READ, RENEW, REPEAT

Summer 2024

An iREAD Summer Reading Companion from

Illinois AGRICULTURE in the Classroom℠

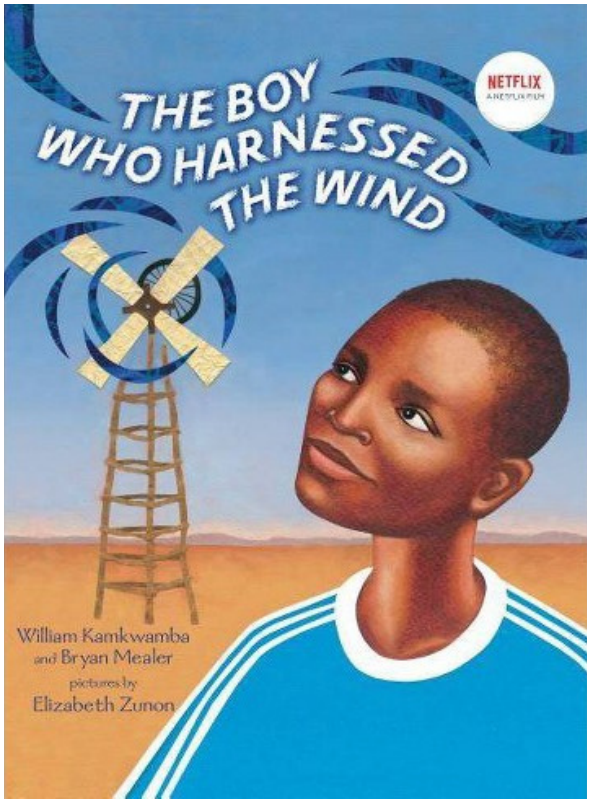
TABLE OF CONTENTS

Find all these lessons and more at https://iaitc.co/iread24

An iREAD Summer Reading Companion from

Illinois AGRICULTURE in the Classroom℠

AG-ACCURATE BOOK RECOMMENDATION:



The Boy Who Harnessed the Wind
William Kamkwamba & Bryan Mealer

When a terrible drought struck William Kamkwamba's tiny village in Malawi, his family lost all of the season's crops, leaving them with nothing to eat and nothing to sell. William began to explore science books in his village library, looking for a solution. There, he came up with the idea that would change his family's life forever: he could build a windmill. Made out of scrap metal and old bicycle parts, William's windmill brought electricity to his home and helped his family pump the water they needed to farm the land.

ACCOMPANYING IAITC LESSON:

A Windy Lift

Learn about sustainable energy with this windmill STEM activity!

See following page(s) for lesson plan!

A Windy Lift

Science

Grade Level
2-6

Length of Lesson
60 minutes

Objective
By the end of this lesson, students will have a better understanding of force, air friction, and mechanical engineering.

Materials Needed
- Copy of *The Boy Who Harnessed the Wind* by William Kamkwamba and Bryan Mealer
- Scissors
- Hole Punches
- Small binder clips
- String
- Pipe cleaner-cut into thirds (3 per student)
- Pipe cleaner-cut into halves (1 per student)
- Pencils (1 per student)
- 16oz disposable cup
- 6oz disposable cup
- Crayons, colored pencils, markers
- Copies of student worksheet

Standards
NGSS
K-PS2-1; K-PS2-2; 3-PS2-1; 3-PS2-2; 5-PS1; MS-PS1

Lesson Summary
This lesson is a fun, hands-on activity designed to help students understand motion and what causes objects to move. This is also a great lesson to introduce renewable energy and how farmers around the world rely on various machinery and energy sources to grow their food and raise their animals.

Suggested Sequence of Events:
1. Set Up: Cut the pipe cleaners into thirds and halves so that each student has three (3) thirds and one (1) half. For younger students or to save time, hole punch the small, 6 oz disposable cup so that there are two holes on opposite sides of the cup. Finally, print enough copies of the student worksheet so that each student has one. It is better to print on cardstock, but normal printing paper will work.
2. Read through the IAITC Renewable Energy Ag Mag to learn more about renewable energies! Interactive online versions can be found on our website.
3. Complete the activity following the procedures:
    - Read *The Boy Who Harnessed the Wind* aloud to your class. You can use our suggested pre-activity questions on the teacher resources page.
    - Give each student their own windmill blade template and have them decorate it. Then have them follow the directions to cut it out.
    - Carefully push the pencil through the center hole and then bend each corner backwards onto the pencil. Don't crease the paper during this stage! It is easier to have the pencil sharpened and to put the pointed side of the pencil through the holes.
    - Carefully push the blades to the other end of pencil. The pencil will be slightly larger that the holes, so be careful not to rip the paper. You now have a pinwheel!
    - Place the 16 oz cup upside down and lay the pencil pinwheel on top. Use the three (3), 1/3 pieces of pipe cleaner and create an arch shape with them. Push each arch over the pencil to hold the pinwheel in place. Now you have a windmill!
    - Hole punch two holes in your small cup, one on either side. Slide the one (1), 1/2 piece pipe cleaner through the holes, forming a small bucket handle. Bend the sides upward to hold the handle in place.
    - Tie one end of your string around the pencil, and the other end around the bucket handle.
    - Attach the binder clip to the end of the sharpened end of the pencil to keep the string in place.
    - Now blow on the blades and lift the small cup!
4. Whole class discussion and reflection of activity.

