

Let Learning Grow With
**STEM, Books,
and Agriculture**

Presented By: Lee Deal



INTRODUCTION

Intro

Illinois AITC

Lessons + Ag Mags + Presentations + Resources



90 County-Level Coordinators



200,000+ Illinois Students



WHAT IS STE(A)M?

Science Technology Engineering (Art) Math

STEM is a philosophy of education with an interdisciplinary approach that combines academic concepts with real life skills. It embraces teaching skills and subjects in a way that resembles real life. This also shows how each subject compliment and support each other.

Project & Inquiry Based

This challenges students to critically think, empowers them to use their creativity, and encourages them to think outside of the box. All of this contributes to students identifying and trying to solve real-world problems. It allows them to take initiative and find purpose in education and their work.

While STEM is focused on designing, engineering, and testing, it is more importantly about inventing ways/things to improve what we have in the present. What do we have now and how can we make this better/more efficient/more effective.

Question

Starting With a Phenomenon

SCIENTIFIC INQUIRY

Materials:

Control:

Variables:

Phenomenon:

What do you already know about this phenomenon?

Write 3 questions that will help you learn more about the phenomenon.

STOP Before you move on, you want to make sure you know exactly what you're investigating! Choose 1 question you hope to answer through your investigation and circle it!

Brainstorm Box: What type of experiment could you design to answer your question?

Use the blank space below to record observations and data!

Did your experiment help answer your question? Explain, using evidence as support!

What was the most challenging part of this activity?

Starting With a Problem or Challenge

STEM: STUDENT WORKSHEET

Everything man-made around you, from the desks to the building to the computers, was designed and constructed for a purpose. There was a need or a problem and through science, technology, engineering, art, and math, the problem was solved! Use this worksheet to help guide you as you solve a problem or complete a challenge!

Problem or Challenge:

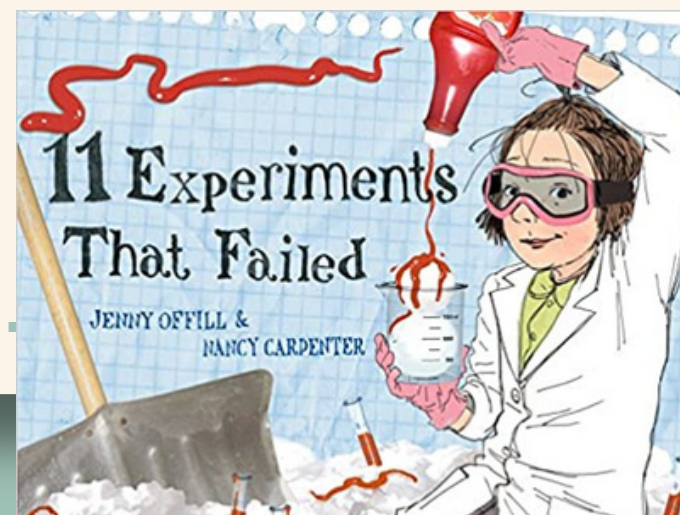
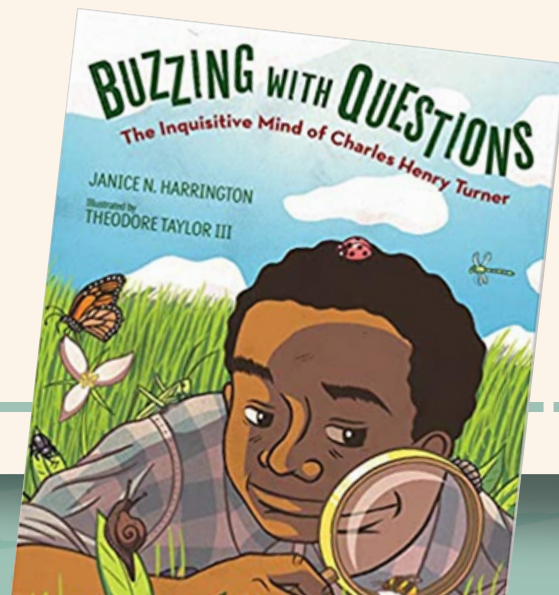
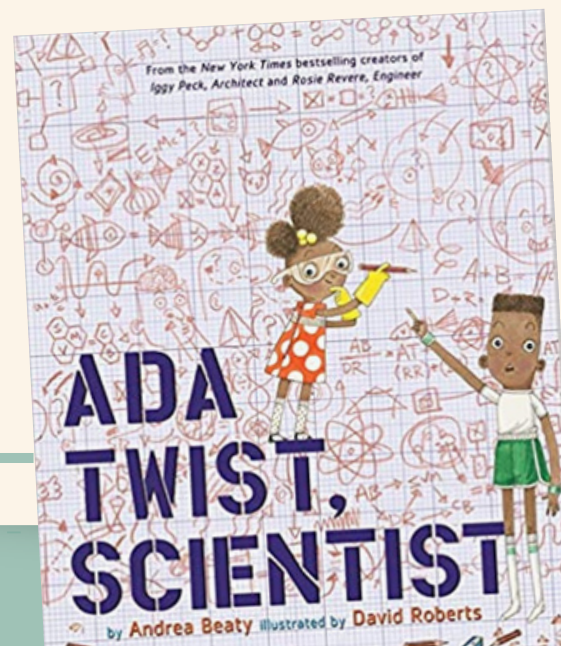
Materials:

Write 3 questions that might come up through this process:

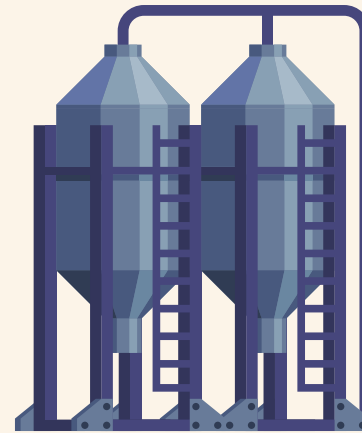
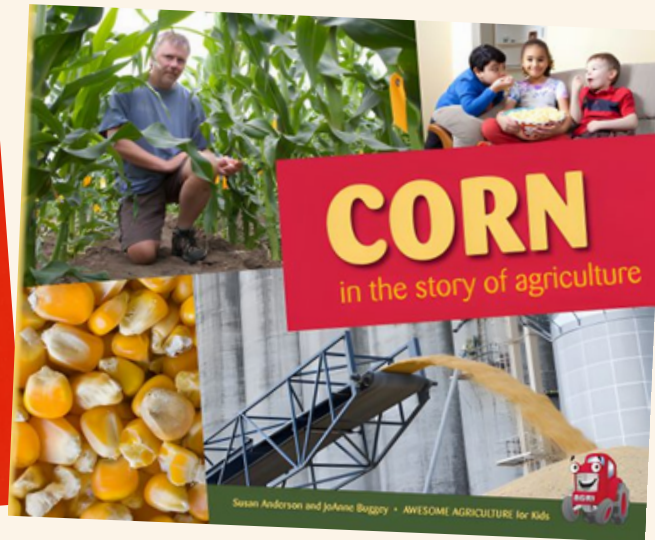
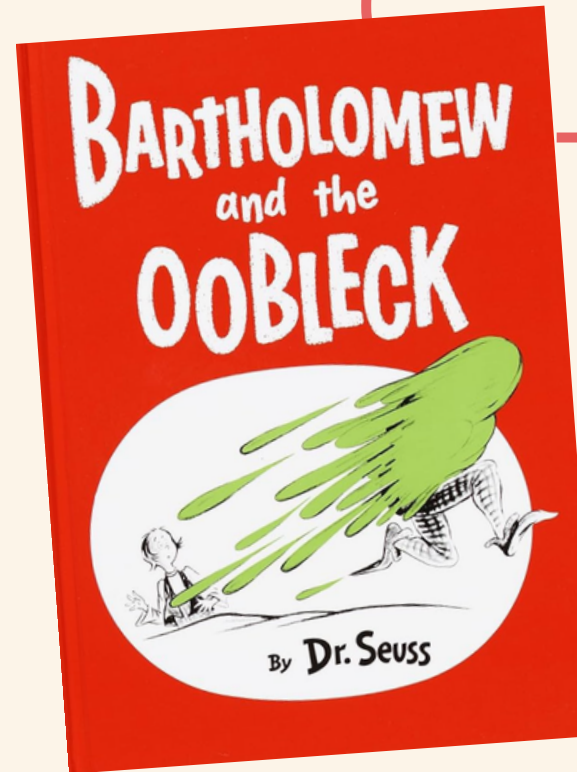
This is your **blueprint box!** Engineers, architects, and so many more professionals draw their design and revise it many times before constructing a model. Make sure you label your design!

