

Let Learning Grow With STEM on the Farm

Presented By: Kevin Daugherty



INTRODUCTION

Intro

Director of the Illinois Center for Agricultural Engagement. Oversee development and implementation of IATC programming and resource efforts that assist the IATC programs, teacher training, and in-service teacher training. Oversee the Illinois Farm Bureau Consumer Engagement Program.

12 Million in IL Less 80,000 farmers; 40,000 FFA; 90,000 4H;
300,000 IFB Members, 500,000 former farmers, FFAers 4Hers....

B.S. Secondary Education
History and English, UIUC
M.S. Technology Training and Development,
EIU

10 Years HS/JH Social Studies and English
2 year with Publishing Company
IATC/Consumer Engagement

ICAE
NAITCO President
LeRoy CUSD #2 Board of Education

MORE INFO

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Intro

CORN PACKING PEANUTS



ScienceLiteracy

PACKING PEANUTS

STUDENT WORKSHEET

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		

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ScienceLiteracy

PACKING PEANUTS

STUDENT WORKSHEET

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

Could 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

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:

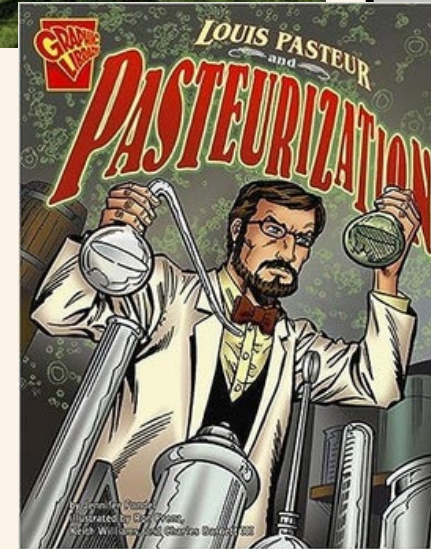
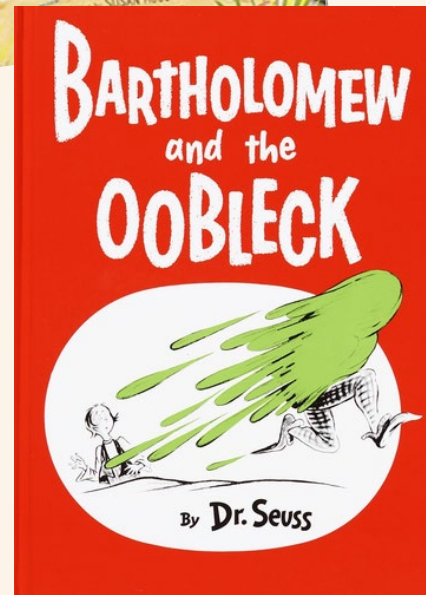
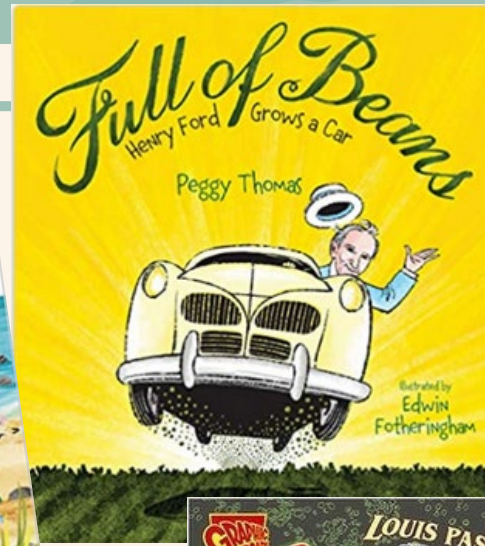
Which of these materials is renewable? Explain.

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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

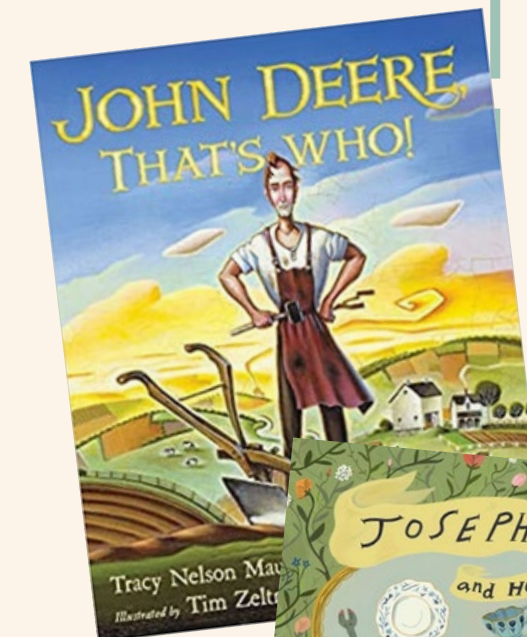
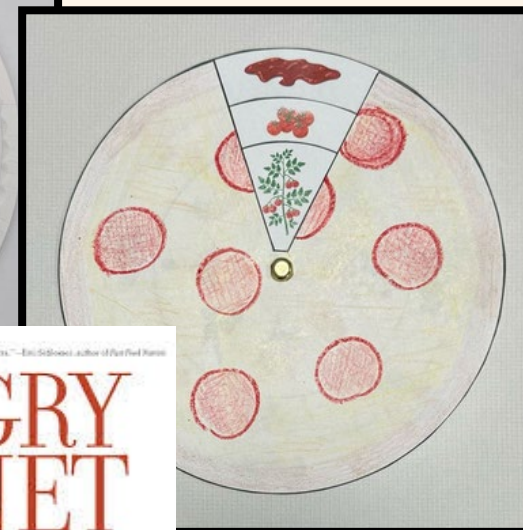