TEACHER RESOURCES

Pre-Activity Discussion Questions:

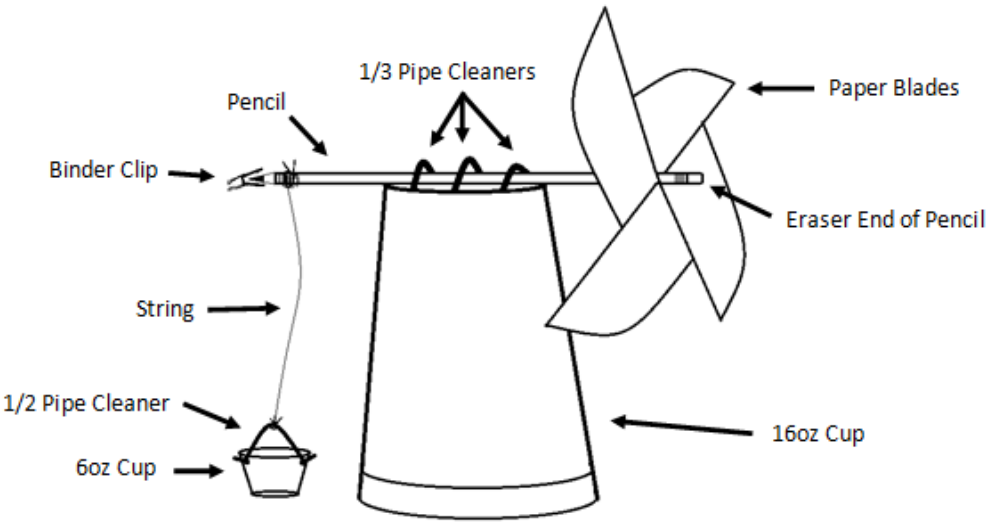
- Ask students what caused the mill to start moving?
- Why did the wind cause the blades to start moving?
- What was the purpose of building the windmill?

Post-Activity Discussion Questions:

- What was the maximum number of pennies your windmill lifted?
- How much time did it take to lift your bucket with no pennies? What about with eight pennies? Why would there be a difference?
- What improvements could be made to help your windmill be stronger or lift the bucket faster?
- What type of motion caused the windmill to start moving? Was it balanced or unbalanced?

Extension Ideas:

- Have students add a penny to their small cups and see if their windmill will lift it. Continue adding pennies and see whose windmill will lift the most! If you don't have pennies, use popcorn kernels, dry beans, etc.
- Use a timer to record how long it takes for the bucket to be lifted with a different amount of pennies. Does it take longer to lift no pennies, four pennies, or eight pennies?
- Use the pennies to learn about the life of Abraham Lincoln.
- Use a fan to move the blades. Does this make a difference in the amount of weight the windmill can lift? Does it make a difference on how quickly the bucket is lifted?
- For higher level students, have them work backwards and draw a blueprint of the windmill before construction.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!



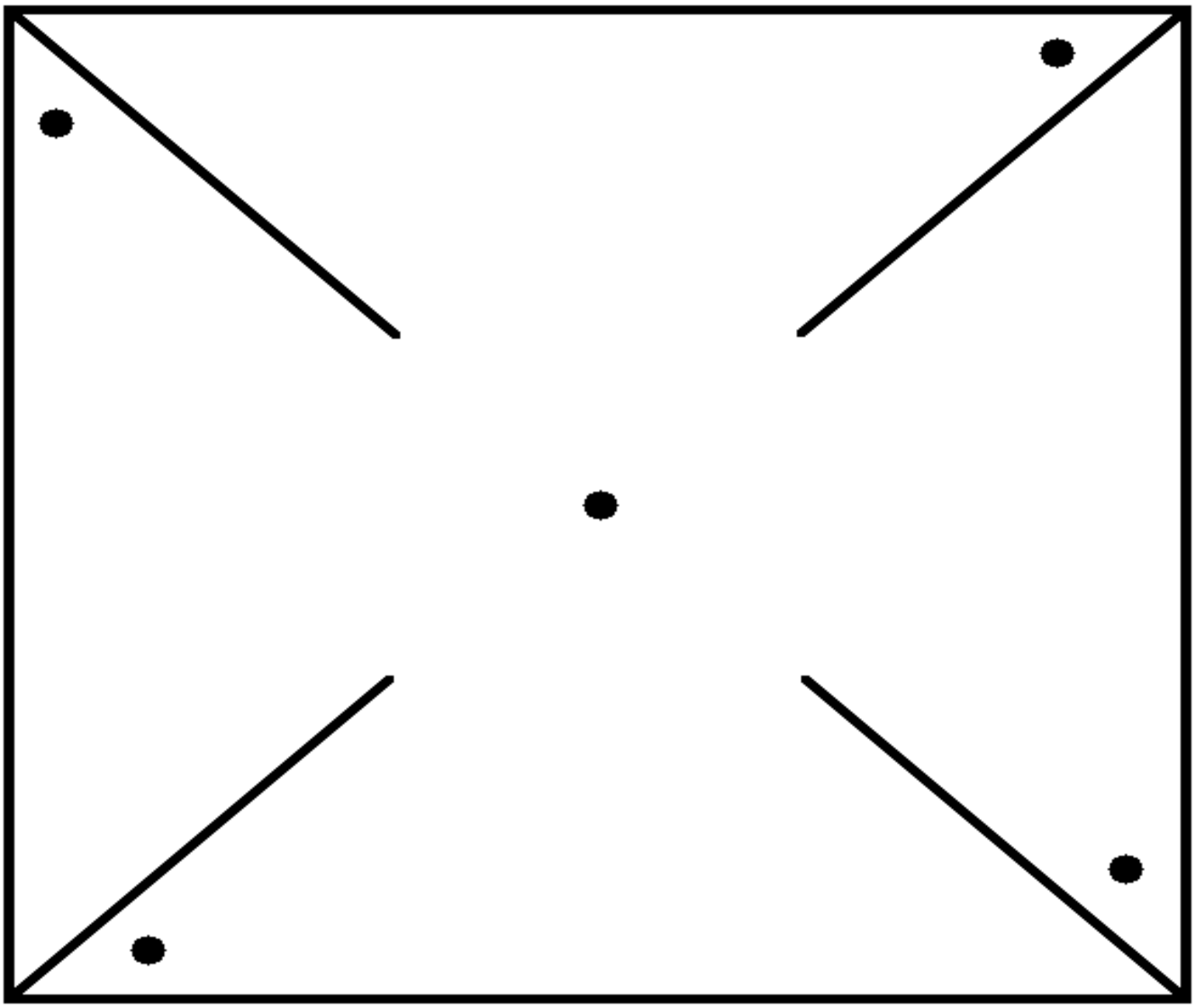
Science

A Windy Lift

Student Worksheet

Directions:

1. Decorate!
2. Cut on all **solid** lines.
3. Use the hole punch to make a hole on all of the black dots.
4. Wait for your teacher for further instructions.