Record your data in the box below. Include a labeled drawing or graph!

The space below is for your reflection. Did you have to revise your design once you started building? What other materials would have made your design better or more effective?



Oobleck



Chapter 1

Newcastle University

Non-Newtonian Fluids

A fluid that changes its properties when a stress or force is applied

cornflour + water = oobleck

no stress = liquid
stress = solid

Runnier when force applied

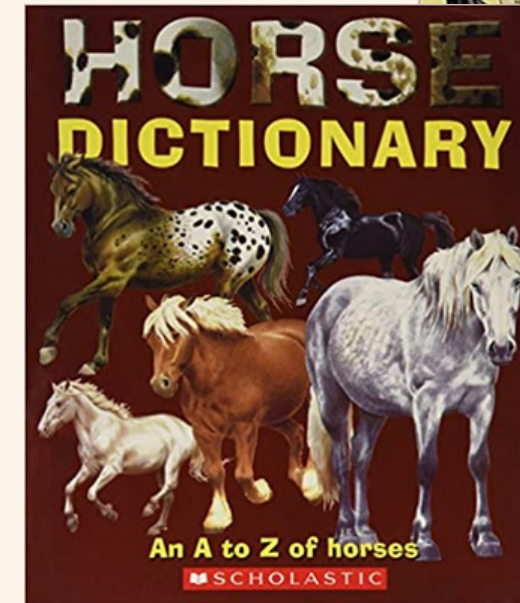
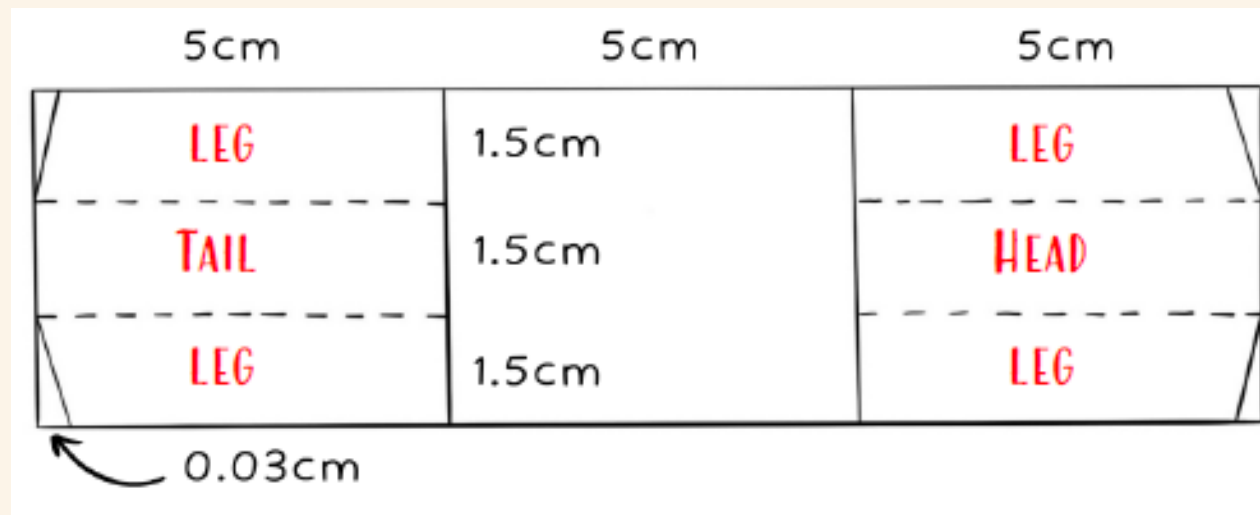
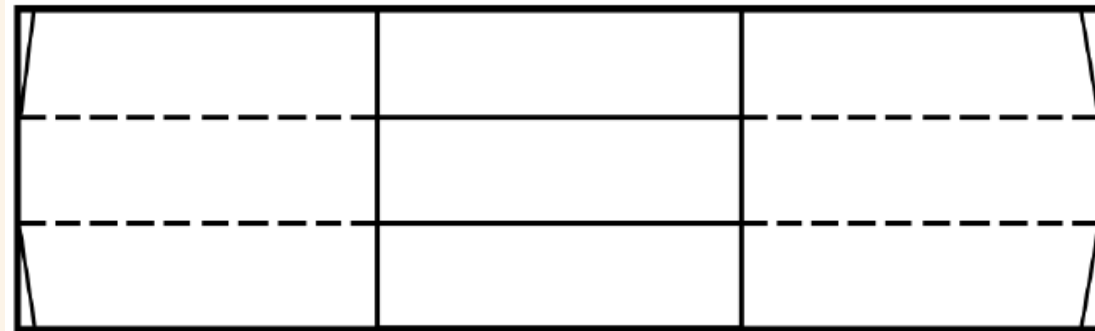
Thins with prolonged stress

CREAM → Prolonged stress → Whipped Cream

NON-NEWTONIAN LIQUIDS

 Asphalt	 Lava	 Molten Metal	 Ketchup
 Blood	 Sperm	 Toothpaste	 Paint
 Glue	 Corn flour and water	 Whipped Cream	 Gypsum paste

WALKING PAPER HORSE



Possible Concepts to Explore

- Force
- Gravity
- Friction
- Movement
- History
- Sports
- Measurements & Conversions
- Genetics & Animal Features
- Livestock & Raising Animals
- Changes Over Time

Horses "Zine"

A "HAND" SOME HORSE!
STUDENT WORKSHEET

Whether it's for selling and buying or studying and categorizing, measuring the height of a horse has been an important task in the horse, or equine, industry. Horses are measured from the withers (where the neck meets the back) all the way down to the ground. It doesn't take a lot of time now a days, but there used to be a time when rulers and measuring tapes did not exist and so people just used their hands. It turns out that our hands are not all the same size and so in the 1700s it was established that a "hand" measures 4 inches.

Let's put your math skills to the test and see if you can convert hands into feet and inches!

Directions: First look at the key and the example given to help you figure out how to convert the measurements. Then, use these as a guide as you convert the height measurements for the remaining horses!

KEY:
1 hand = 4 inches
1 foot = 12 inches

EXAMPLE:
SCOUT is 15 hands tall. How tall is he in feet and inches?
15 hands x 4 inches = 60 inches
60 inches / 12 inches = 5 feet tall
Scout is 5 feet and 0 inches tall.

BELLA
Bella is 11 hands tall. How tall is she in feet and inches?
Bella is _____ feet and _____ inches tall.

AGRICULTURE
For more great educational agriculture resources, visit: agintheclassroom.org

A "HAND" SOME HORSE!
STUDENT WORKSHEET

How tall is he in feet and inches?
_____ feet and _____ inches tall.

The diagram on the left shows the bottom of a horse's hoof.

How wide is this hoof?
_____ inches
_____ centimeters

Horses who will be walking long distances or will be walking on a hard surface need to wear "shoes" to protect their hooves! Horseshoes come in many different sizes but can be bent 1/2 in with a hammer.

Will this horseshoe fit the hoof above? (Circle one)
YES OR NO
Why or why not?

AGRICULTURE
For more great educational agriculture resources, visit: agintheclassroom.org

HORSES

NAME: _____

HORSING AROUND
There are more than 500 breeds of horses and ponies around the world. They are classified into four different groups by their size. The four categories are:

Miniature Horse less than 34 inches tall when fully grown	Pony less than 58 inches tall and under 800 pounds when fully grown
Lightweight Horse weigh less than 1,000 pounds when fully grown	Heavyweight Horse weigh more than 2,000 pounds when fully grown

Horses and ponies are all part of the same species and have the same family tree. But ponies are not horses -- they have different bone and muscle structures.

There are nearly 640,000 horse owners in Illinois with around 150,000 horses!

EQUIPMENT
Horses are professional athletes and their bodies are made of muscle and bone. They need to be taken care of properly to stay healthy and happy. This includes feeding them, grooming them, and exercising them. Horses also need to be protected from the elements and kept safe from predators. This is why horses need to wear protective gear like blankets, wraps, and boots. Horses also need to be protected from the elements and kept safe from predators. This is why horses need to wear protective gear like blankets, wraps, and boots.

NUTRITION
Horses eat fresh grass, hay (dried grass), barley, oats, flaked corn, dry sugar beets, and hay pellets. As a general rule, horses need about 2 percent of their body weight in food daily. This means a 1,000 pound horse needs 20 pounds of food every day.