TEDTalk: Sitting On Soybeans

Colors on Your Plate



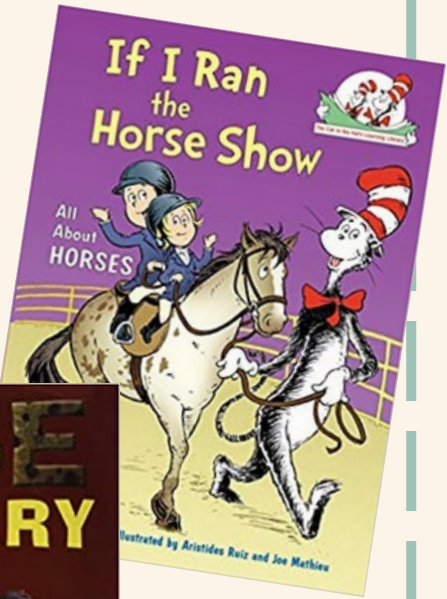
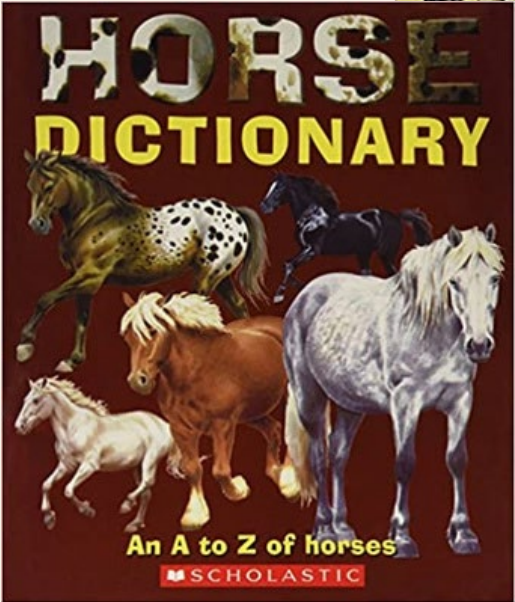
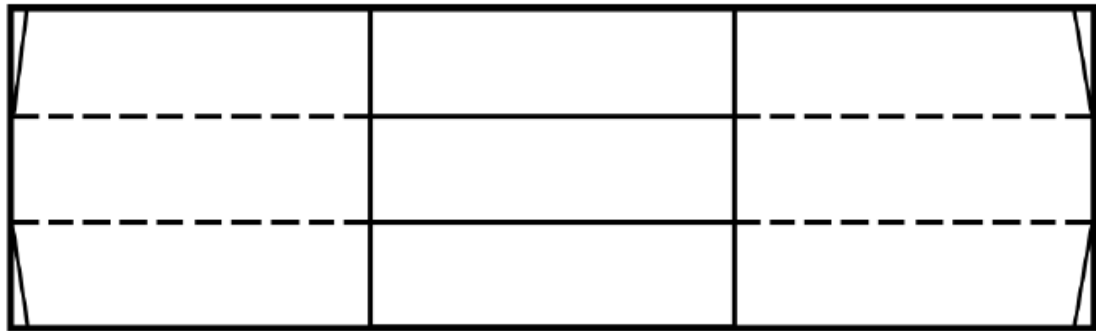
Pizza Process



Circle of Earth Bracelet



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

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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?

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HORSES

NAME: _____

Directions: Read the information and answer the questions. Use the key to fill in the blanks in numerical order.

HORSEHOOF
The hoof of a horse is the part of the foot that is in contact with the ground. It is made of a hard, fibrous material called keratin. The hoof is divided into two main parts: the hoof wall and the hoof sole. The hoof wall is the outer edge of the hoof, and the hoof sole is the bottom of the hoof. The hoof is also divided into two main sections: the hoof body and the hoof wall. The hoof body is the part of the hoof that is in contact with the ground, and the hoof wall is the part of the hoof that is not in contact with the ground. The hoof is also divided into two main sections: the hoof body and the hoof wall. The hoof body is the part of the hoof that is in contact with the ground, and the hoof wall is the part of the hoof that is not in contact with the ground.

EQUIPMENT
Horses are often used for a variety of purposes, and they need different types of equipment to help them. Some of the most common types of equipment used on horses are saddles, bridles, and halters. Saddles are used for riding, and bridles and halters are used for leading and tying up horses. There are many different types of equipment available, and the type of equipment you choose will depend on the type of horse you are using and the type of work you are doing.

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.

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.