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AG-ACCURATE BOOK RECOMMENDATION:

We Are Water Protectors
Carol Lindstrom

Inspired by the many Indigenous-led movements across North America, *We Are Water Protectors* issues an urgent rallying cry to safeguard the Earth's water from harm and corruption—a bold and lyrical picture book written by Carole Lindstrom and vibrantly illustrated by Michaela Goade.

ACCOMPANYING IAITC LESSON:

Water Cycle in a Bag

See the water cycle happen right before your eyes using a few simple materials and a ziplock bag!

See following page(s) for lesson plan!

Science Math

Water Cycle in a Bag

Grade Level
1-5

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will have a basic understanding of the water cycle.

Materials
- Sandwich-sized zipper seal bags
- Permanent markers
- Aquarium rocks
- Tablespoon
- ¼ cup measuring cup
- Water
- Packing tape
- Copies of the water cycle template

Standards
Common Core
Mathematics: CCSS.Math.Content.3.MD.A.2

NGSS
Earth's Systems: 2-ESS2-3

Lesson Summary
This lesson is a fun, hands-on activity that allows students to develop their observation skills while learning the stages of the water cycle. This is also a perfect activity to introduce the three states of matter: solid, liquid, and gas.

Suggested Sequence of Events:
1. Set Up: Print and cut out water cycle illustrations. Then place illustrations in a plastic bag for each student.
2. Read: "Water is Water" by Miranda Paul to capture student interest.
3. Read through the IL AITC Water Ag Mag to learn more about the importance of water. Interactive versions can be found on our website.
4. Complete the activity following the procedures:
    - Give each student a baggie with the water cycle template inside.
    - Using permanent markers, have students trace over all the black lines, including the numbers.
    - After completely tracing everything, remove the paper from the bag.
    - Add two tablespoons of aquarium rock to the bottom of the bag.
    - Next, Add ¼ cup water to the bag.
    - Using wide, clear packing tap, affix the bag to a window in direct sunlight and watch the water cycle work over the next few days!
5. Whole class discussion and reflection of activity. Pair students together and have them share what they learned about the water cycle.

TEACHER RESOURCES

Extension Ideas:

- Sing the Water Cycle Song (to the tune of “Oh, My Darlin”):

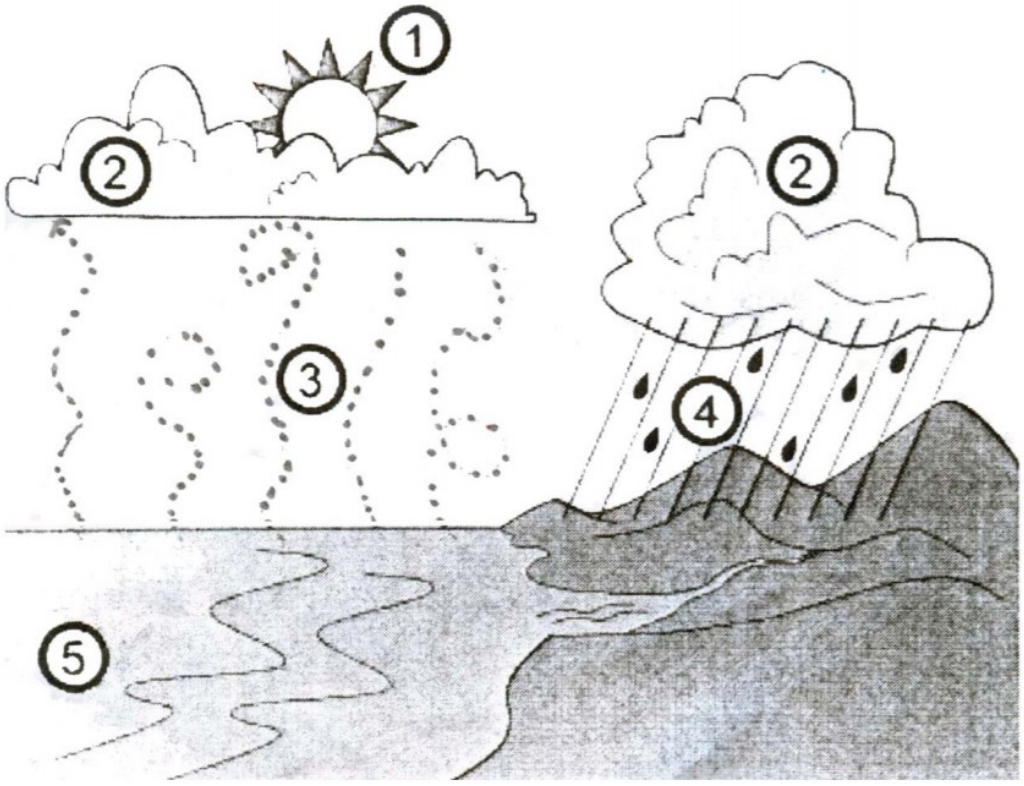
Evaporation, (Push both palms up, palms parallel to the floor.)
Condensation, (Push with arms straight out to the side.)
Precipitation on my head. (Pretend to “rain” on head.)
Accumulation, (Make arms sweep back and forth in front.)
Water Cycle, (Arms rotate in circle in front.)
And we start all over again. (Turn around in place in a circle.)