Horses also need a lot of water. A single horse drinks 10-12 gallons of water every day.

SENTENCE FIX
Use correct capitalization and punctuation for each sentence.
1. horses are herbivores and eat plants
2. a foal is born

HOOFING THROUGH HISTORY
Horses have been around for millions of years. They were first domesticated, or tamed, in 4000 B.C. Scientists believe horses were tamed to help with hunting larger animals. Eventually, horses were used for transportation and help on the farm.

Before tractors, farmers used the power of horses to help them clear the land and plow the fields. This is because heavyweight horses were strong enough to pull heavy wagons and plows. A farmer would need to keep as many as 12 horses for farm labor.

Today, machinery and automobiles do most of these things. Technology has gotten so much better that we don't have to rely on horses as much anymore. Now, we can enjoy the company of horses through recreational activities like:

horseback riding equestrian events

SHOES
Horses don't wear shoes, do they?

TIMELINE TRIVIA
Help historians finish the timeline! Use the dates from the key to fill in the blanks in numerical order.

KEY 1840 2022 1945

4000 B.C. Horses first tamed

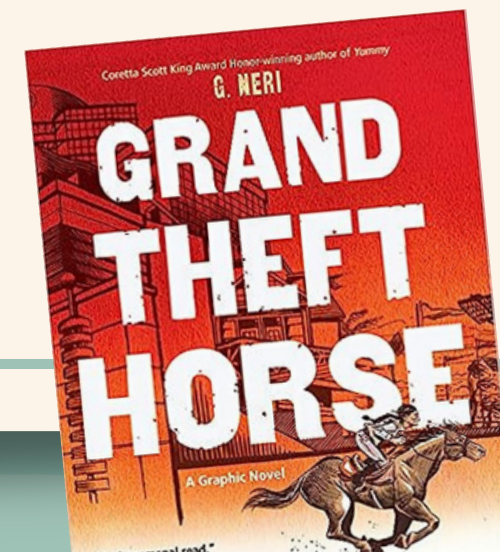
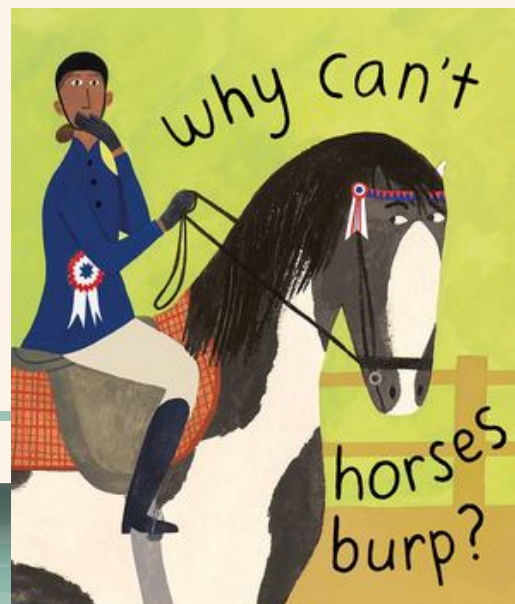
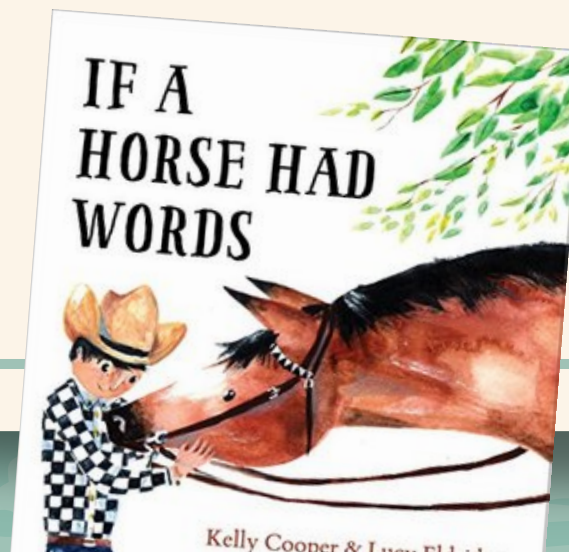
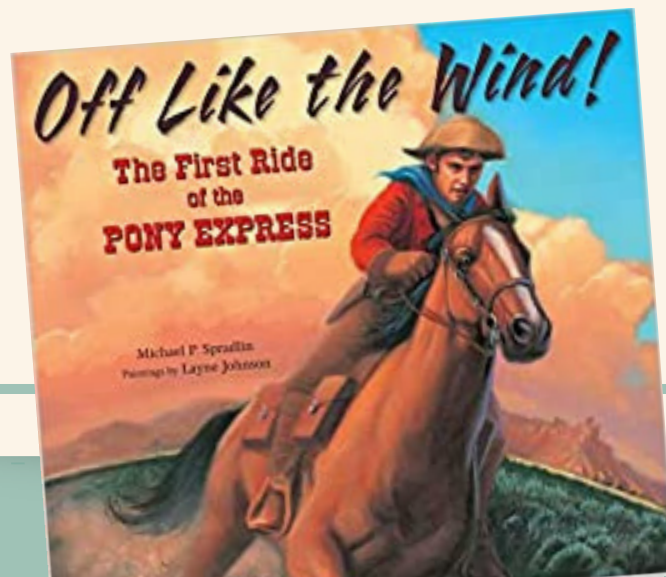
1875 Pony Express the first mail delivery system was created