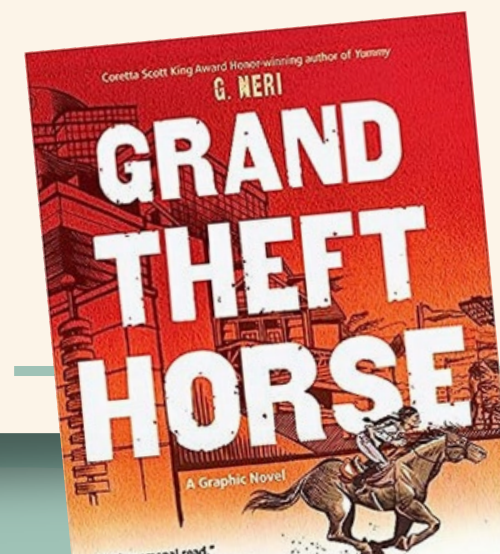
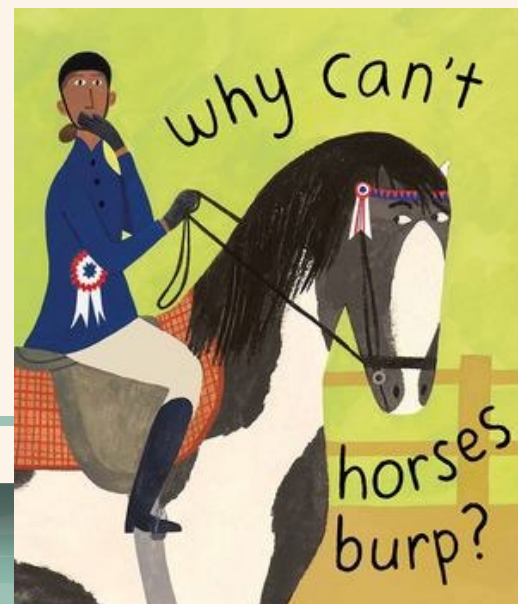
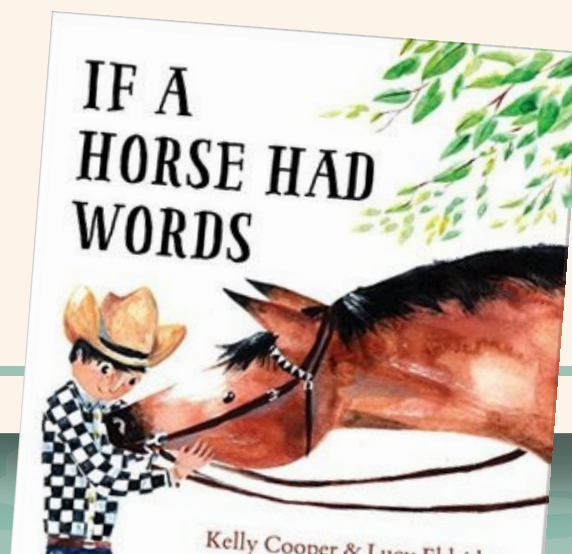
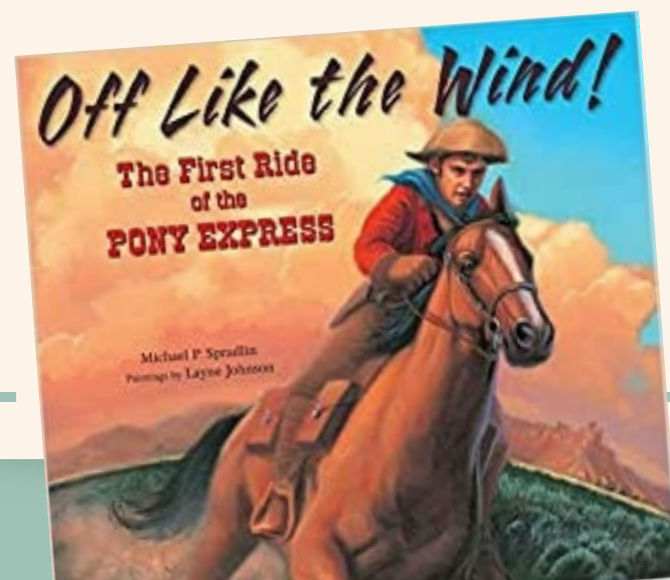
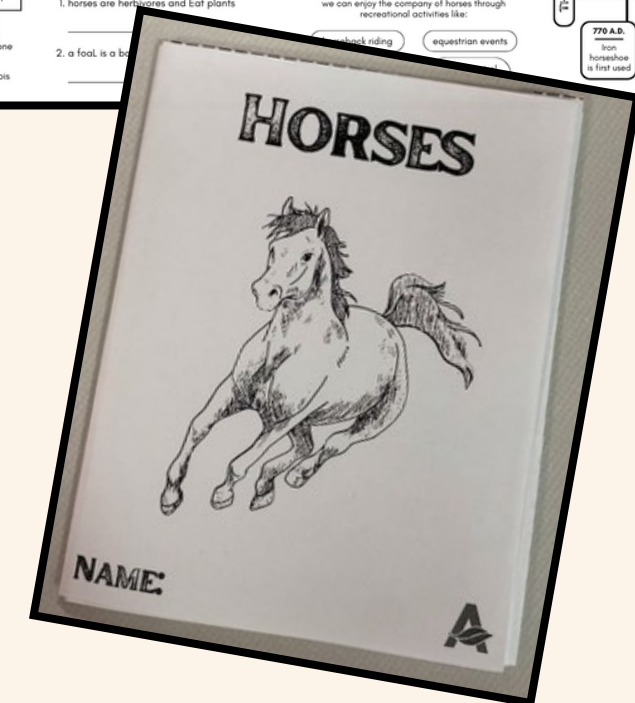
SENTENCE FIX
Use correct capitalization and punctuation to fix each sentence.
1. horses are herbivores and eat plants
2. a foal, is a baby horse

SHOES
Horses don't wear shoes, do they?
Horseshoes can be made of iron, plastic, or aluminum. The type of shoe depends on the type of job the horse is doing. Shoes are very important. Horses spend 60 percent of their time standing up, so their hooves need to be in good shape. Horseshoes are made of metal, and they are used to protect the hooves from rocks, nails, and even when working on hard roads or in muddy conditions. Horseshoes are also used to correct leg problems. Horses need to wear shoes to work on hard roads or in muddy conditions. Horseshoes are also used to correct leg problems.