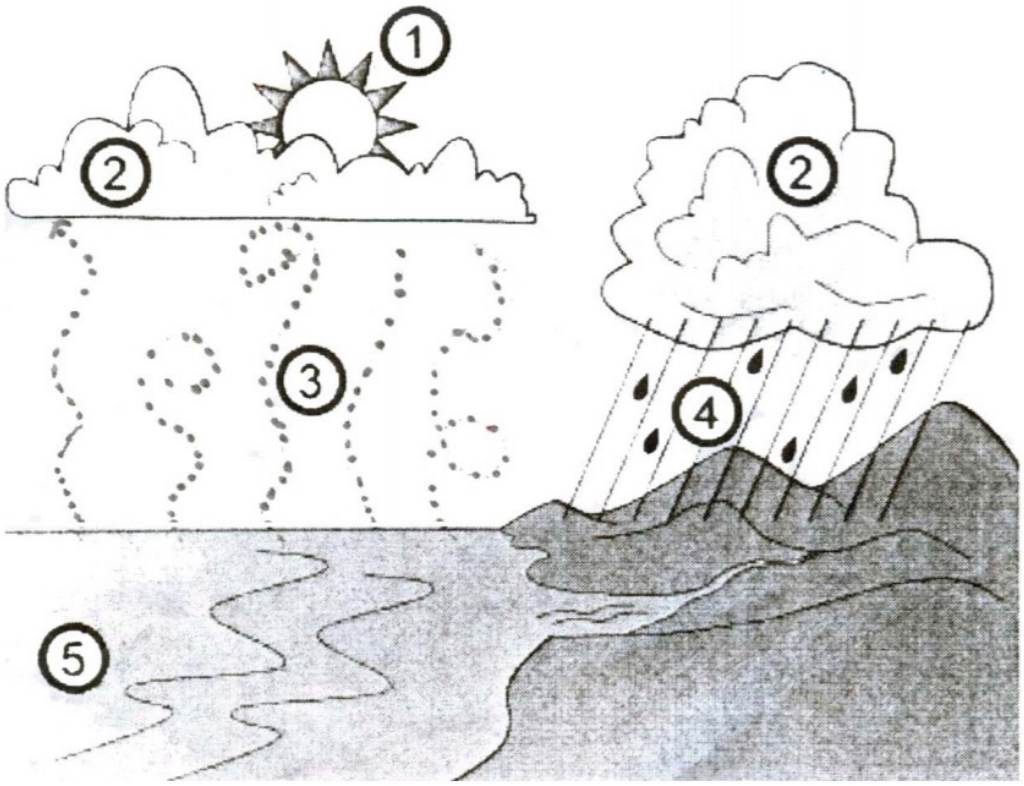
- Have students record their observations of their water cycle bags each day.
- Have students write a short summary describing the water cycle.
- Have students draw a comic strip following a drop of water through the water cycle. Introduce or strengthen the use of descriptive language.
- Have students act out the water cycle!
- Complete our Water Cycle Bracelet activity to strengthen their understanding of the water cycle.
- Talk more about all the places water can go.
- For upper grades, dig deeper with the three states of matter and introduce molecules.
- Learn more about water use around the world. How can we sustain clean water? How can we eliminate wasting water? What are the types of water pollution? Why is it important to keep our water clean? What does it take to clean our water?
- Invite someone from your local water treatment center in to talk with the class.
- Have students compare and contrast fresh water and salt water.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

Science

Math

Water Cycle Template





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AG-ACCURATE BOOK RECOMMENDATION:

Compost Stew
Mary McKenna Siddals

Teach kids to compost and help them develop life-long habits to protect the Earth. From apple cores to zinnia heads, readers will discover the best ingredients for a successful compost pile in this fun picture book perfect for Earth Day! This inviting book provides all the answers for kids and families looking for simple, child-friendly ways to help the planet.

ACCOMPANYING IAITC LESSON:

Classroom Vermicomposting

Learn about using worms to convert food waste into rich soil by building and maintaining a classroom "vermicomposter."

See following page(s) for lesson plan!

Classroom Vermicomposting

Science

Grade Level
K-8

Length of Lesson
Ongoing

Objective
By the end of this lesson, students will have a better understanding of vermicomposting and soil health.

Materials Needed
- (2) large, opaque plastic containers
- Replacement drain for cooler
- Drill & drill bits
- Newspaper
- Small amount of compost or soil
- 1/4 lb red wiggler worms
- Copy of the Weekly Log Sheet (optional)

Standards
NGSS
K-2-ETS1-1; K-LS1-1; 4-LS1-1-2; 4-ESS3-1; 5-LS2-1; MS-LS2-3

Lesson Summary
This lesson is a fun, hands-on activity designed to introduce students to the exciting world of vermicomposting—making compost with the help of worms! Students will help construct and maintain a classroom vermicomposter. As an alternative or supplemental lesson, students can make their own "desktop" composters as well.

Suggested Sequence of Events:
1. Set Up: Assemble all necessary materials. Teachers may want to mostly prepare the vermicomposting tubs beforehand and have students help with adding the worms.
2. Read through the IAITC Soil Ag Mag to learn more about soil health! Interactive online versions can be found on our website.
3. To prepare the composting bins, follow these steps (diagrams can be found on the Teacher Resources page:
    - Use the drill and a 1" drill bit to cut two holes near the top on each long side of one of the tubs. These holes will serve as ventilation for the worms.
    - Then, use the same 1" drill bit to drill a hole near the bottom on the short side of the other tub.
    - Attach the cooler drain through this hole. This will allow you to drain any liquid "worm tea" that collects in the bottom tub. Worm tea can be added to gardens and planting containers as fertilizer as well.
    - Return to the initial tub with the ventilation holes and flip the tub over. Switch to a 1/8" drill bit and drill a series of holes in the bottom of the tub. The holes should be large enough for liquid to drain, but not large enough to allow the worms to travel out of the tub.
    - Place this tub inside of the other tub to complete your vermicomposting bins!
4. To set-up your vermicomposting bins, follow these steps:
    - Have students tear the newspapers into small pieces.
    - Add the newspaper and compost/soil to the bin with the drain holes. Then, add a small amount of food waste. Avoid meat, dairy, and citrus products in your worm composter.
    - Finally, add the worms to your bin. Depending on how you received your worms, you may need to follow the directions included with them to "re-hydrate" the worms before adding them to your bin.
5. Your worm composter is now complete. Read the attached Teacher Resources page to learn more about maintaining your classroom composter.