1875 First Kentucky Derby horse race takes place

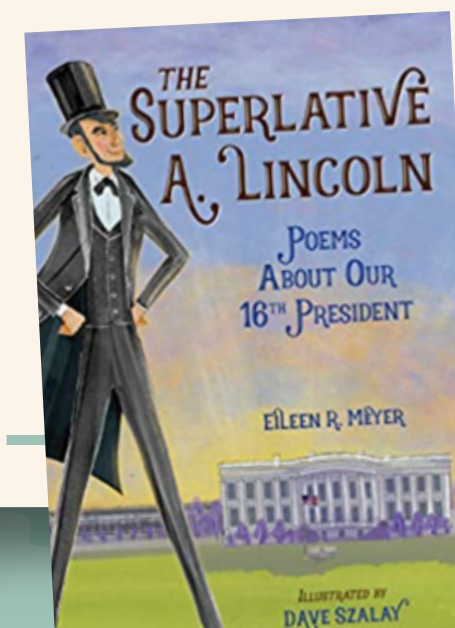
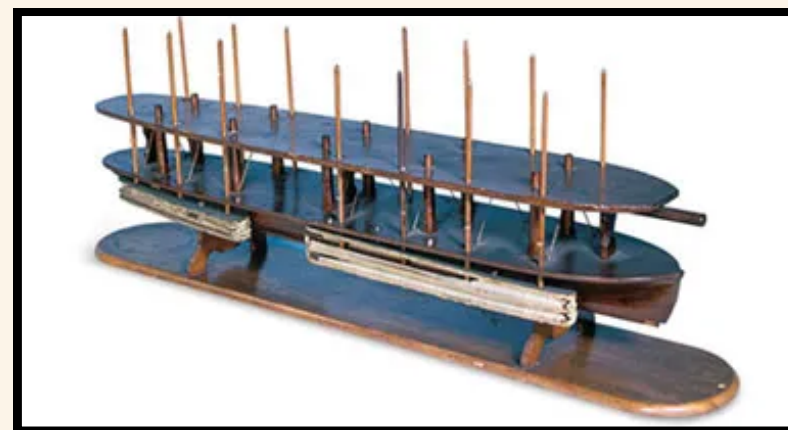
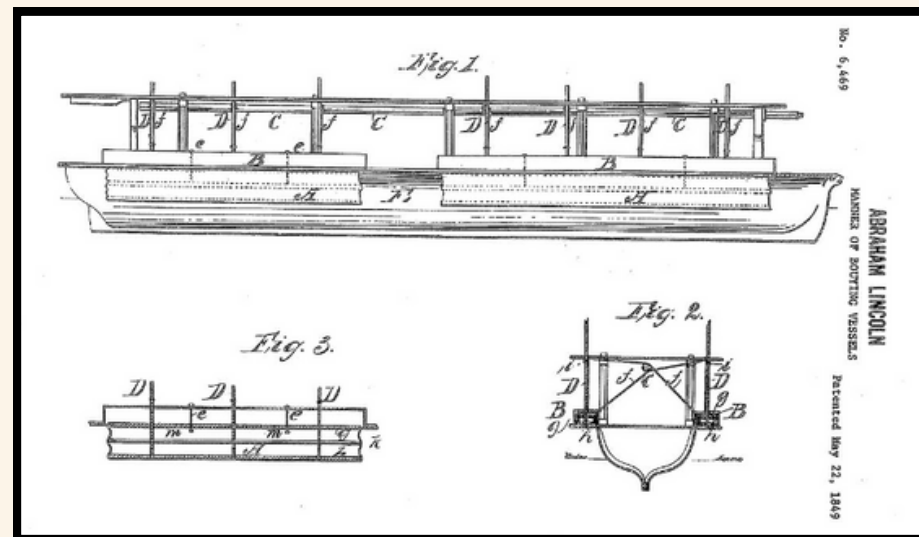
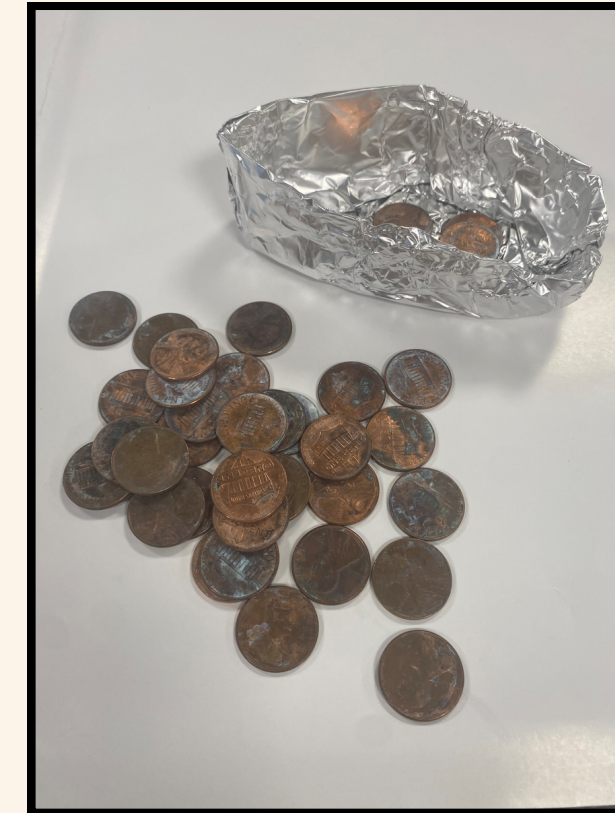
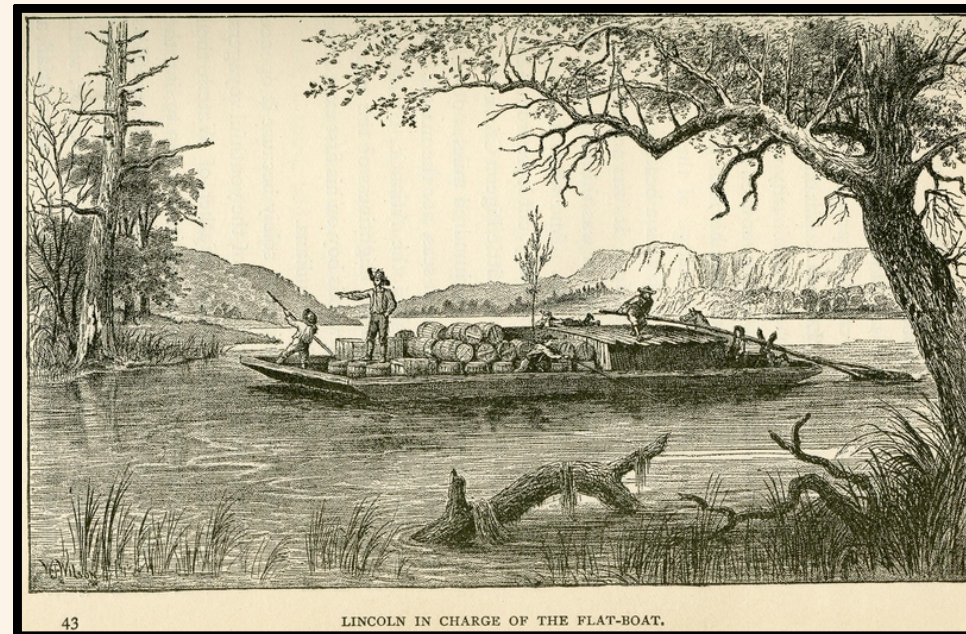
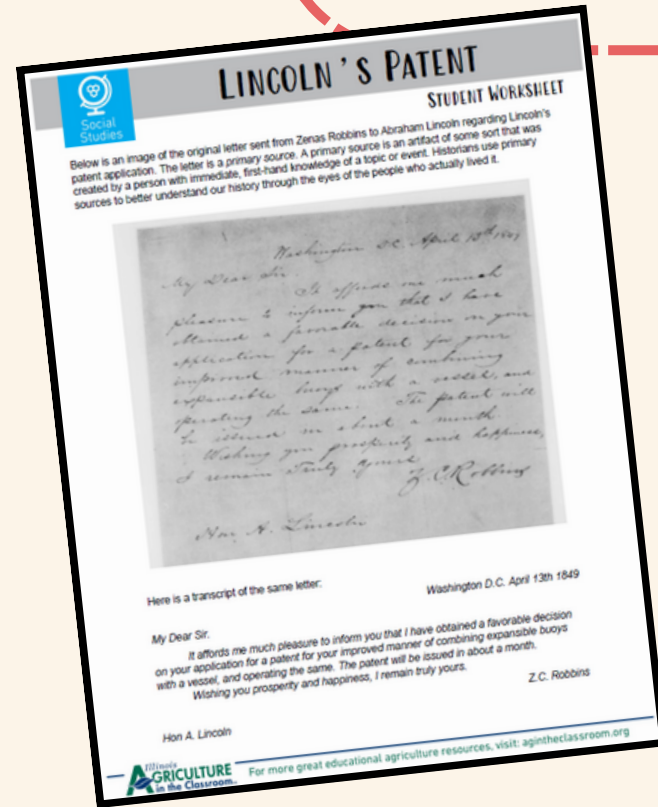
1945 Tractors replace horses on farms

2022 7.2 million horses in the United States

NAME: _____



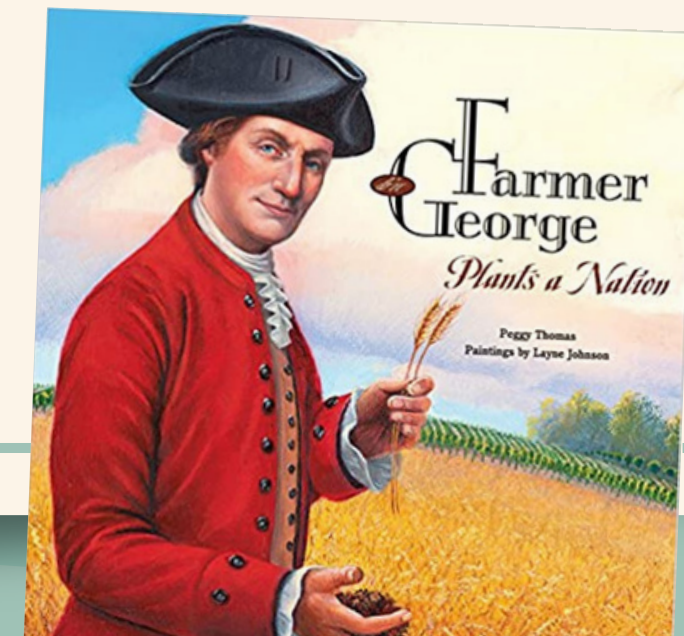
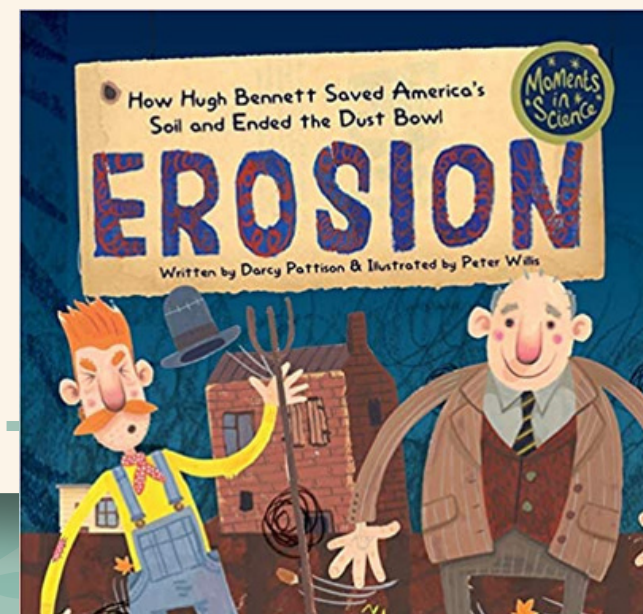
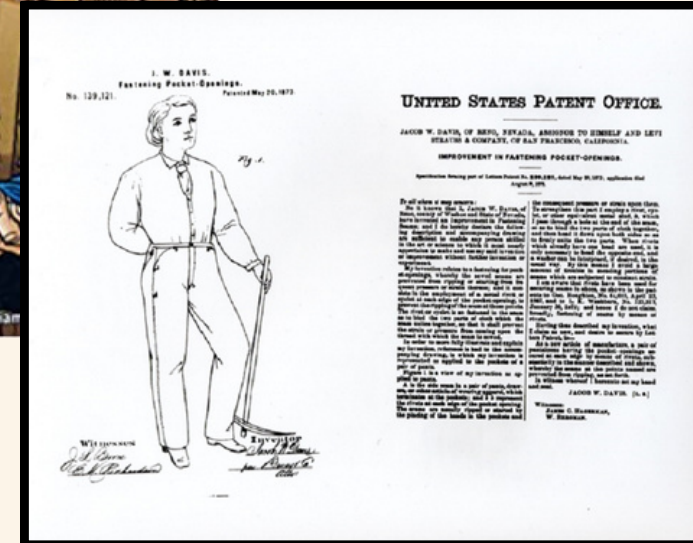
TIN FOIL FLATBOAT