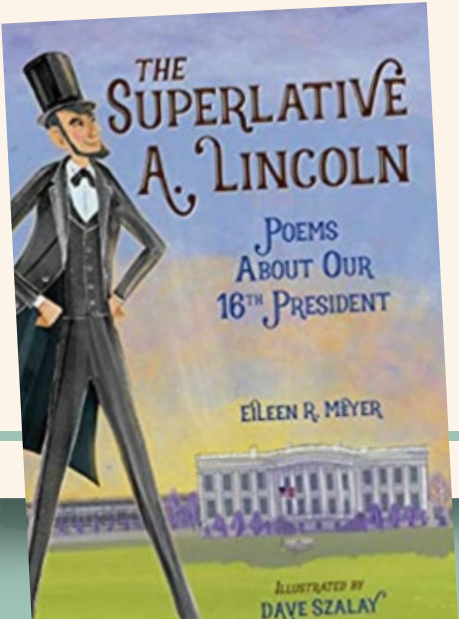
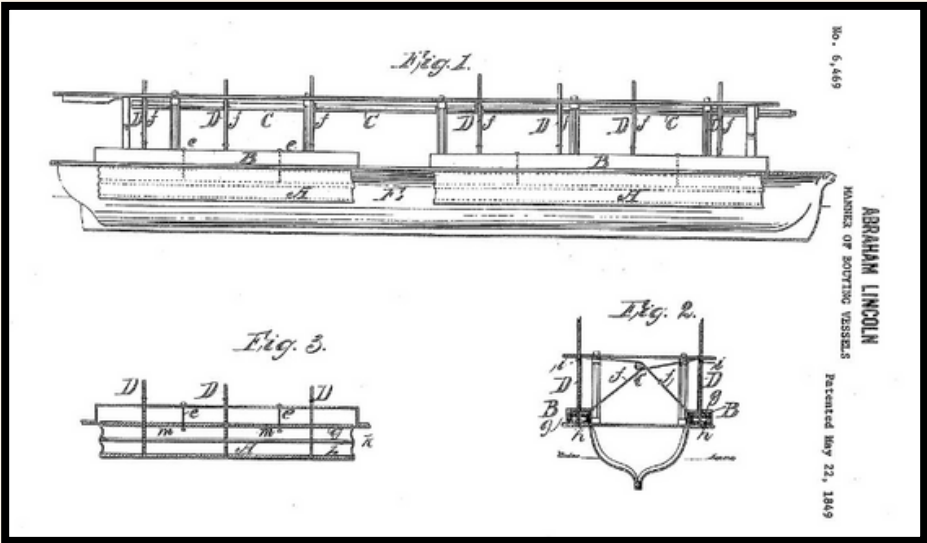
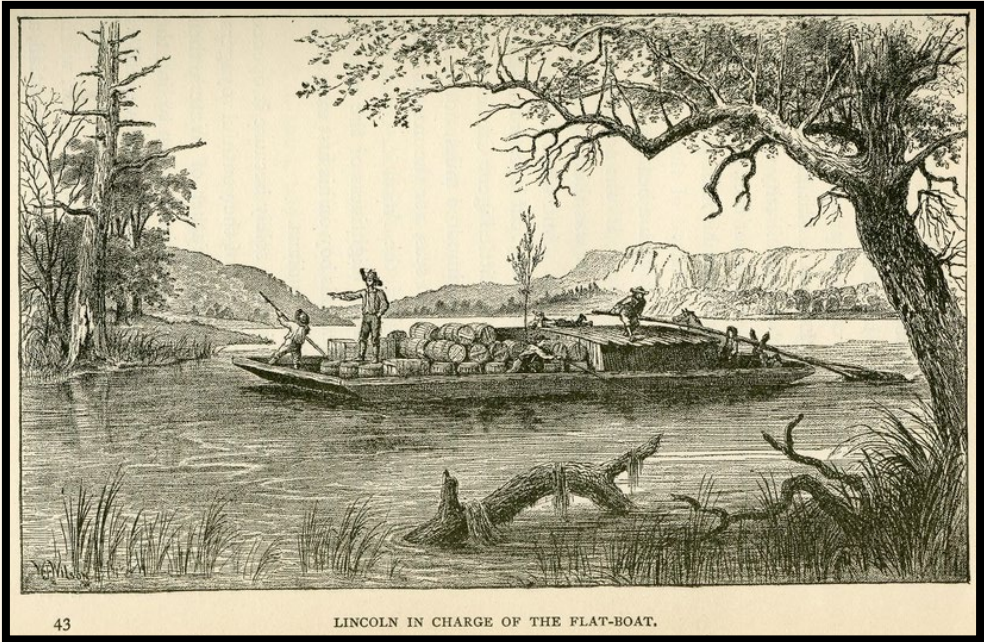
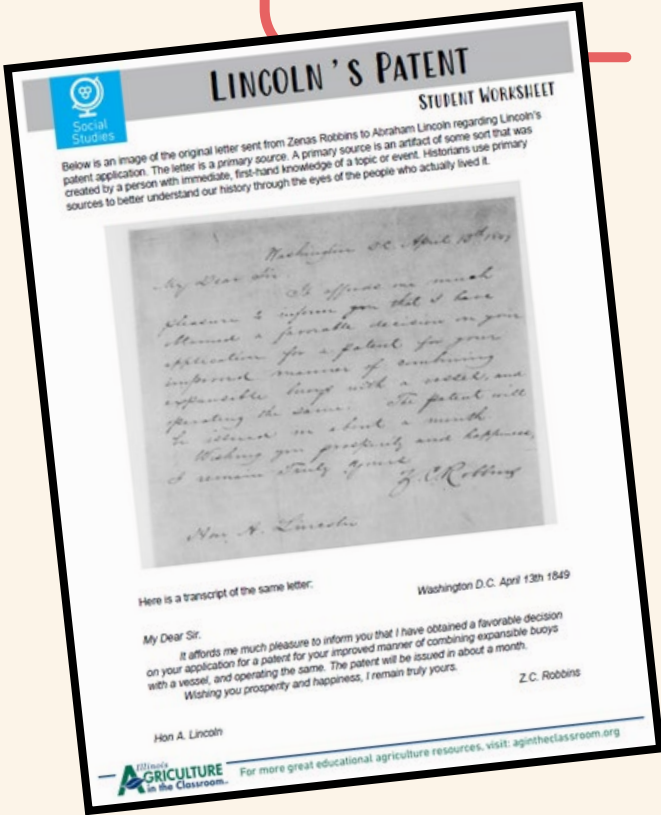
TIMELINE TRIVIA
Help historians finish the timeline! Use the key to fill in the blanks in numerical order.