TEACHER RESOURCES

- Watch our video about building our own vermicomposter on YouTube: https://youtu.be/U7d7zek6IEM

Maintainence:

- A vermicomposter takes little work to maintain in your classroom. Follow these tips to help your worms do their best work:
    - Add approximately the same weight in food as you have worms in your bin. For instance, if you start with 1/4 lb. of worms, add about 1/4 lb. of food scraps every week.
    - Food scraps that are in small pieces will be easier for the worms to digest quickly. Adding scraps of varying sizes may be a fun experiment to test how long it takes the worms to break down different materials.
    - Add shredded newspaper bedding as needed to keep the food scraps covered and help the pile retain moisture.
    - Burying the food scraps in the bin will help the worms digest the materials more quickly and will also eliminate the chance for bad smells.
    - The worm bin should have similar moisture to a damp sponge. Additional liquid should drain into the bottom bin, thought this often isn't even necessary.
    - The worms will self-regulate their population. As the population grows, you will need to add more food each week. Eventually, the worm colony can be split to create an additional worm bin.

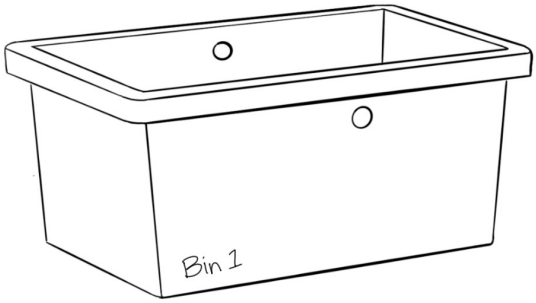
Extension Ideas:

- Students can perform various experiments and inquiry activities with the vermicomposter:
    - Use the attached weekly log for students to fill out with what they added to the worm bin, what they noticed inside the worm bin, what the worms are currently decomposing, etc. Assign different students to fill out the log each week.
    - Weigh the worms at various points in time to determine how quickly they are multiplying.
    - Experiment with adding different size food scraps to see how quickly the worms can decompose them.
    - Once the worms are creating compost, extract some and use it with garden or container plantings. See how plants grown with the vermicompost grow differently that plants grown with other types of soils.
    - Take a sample of your vermicompost and submit it for a soil sample to see what nutrients are present in the worm castings. Compare this with a soil test taken from soil around the school yard.
    - Have students research the benefits of vermicomposting and composting.
- Variation: Students can also create their own "desktop" vermicomposters using large plastic cups with lids. Worms prefer to work in the dark. Use construction paper to make a collar to block the light from the cup. Then, students can remove the collar to view the worms and their progress.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

TEACHER RESOURCES

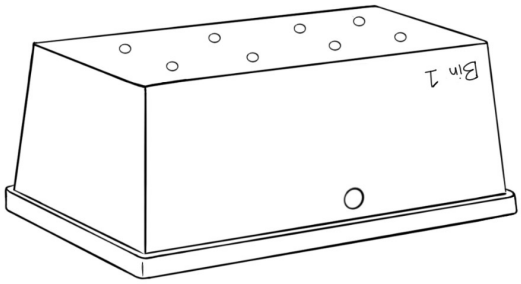
Holes for Ventilation

1” drilled holes
Top, 2 sides of the first bin



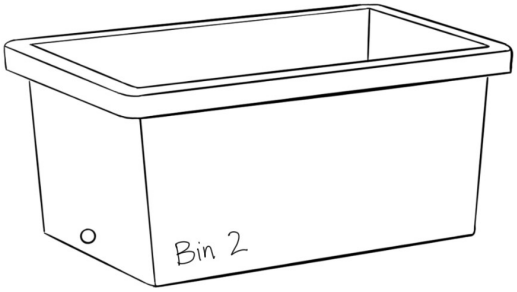
Holes for Drainage

1/8” drilled holes
Bottom of the first bin

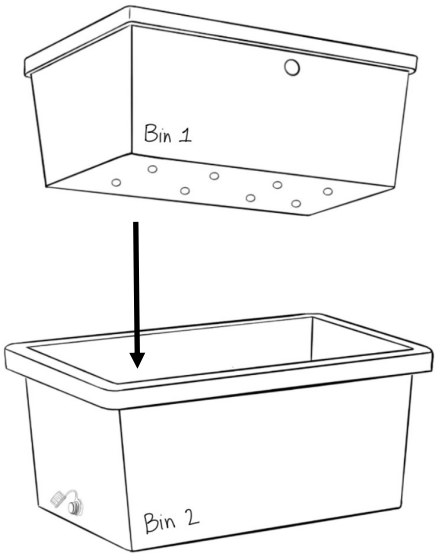


Hole for Cooler Drain

1” drilled hole
Bottom edge, 1 side of the second bin



(Cooler Drain)



Assembly

Secure the cooler drain in the hole drilled at the bottom of the second bin. Then, place the first bin into the second bin.

Your vermicomposter is ready for its materials and tenants!

Science

Classroom Vermicomposting

Weekly Log

Date	Food Scraps Being Added	Observations of compost

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AG-ACCURATE BOOK RECOMMENDATION:

The Last Straw: Kids vs. Plastics
Susan Hood

With an introduction from Milo Cress and bright, colorful illustrations from Christiane Engel, this collection of brilliant, lyrical nonfiction poems by award-winning author Susan Hood highlights the threat of plastic and the kids who are fighting for change to save our planet. Includes extensive backmatter with a timeline, author's note, further resources, and more.

ACCOMPANYING IAITC LESSON:

Soybean Plastic

Learn more about the science behind plastics with this fun and engaging activity using soybeans, one of the most widely grown crops in Illinois.

See following page(s) for lesson plan!

Science

Soybean Plastic

Grade Level
3-7

Length of Lesson
50 minutes

Objective
By the end of this lesson, students will have a better understanding of how plastic can be made from renewable resources.