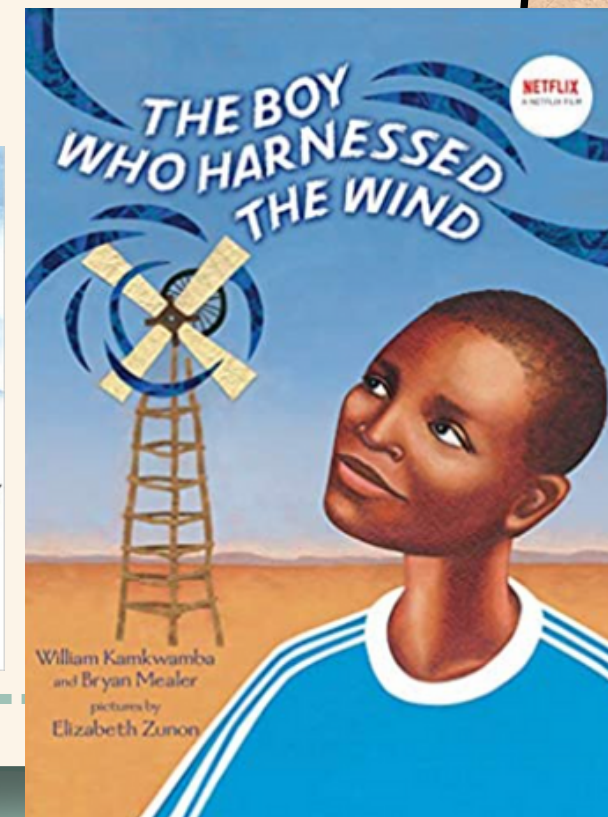
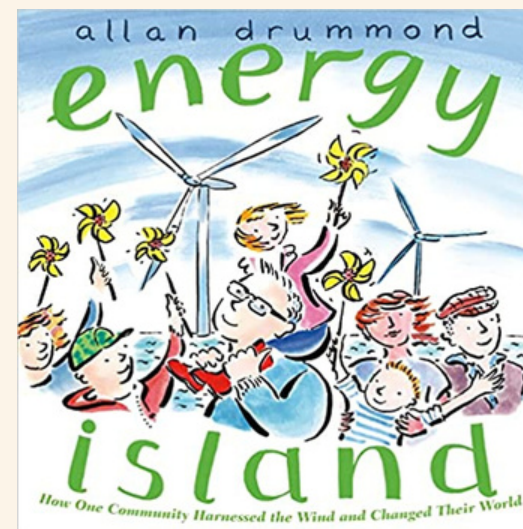
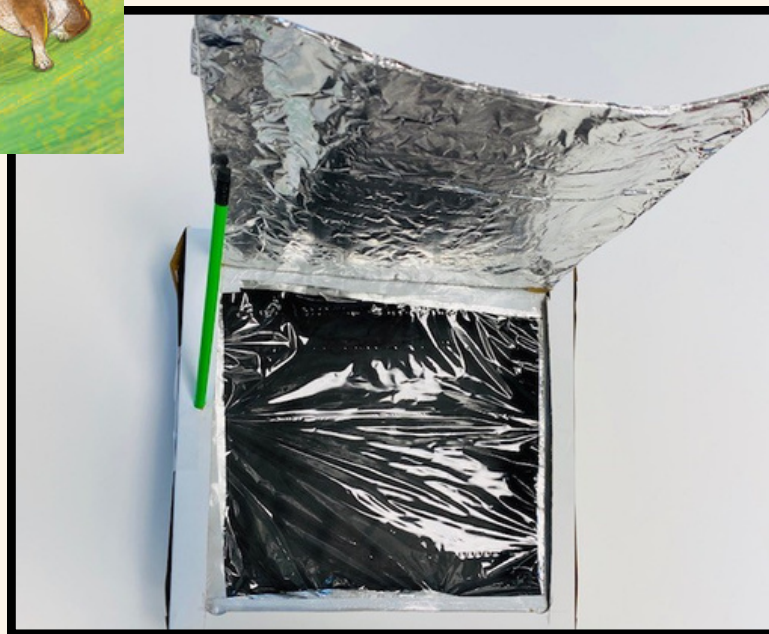
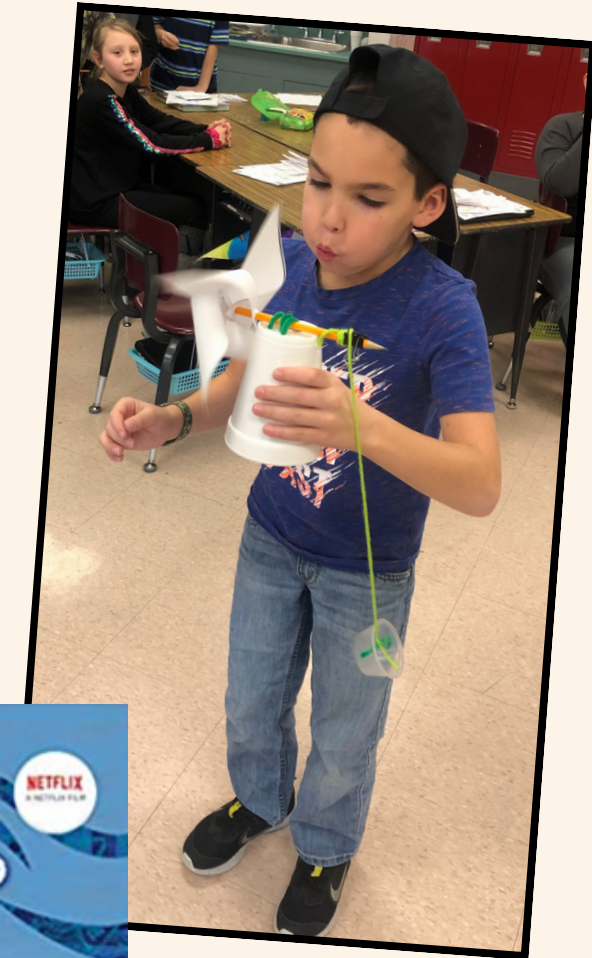
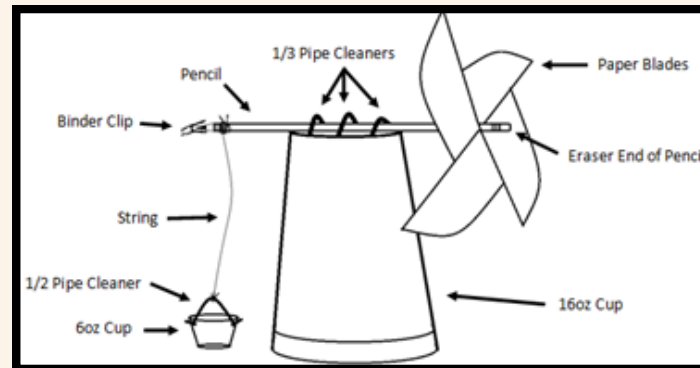
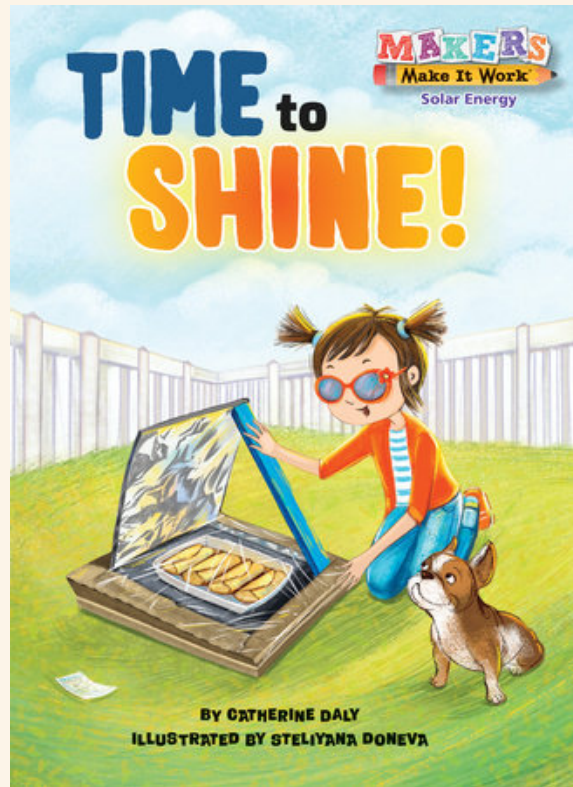
Chapter 3