KEY: 1860 2022 1945

4000 B.C. Horses first tamed
1875 First Kentucky Derby horse race takes place
1945 Tractor replaces horses on farms
2022 Pony Express first mail delivery system was created

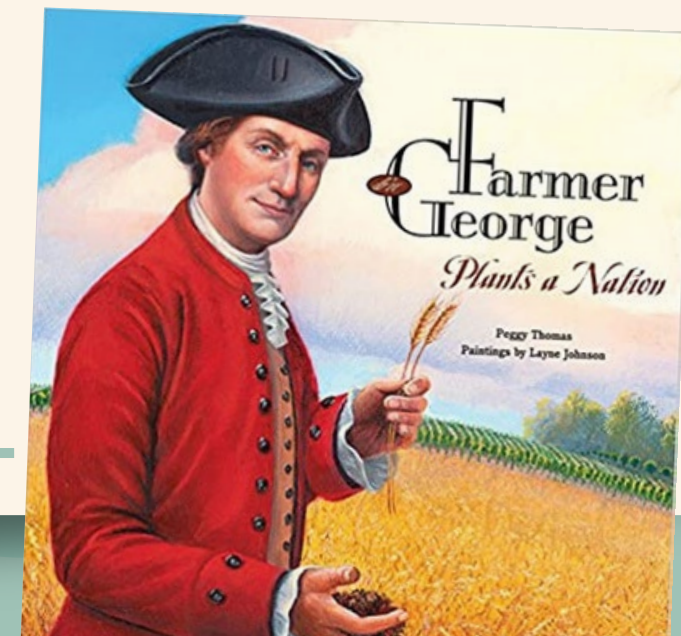
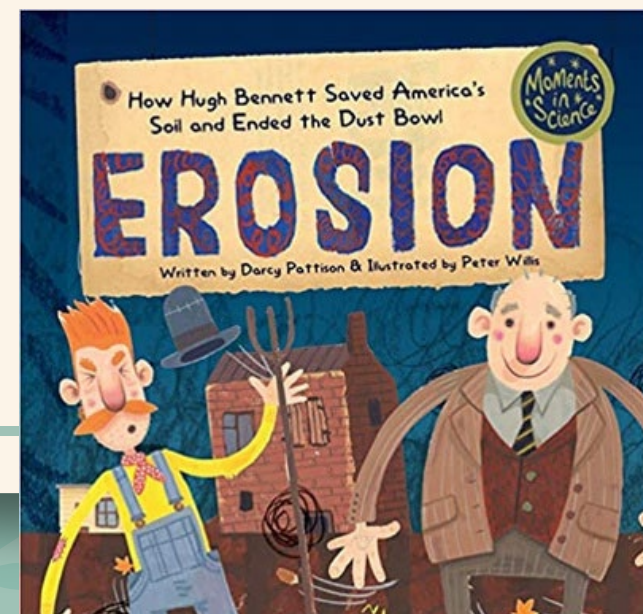
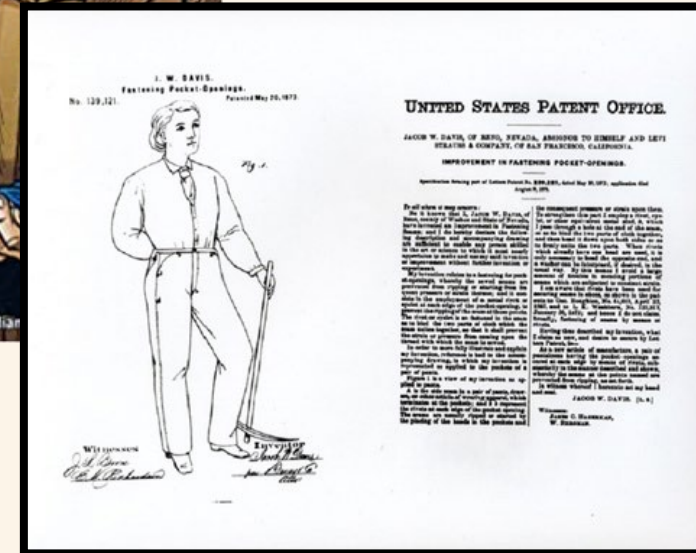