Materials Needed
- Cornstarch
- Soybean oil
- Food coloring
- Water
- Resealable sandwich-sized bags
- Microwave
- Pipette or eye dropper
- Tablespoon measuring spoons
- 1/8 teaspoon measuring spoon

Standards
Common Core
CCSS.ELA-Literacy.RI.4.3; RI.5.3

NGSS
5-PS1; MS-PS1

Lesson Summary
This lesson is a fun, hands-on activity designed to help students understand how agriculture and the biological materials produced on farms can be used for more than just food. This lesson is also perfect for introducing renewable and non-renewable resources!

Lesson adapted from National Ag in the Classroom.

Suggested Sequence of Events:
1. Set Up: Complete this as a demonstration, group activity, or individual activity depending on time and materials.
2. Read through the AITC Soybean Ag Mag to learn more about soybeans! Interactive online versions can be found on our website.
3. Complete the activity following the procedures:
    - Read *Full of Beans: Henry Ford Grows a Car* by Pegge Thomas aloud. Suggested pre-activity questions can be found on the teacher resources page.
    - Introduce the term “bioplastic” by breaking the word into two parts; “bio” and “plastic.”
    - Put students into groups of three to four and give each group a set of materials.
    - Place one (1) tablespoon of cornstarch, 1/8 teaspoon of soybean oil, and one (1) tablespoon of water into the baggie.
    - Close the baggie and knead the materials together.
    - Open the baggie and add two drops of food coloring. Then close the baggie and mix again.
    - Open the baggie a little to create a vent and then heat it in the microwave for 20-25 seconds.
    - Remove the baggie and let it cool. Be careful, the baggie and contents will be hot!
    - Once it’s cooled, take it out of the baggie and you now have soybean plastic!
4. Whole class discussion and reflection of activity. Ask how plastic and bioplastic affect the environment. How does bioplastic affect farmers? What objects could be made using bioplastics? Would Henry Ford’s soybean plastic car work in today’s world?

TEACHER RESOURCES

Pre-Activity Questions:
What is plastic made from? (Many plastics are petroleum-based.)
How did the Great Depression affect Henry Ford and soybeans?
How did WWII affect the soybean plastic car?
What other events had an impact on Henry Ford's life and/or career?
How could soybean plastic be used today?
Why is soybean plastic considered biodegradable?

Extension Ideas:
- Show students a diagram of a soybean plant.
- Complete our "Beanie Baby" activity to learn about germination and watch soybeans grow.
- Watch Farm to Car and the TEDx Talk Sitting On Soybeans to learn about how the Ford Motor Company uses bio-based products to create materials for cars. What are bio-based materials? Talk about the benefits of using bio-based materials.
- Take the experiment to the next level and have students test different amounts of the ingredients to see if that changes the product. Use our scientific inquiry worksheet to guide students.
- For higher grade levels, have students weigh the materials on a scale before and after microwaving.
- Take a field trip to a soybean farm and learn about soybean farming.
- Invite a soybean farmer into the classroom.
- Complete our "Corn Plastic" activity and compare the two types of plastics.
- Compare and contrast renewable and non-renewable resources.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

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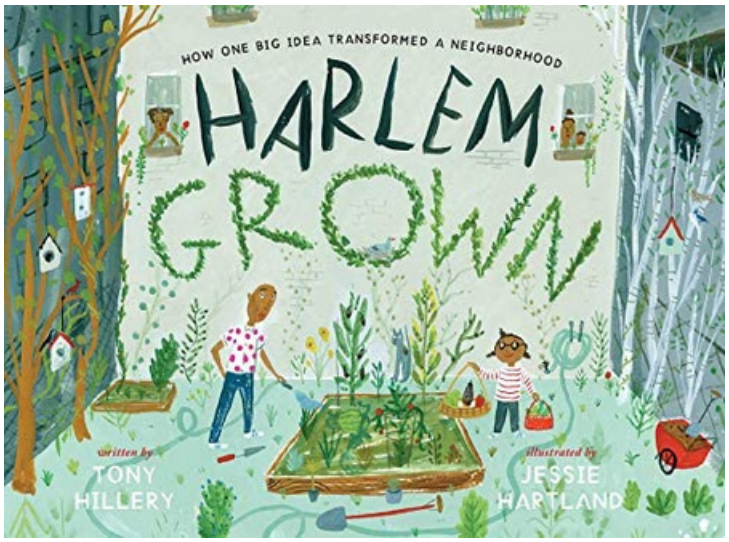

Harlem Grown: How One Big Idea Transformed a Neighborhood
Tony Hillery

Harlem Grown tells the inspiring true story of how one man made a big difference in a neighborhood. After seeing how restless they were and their lack of healthy food options, Tony Hillery invited students from an underfunded school to turn a vacant lot into a beautiful and functional farm. By getting their hands dirty, these kids turned an abandoned space into something beautiful and useful while learning about healthy, sustainable eating and collaboration.

ACCOMPANYING IAITC LESSON:

Garden in a Glove

Have students start their very own garden and learn how seeds germinate and begin to turn into plants, all within a single glove!

See following page(s) for lesson plan!

Garden in a Glove

Science Literacy

Grade Level
K-5

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will have a better understanding of seed germination.

Materials Needed (per student)
- Clear, plastic glove (food service gloves work well)
- 5 cotton balls
- 5 types of seeds
- Pencil
- Water
- Yarn
- Marker

Standards
Common Core:
CCSS.ELA-Literacy.RL.K.9; RL.K.10; RI.K.9; RI.K.10; W.K.3; W.K.7; W.K.8; SL.K.3; RI.4.7; SL.4.1

NGSS:
K-LS1-1; K-ESS3-1; 2-LS2-1; 3-LS1-1; 3-LS3; 3-LS4; 5-LS2-1

Lesson Summary
This lesson is designed to show students how seeds begin to turn into plants and what seeds need for germination.