Possible Concepts to Explore

- Primary and Secondary Sources
- Inventions
- Process of Patent for Inventions
- Supply Chain
- Transportation
- Soil Erosion
- Presidents – Their Impacts in Agriculture



SOLAR OVEN & A WINDY LIFT



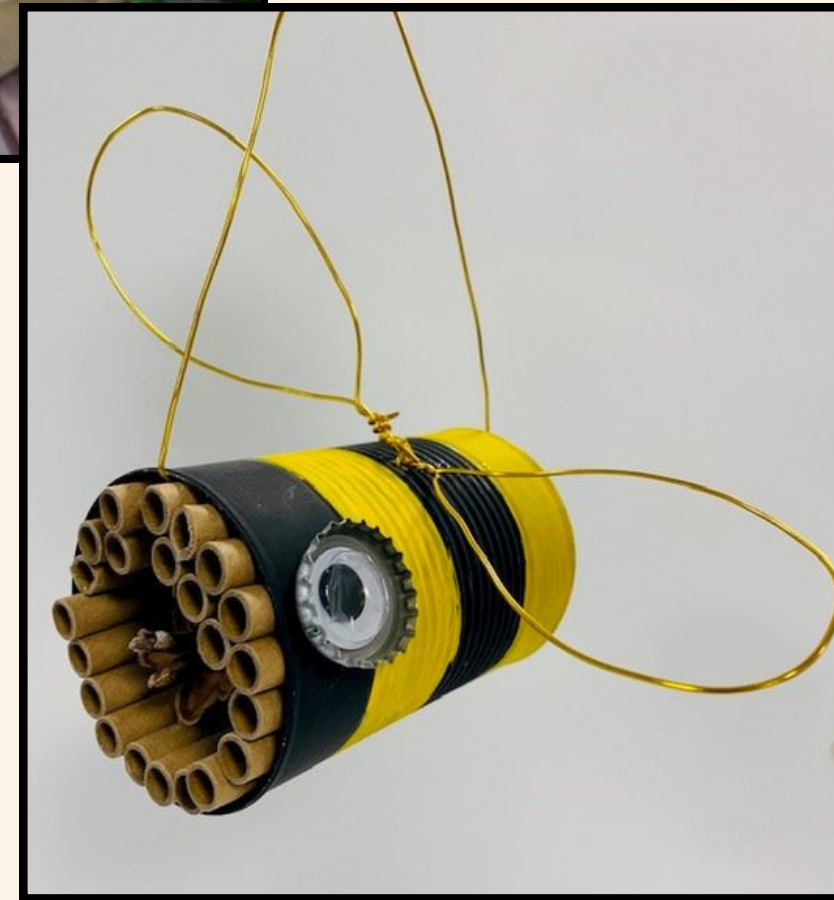
BUILD A BEE HOTEL



ground dwelling bees nests

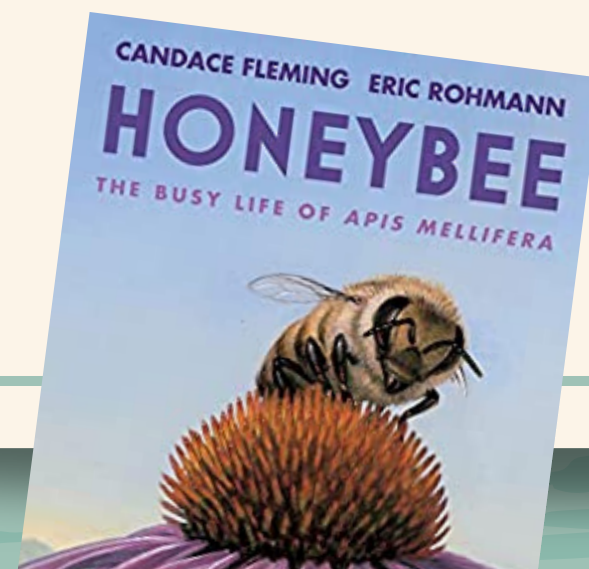
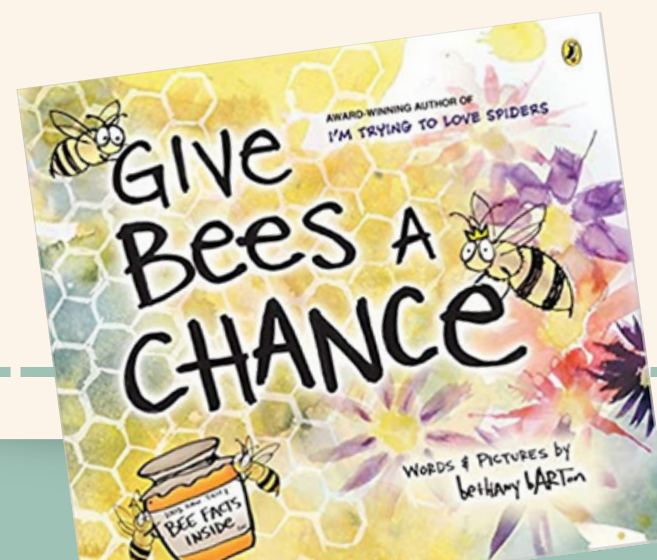
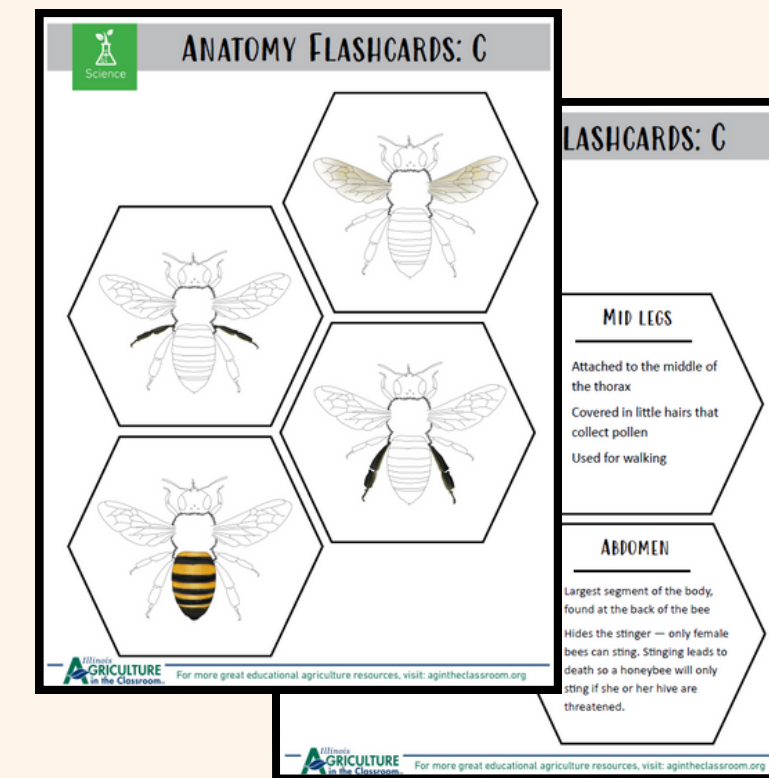
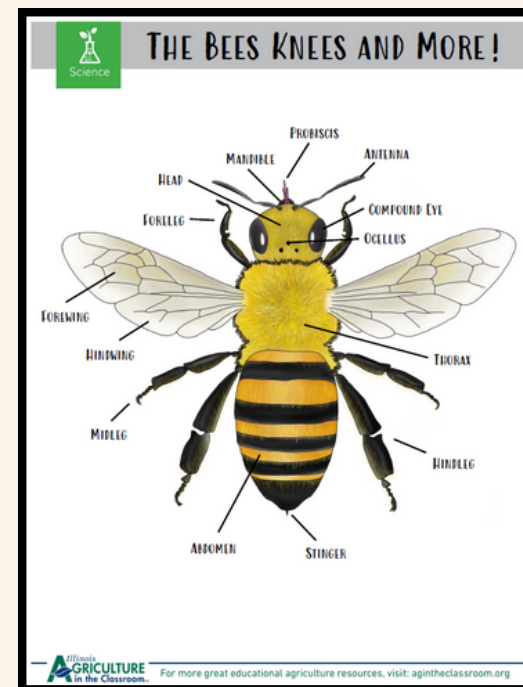
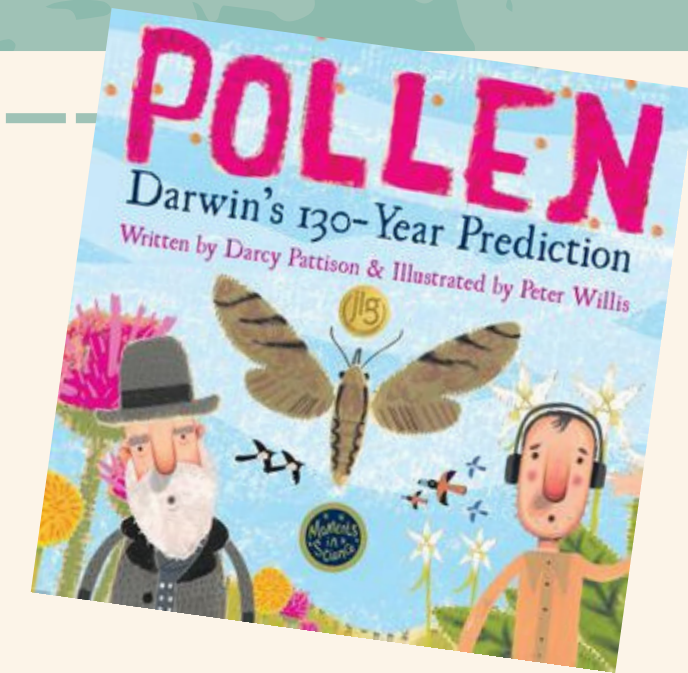


