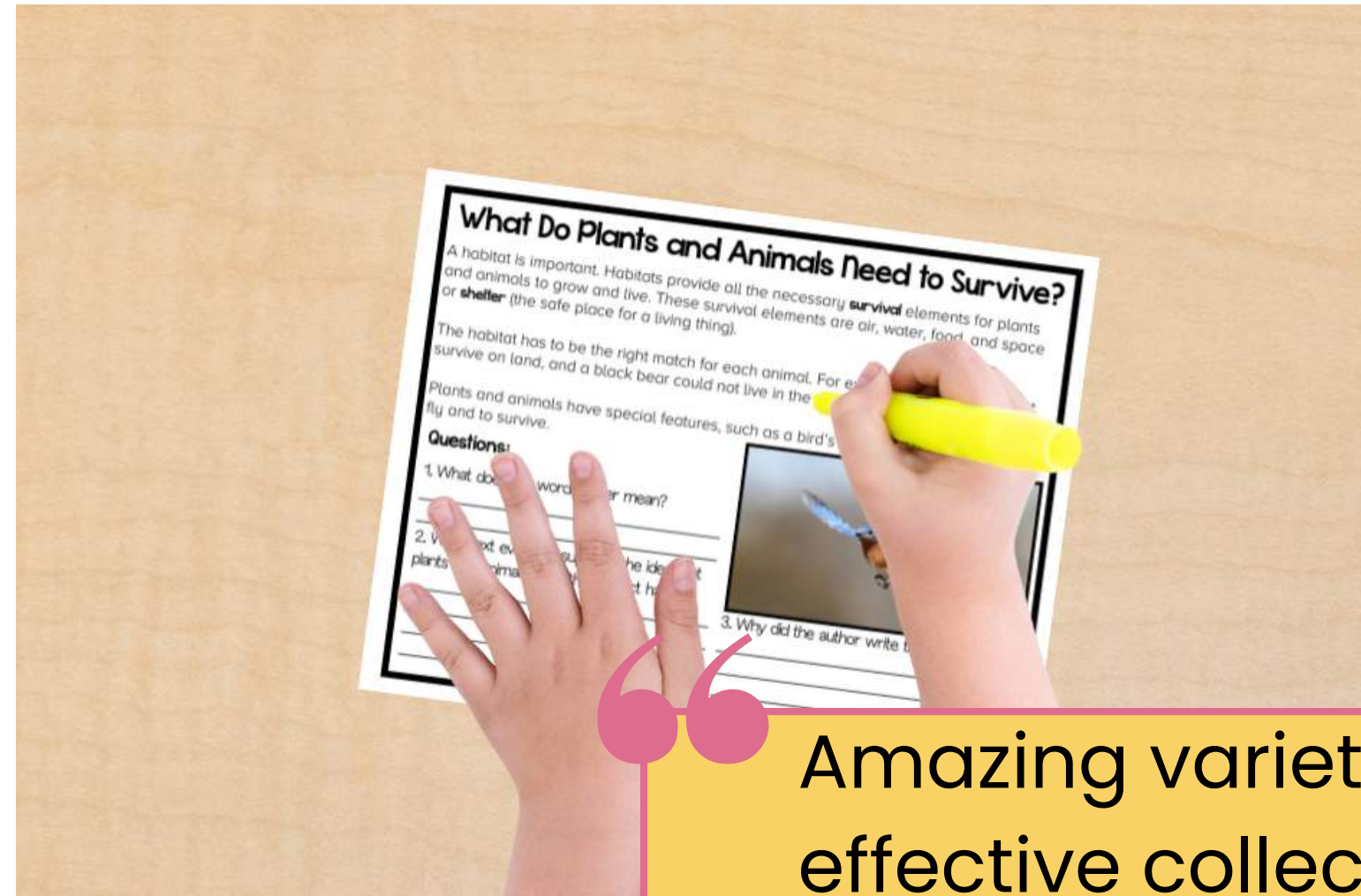
With Answer Keys

4 Student Notebooks

- Each student notebook contains student sheets, reading materials, and more inside of the notebook.
- 2 Print options available per notebook.

“Love the activities! It includes A LOT! I was sad to not be able to get to all of it, it takes a lot of time but very engaging and science-based. ~Cathryn A.”





“ I love this resource! It's very well set up, and it is very engaging! Great resource! ~Nicole N. ”

“ Amazing variety and simple and effective collection of resources! I can't wait to use them all! ~Sandra T. ”

“ Wonderful resource, just what I was looking for for STEAM! ~Renea W. ”