Suggested Sequence of Events:
1. Set Up: Pass out supplies to each student and have them write their names on their gloves.
2. Read "Oh Say Can You Seed?" by Bonne Worth to capture student interest.
3. Read the IL AITC Soil Ag Mag to learn about soil. Interactive online versions can be found on our website.
4. Complete the activity following the procedures:
    - Label each finger of the glove with the type of seed you will be planting.
    - Wet five cotton balls and wring them out.
    - Dip each cotton ball in a different type of seed.
    - Put each cotton ball with the seeds attached into each finger of the glove. (hint: you may have to use a pencil to get the cotton ball all the way to the tips of the glove fingers)
    - Blow a little air into the glove and then tie it closed at the top with a piece of yarn.
    - Tape the glove to a window, chalkboard, or wall. You may want to hang a clothes line under a chalk tray and use clothes pins to hold the gloves on.
    - The seeds will germinate in 3 to 5 days.
    - Transplant the seeds at about 1 1/2 to 2 weeks by cutting the tips of the fingers off the glove.
    - Transplant the small plants, cotton ball and all, into soil or sphagnum moss.
5. Whole class discussion and reflection of activity. Keep a plant growth journal as you go! Then, have students discuss their growth with a partner or in small groups.

TEACHER RESOURCES

Extension Ideas:

- Teach or review the term ‘germination.’
- Read “The Curious Garden” by Peter Brown and talk about the importance of gardening and hard work.
- Have students draw or take pictures of their observations on their plant growth.
- Have students measure the growth of their plants and record the data on a graph.
- Scientific Inquiry: What do seeds need to germinate? Create a list of what students think a seed needs in order to germinate, and then test those variables. Once the plants germinate, does they need different nutrients/conditions to survive?
- Have students research a native Illinois flower and its usual pollinators.
    - Students can write a paper about their findings.
- Draw comic strips that show an understanding of seed germination and growth.
- If transplanting seeds to pots, have students decorate their pots before they plant their seeds.
- Learn about the difference of “soil” vs. “dirt.”
- Learn about different Illinois pollinators!
- Have students write a paragraph about the importance of pollinators.
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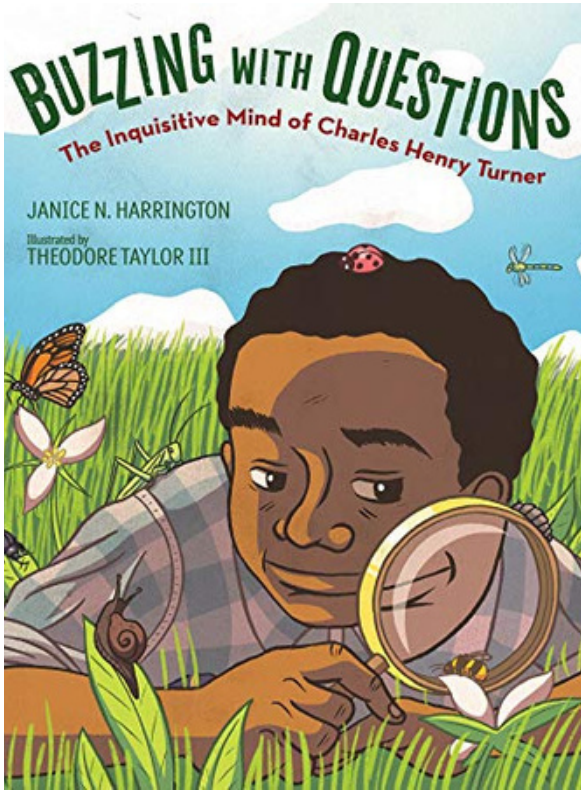

Buzzing with Questions: The Inquisitive Mind of Charles Henry Turner
Janice N. Harrington

Can spiders learn? How do ants find their way home? Can bugs see color? All of these questions buzzed endlessly in Charles Henry Turner's mind. He was fascinated by plants and animals and bugs. And even when he faced racial prejudice, Turner did not stop wondering. He constantly read, researched, and experimented.

ACCOMPANYING IAITC LESSON:

Scientific Inquiry Worksheet
Help students learn about scientific inquiry with this experimental design activity!

See following page(s) for lesson plan!

Science

Scientific Inquiry

It all starts with a question! Everything we have today came from someone questioning the current beliefs, technologies, and practices of that time with hopes to gain new knowledge, discover something new, or to make something better or different!

Scientific Inquiry is investigating and finding evidence from observations in order to create logical explanations and answer questions!

Phenomenon:

What do you already know about this phenomenon?

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

?

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?

Scientific Inquiry

Materials:

Control:

Variables:

Now that you brainstormed, finalize your experiment. Using complete sentences, explain how you will set it up!

Scientific Inquiry

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?

Science

Scientific Inquiry Worksheet

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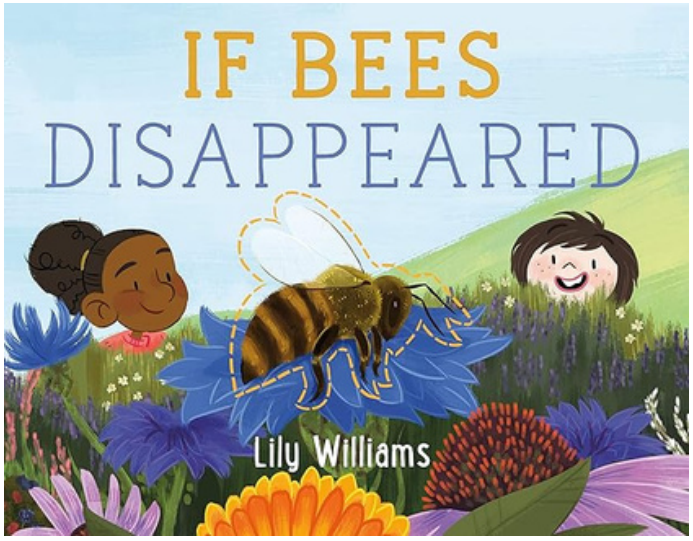
AG-ACCURATE BOOK RECOMMENDATION:



If Bees Disappeared
Lily Williams

Though bees are small, their importance is BIG. Today there are over 250,000 species of bees but all of them are in danger. Because of disease, pesticide exposure, lack of foraging habitats, and poor nutrition, entire honey bee hives are dying. What would happen if bees disappeared completely? Artist Lily Williams explores how such a loss would effect not just bees' environment, but the world as a whole in this poignant, beautiful book about the importance of our most important bees.