TIN FOIL FLATBOAT

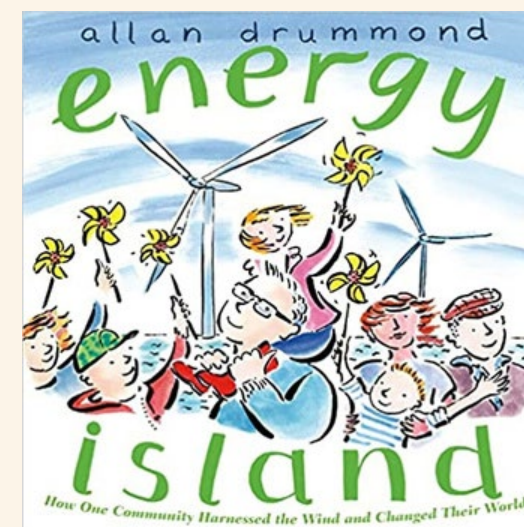
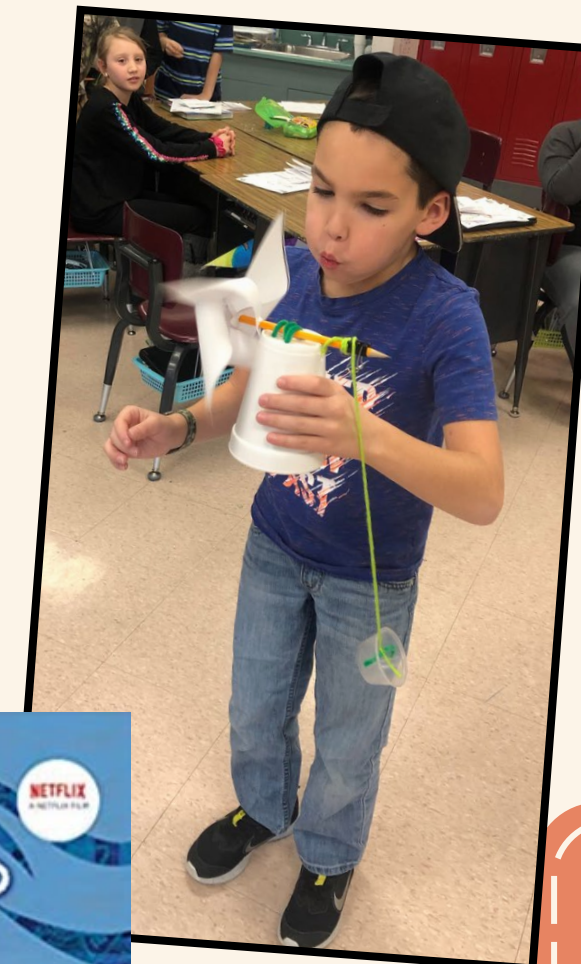
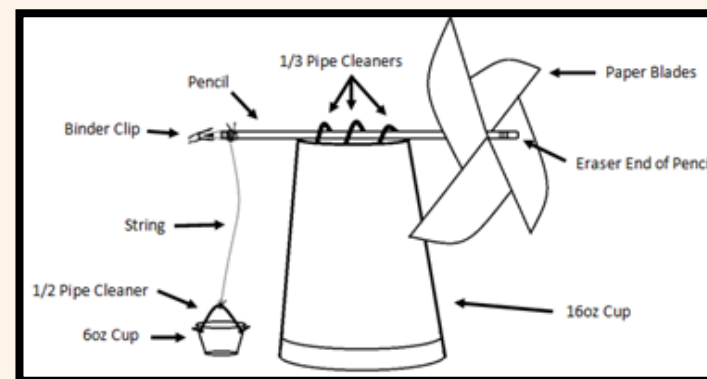
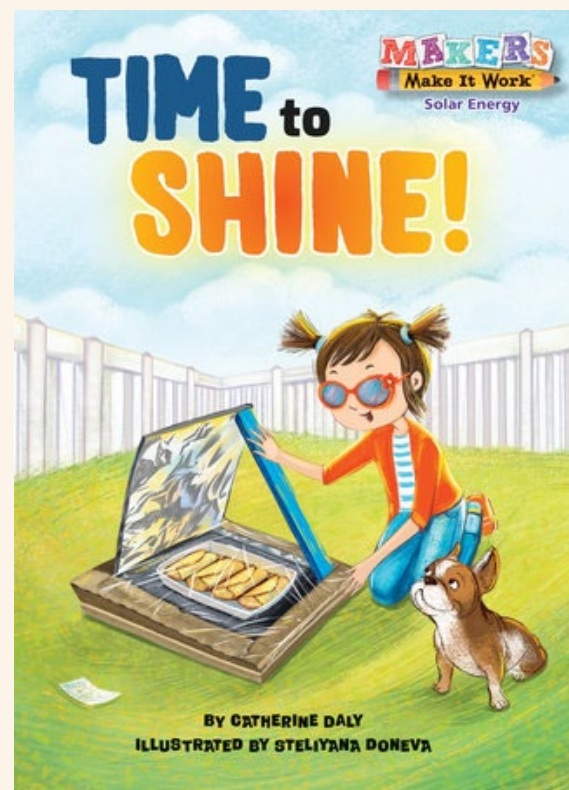