manmade bee hive



Possible Concepts to Explore

- Habitats
- Native species
- Other pollinators
- Process of pollination
- Insect anatomy
- Life cycles
- History
- Honeybees and honey
- Symbiosis/adaptations
- Beekeeping



PUMPKIN CATAPULT



Chapter 6

PUMPKIN CATAPULT
STEM STUDENT WORKSHEET

STEM Challenge: There's been a machine breakdown! A farmer needs help getting his pumpkins into the wagon. Can you design and build a *Pumpkin Catapult* to launch those pumpkins into the wagon?

The **distance** and **speed** of the pumpkin is going to depend on the **force** of the machine. The force is determined by how far back your catapult is pulled before releasing.

How will you adjust the force of your catapult?

Look at the materials your teacher has given you for your build. Draw and label some possible designs (blueprints) for your catapult in the box below.

PUMPKIN CATAPULT
STEM STUDENT WORKSHEET

Use the data you collected to create a visual representation of those measurements! You will need to add the information for the bar graph, and use two different colors to represent the two angle tests you completed. Make sure you label your graph!

KEY
 TEST 1
 TEST 2

Reflection Questions:
1. How do scientists and engineers revise their original designs? Did you revise yours?
2. What worked well and what was challenging?
3. How did your catapult work for getting the pumpkin into the wagon? Why or why not?
4. How would changing a heavier or lighter object change the angle needed to get the pumpkin into the wagon?

PUMPKIN CATAPULT
STEM STUDENT WORKSHEET

Time for your **hypothesis**. This should include your ideas on the relationship between force of your catapult and the distance your pumpkin will travel.

My Hypothesis:

Just as scientists and engineers do, you are going to complete a series of tests before trying to get your pumpkin into the wagon! Fill out the information below as you complete your testing trials.

Angle: this is the number of popsicle sticks and/or the angle measured with a protractor.

Distance: this is the amount of space (in inches) measured from the base of the catapult to the spot where your pumpkin **landed** – this does NOT include where the pumpkin stops after rolling!

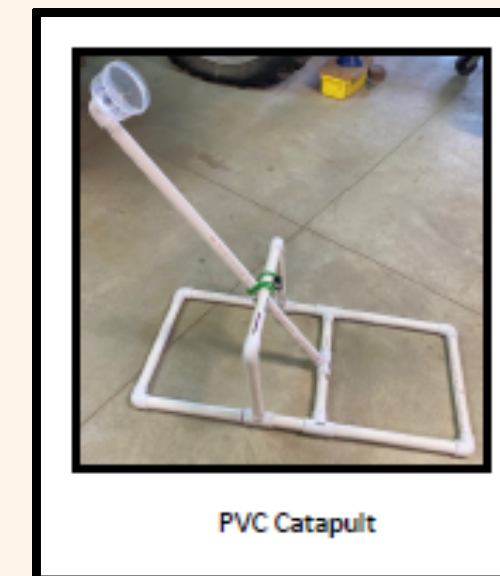
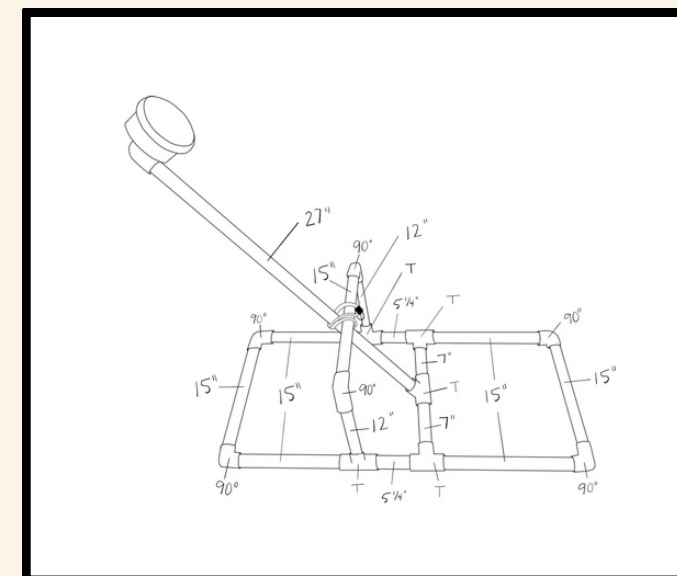
Now, calculate the average distance traveled for each angle you tested.

TEST 1
Angle of Launch =

Trial 1	inches
Trial 2	inches
Trial 3	inches

TEST 2
Angle of Launch =

Trial 1	inches
Trial 2	inches
Trial 3	inches



Possible Concepts to Explore

- Trial and Error – Collecting Data
- Kinetic/Potential Energy
- Simple Machines
- Force and Gravity
- Plant Life Cycles
- Plant Parts
- Nutrition and Cooking
- Supply Chain
- Harvesting Processes and Machinery
- Holiday Traditions and History

Exploding Pumpkin



3D Pumpkin



PLANT PARTS LOGIC PUZZLE

Grade Level: 3-8
Length of Lesson: 30 minutes

Objective: By the end of the lesson, students will have a better understanding of plant parts and why plants we eat.

Materials Needed: Scissors, Glue or Staples, Copies of sheets

Standard: NGSS 3-LS3-1

Time to go shopping at the Farmers Market and put your knowledge to the test!