Possible Concepts to Explore

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

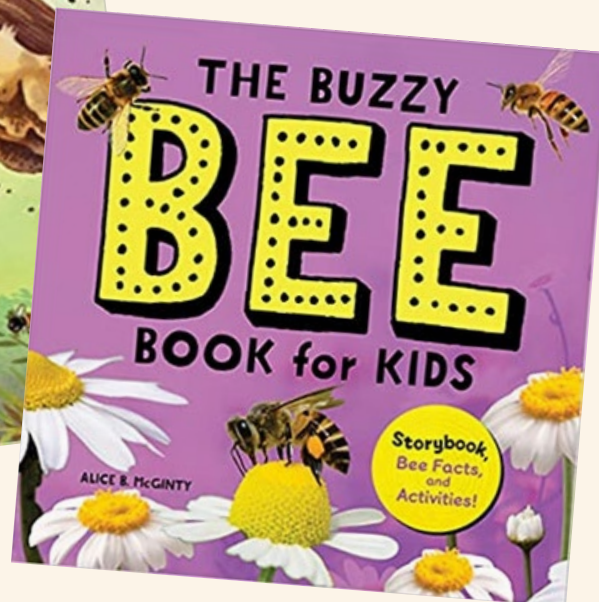


SOLAR OVEN & A WINDY LIFT



Chapter 4

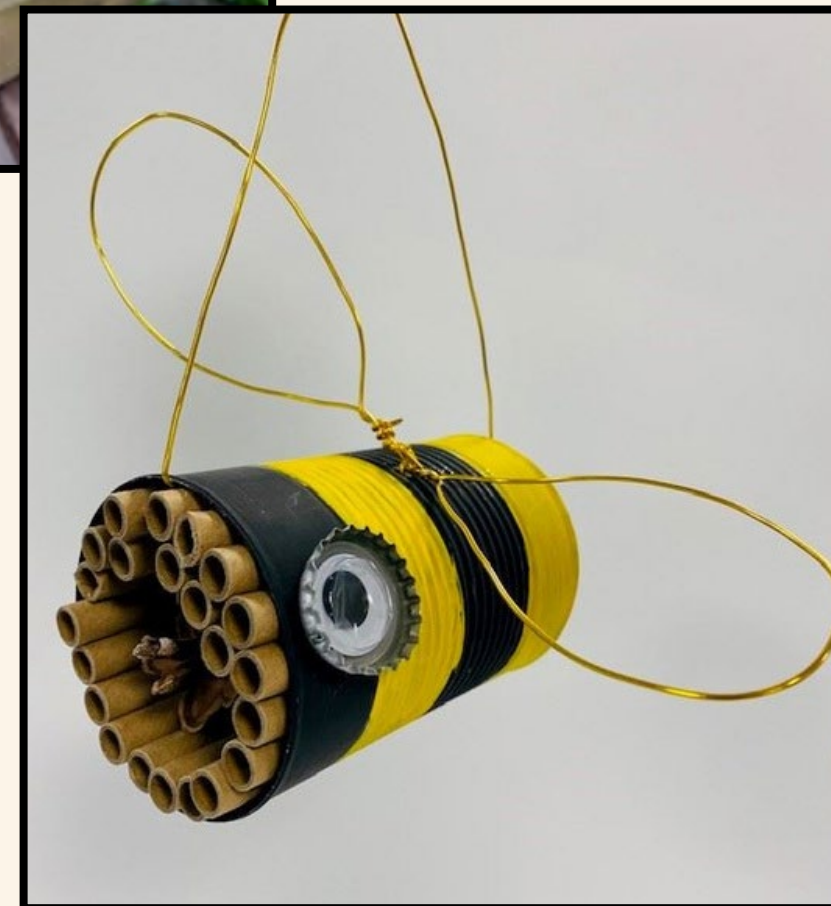
BUILD A BEE HOTEL



ground dwelling bees nests

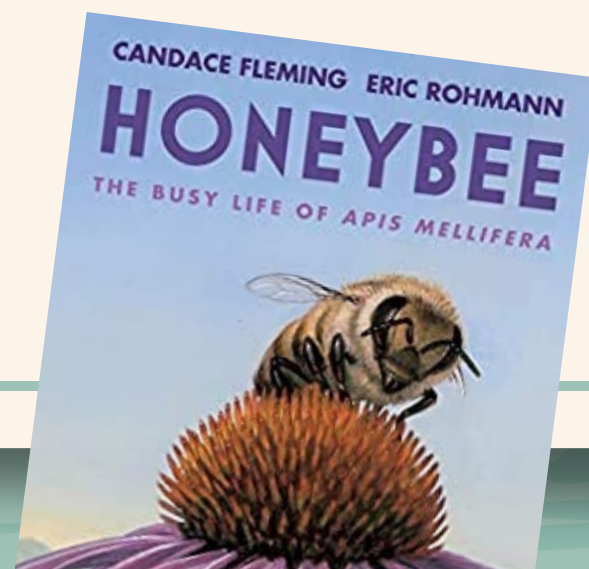
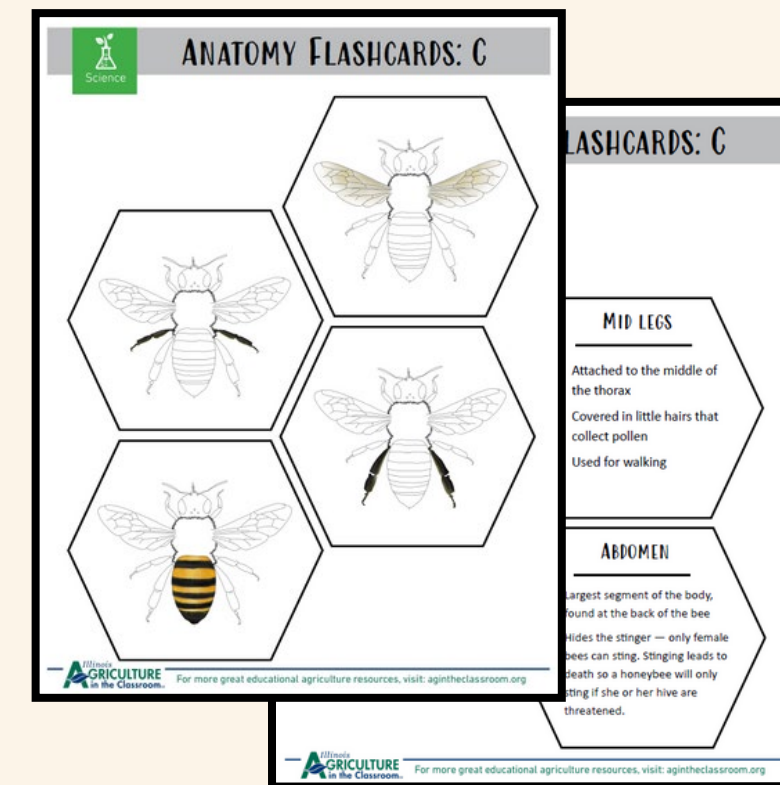
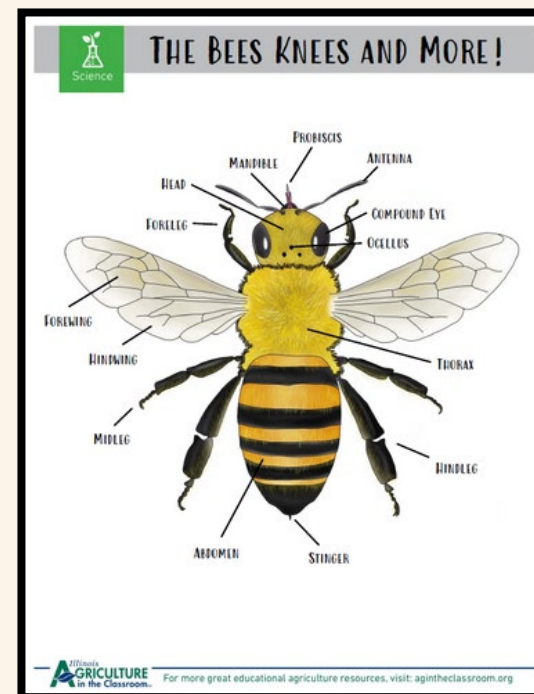
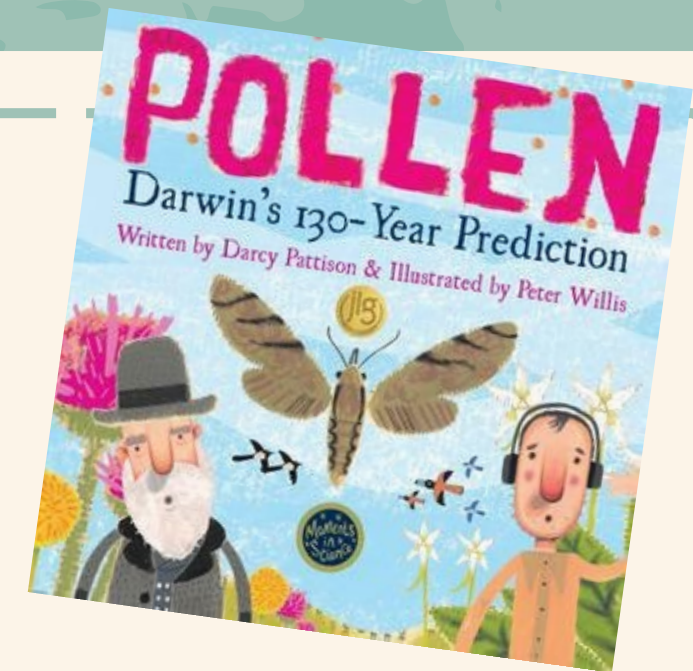