Arrange the Vegetable Cards into the shopping bag below so that "like" plant parts are touching each other (i.e. - stems touching stems, roots touching roots)

root	stem	seed	flower
root	leaf	seed	flower
root	leaf	fruit	flower
stem	leaf	fruit	seed
stem	leaf	fruit	seed

PUMPKIN PIE IN A BAG

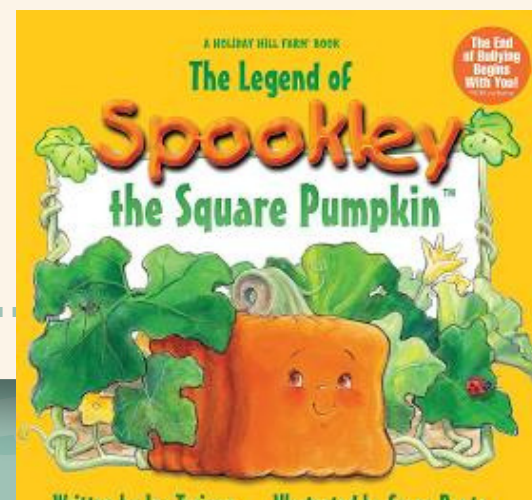
Ingredients

- 1/2 teaspoon ground ginger
- 1 teaspoon ground cinnamon
- 2 packages instant vanilla pudding mix
- Graham cracker crumbs
- 1 can whipped topping
- 2 2/3 cup cold milk
- 1 15oz can solid-pack pumpkin
- 1 gallon size Ziploc® bags
- Scissors
- 26 small cups
- 26 spoons

Directions

- Combine the milk and instant pudding in the gallon size baggie, remove the air, and zip closed.
- Squeeze and knead with your hands for about 1 minute until blended.
- Add the pumpkin, cinnamon, and ginger. Zip closed and knead for another 2 minutes, until ingredients are evenly combined.
- Place 1/2 teaspoon of graham cracker crumbs in the bottom of the cups.
- Cut the corner of the gallon baggie and squeeze the pie filling into the cups.
- Add some whipped topping on top, add a spoon, serve, and enjoy!

Makes 26 cups!



CORN PACKING PEANUTS

Chapter 6.2



PACKING PEANUTS
STUDENT WORKSHEET

Science Literacy

Take a few minutes to think about resources that we use daily. Which of those are renewable? Which are non-renewable? Make your list of each type in the boxes below!

Renewable	Non-renewable

Now that you've shared your ideas as a class, write what it means for a resource to be renewable and non-renewable.

OBSERVATION

Before any scientist begins the experimentation stage of their inquiry, they must make observations of the objects they are using in their experiment! This way, they can use that data to help determine how to complete their experiment and what materials to use. Observe your two types of packing peanuts and record your observations in the table below!

	sound	Color	shape	Texture	Smell	Softness
Packing Peanut A						
Packing Peanut B						

For more great educational agriculture resources, visit: agintheclassroom.org

PACKING PEANUTS
STUDENT WORKSHEET

Science Literacy

HYPOTHESIS

Want to figure out which one of these packing peanuts is made from biodegradable materials. Based on your observations and your understanding of the term 'biodegradable,' write your hypothesis in the space below.

EXPERIMENT

You should have two cups of water, with the same amount of water in each cup. Slowly pour one of water into the "Packing Peanuts A" cup and the other cup of water into the "Packing Peanuts B" cup. Record your observations in the table below.

Packing Peanut A	Packing Peanut B

CONCLUSION

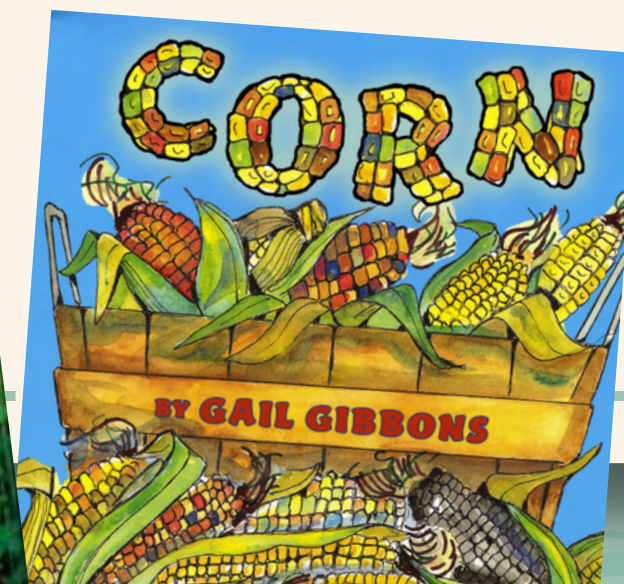
After you've finished your experiment, can you accept or reject your hypothesis? (Circle one)

Accept Reject

What materials are the packing peanuts made from?
Packing Peanut A:
Packing Peanut B:

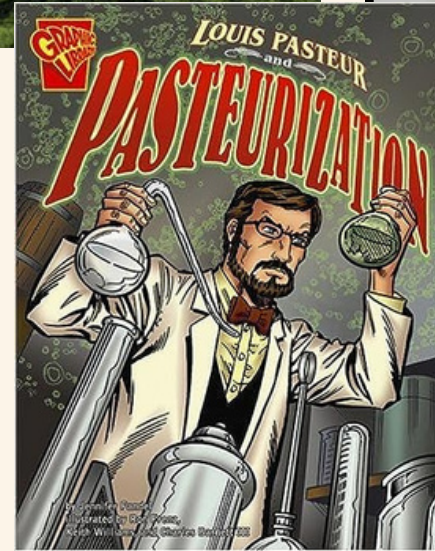
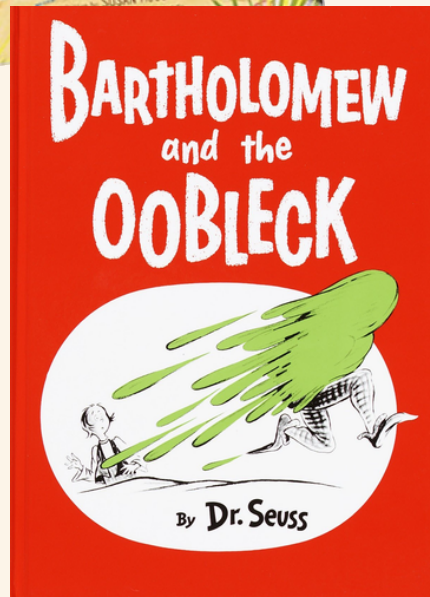
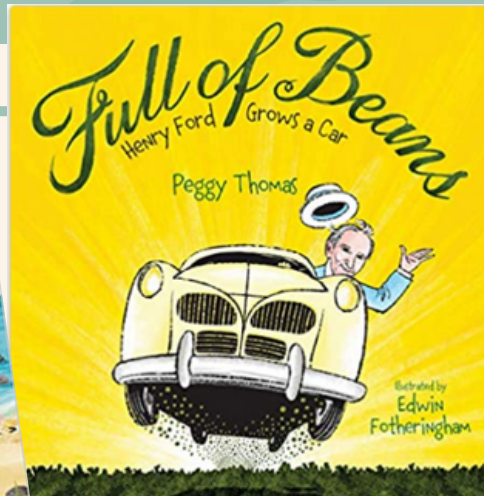
Which of these materials is renewable? Explain.

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Possible Concepts to Explore

- Sustainability and Conservation
- Renewable vs. Non-renewable Resources
- Nutrition and Cooking
- Simple Machines
- Inventions
- History and Historical Figures
- Energy
- Architecture
- Plant Growth



Milk Plastic



Beanie Baby

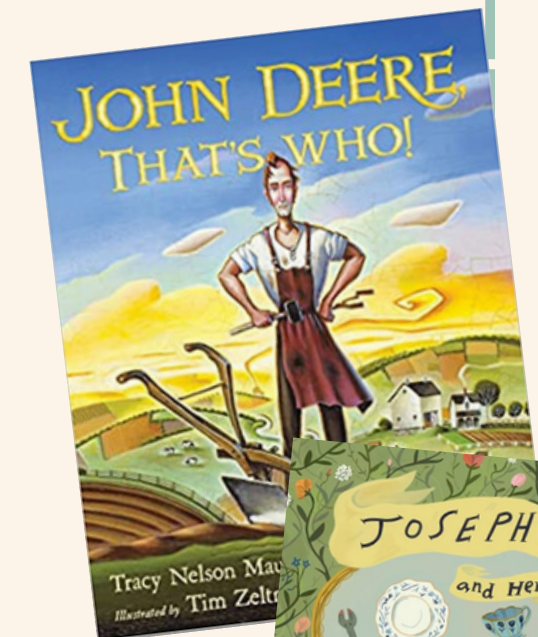


TEDTalk: Sitting On Soybeans

Colors on Your Plate



Pizza Process



Circle of Earth Bracelet



Thank You!

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