manmade bee hive



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



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.

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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 you think your design 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 do you think a heavier or lighter object change the angle needed to get into the wagon?

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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!

TEST 1
Angle of Launch =

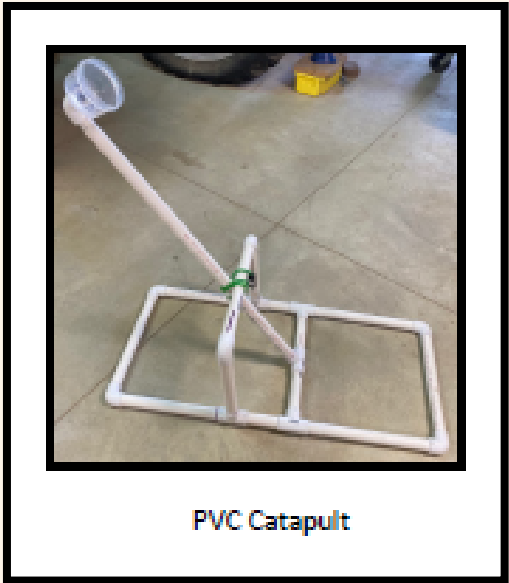
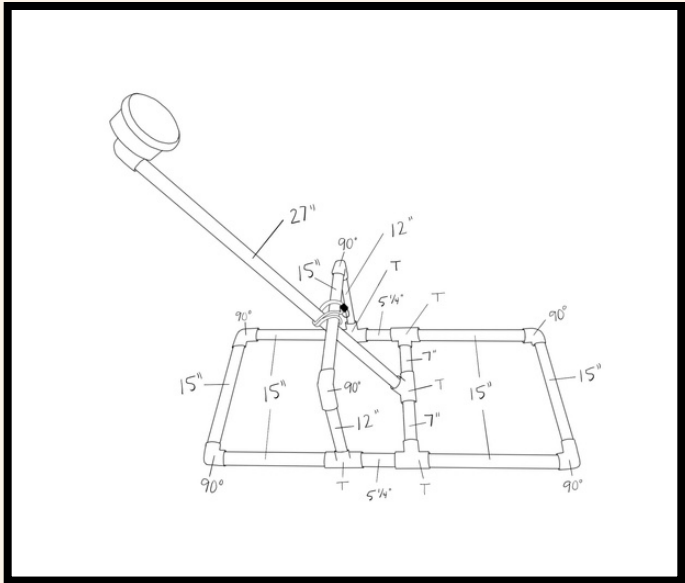
Trial 1	inches
Trial 2	inches
Trial 3	inches

TEST 2
Angle of Launch =

Trial 1	inches
Trial 2	inches
Trial 3	inches

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

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PVC Catapult

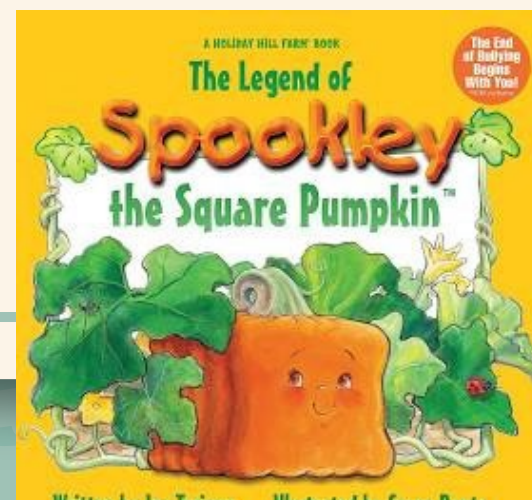
Possible Concepts to Explore

- 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



3 D Pumpkin



SOYBEAN, SOIL AND BASKETBALL?

SOYBEAN AND BEANIE BABY

“Oh, Say Can You Seed”?

SOIL

Soil Your Undies

Say It With Soil

Basketball and

Allusions

Thank You !

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