ACCOMPANYING IAITC LESSON:

Build A Bee Hotel

Let students be creative as they learn about the importance of pollinator habitats with this fun STEM activity.

See following page(s) for lesson plan!

Art Science

Build-a-Bee Hotel

Grade Level
2-5

Length of Lesson
30-60 minutes

Objective
By the end of this lesson, students will have a better understanding of native bees, their habitat, and how we can help them prosper.

Materials Needed
- Empty, clean aluminum food cans with lids removed
- Cardboard and bamboo bee tubes (available online)
- Pinecones, bark, small twigs, and other organic materials
- Wire and wire snips
- Paint supplies

Standards
NGSS
2-LS4-1; 3-LS2-1; 3-LS4-4; 5-ESS3-1

Illinois Visual Arts
VA: Cr2.1.2-5; VA:Cr2.2.2-5

Lesson Summary
This lesson is a fun, hands-on activity designed to introduce students to different types of pollinators, help them understand the importance of pollinators, and provide them a chance to design and build their very own “bee hotel” to add to their school or home garden.

Suggested Sequence of Events:
1. Set Up: Have students bring in empty aluminum cans from home and collect them. Drill a small hole near the edge of the round side of each can before giving to each student. Plan for a “foraging day” in which students can gather pinecones, bark, and small twigs from around the school.
2. Read through the IAITC Pollinator Ag Mag to learn more about pollinators and the process of pollination! Interactive online versions can be found on our website.
3. Students should have a basic understanding of the diversity of pollinators in our environment, and how different pollinators need different types of habitat and are attracted to different types of flowers. See the Teacher Resources page for a list of suggested books.
4. Complete the activity following the procedures:
    - Give each student an aluminum can to decorate. Students can decorate them to look like a bee or other pollinator if they choose. Wire can be used to make and attach wings, and bottle caps and googly eyes can be used as the insect eyes as well.
    - Once the paint dries, it is time to fill each can with the bee tubes and some of the materials collected from outside. Different bee species need different sized openings for their nests, so having a variety is a good thing. It may be necessary to cut the bee tubes to the length of the can.
    - Wires can be strung through the hole in the bottom of the can and through the open top in order to hang the bee hotels in the garden.
        - See the Teacher Resources page for additional ideas and variations.
4. Whole class discussion and reflection of activity.

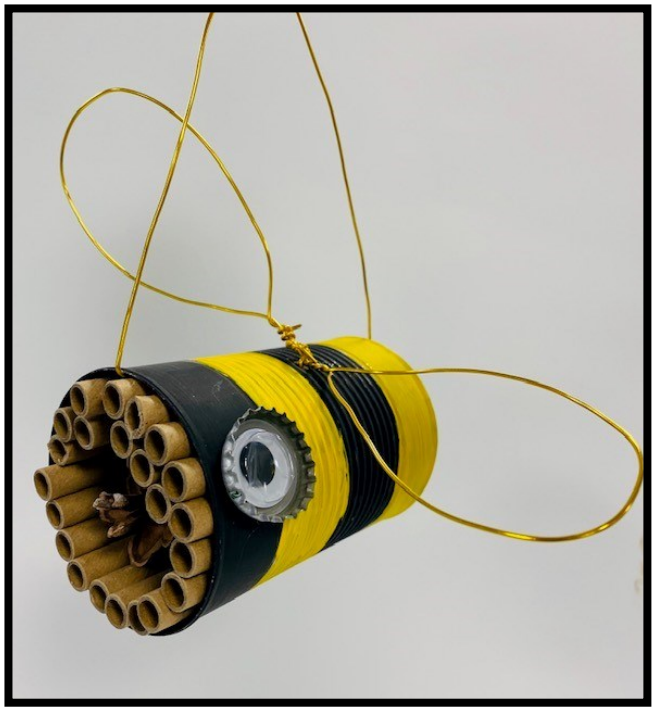
TEACHER RESOURCES

Background information on native Illinois bees:
Honeybees get a lot of the attention when we discuss pollinators. While they are important to our food supply, native pollinators are just as important, and need our help in establishing and maintaining habitat for them to reproduce.

There are 400 to 500 species of native bees in Illinois. These include bumble bees, carpenter bees, cuckoo bees, mason bees, sweat bees, mining bees, and many more. These native bees live in wetland, woodland, grassland, and urban habitats across the state. All bees need a place to lay their eggs so that their larvae and pupae can safely develop into the next generation of bees. Native Illinois bees have a wide variety of nesting styles which allow them to raise their young. Some live solitary lives away from other bees. Some create communal and semi-social hives. The cuckoo bee is considered a “nest parasite” because it invades the hive of another species of bumblebees and tricks them into raising their young for them!

Additional Ideas and Variations:

- A variety of materials can be used to create bee hotels. Alternatives include empty bottles, wooden boxes, PVC pipe, and more. The containers should block the rain and should be closed on one end—many bees will not nest in tubes that are open on both ends. The containers should also be opaque to block the light to better attract pollinators.
- Spraying the painted hotels with clear lacquer before placing outside may protect the paint finish for longer.
- Instead of hanging the bee hotels, they can also be attached with screws or plastic zip ties to a post or other structure and then filled with nesting materials.
- Students could also fill milk cartons with a sand/clay/water mixture and then press holes into the wet clay with a small stick or dowel rod. Once dry, these can be placed in the garden, protected from rain, to attract bees.



Resources:

- Some excellent pollinator books to pair with this activity include: *Give Bees a Chance* by Bethany Barton, *Honeybee* by Candace Fleming, *Buzzing with Questions* by Janice Harrington, and *Flowers are Calling* by Rita Gray.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

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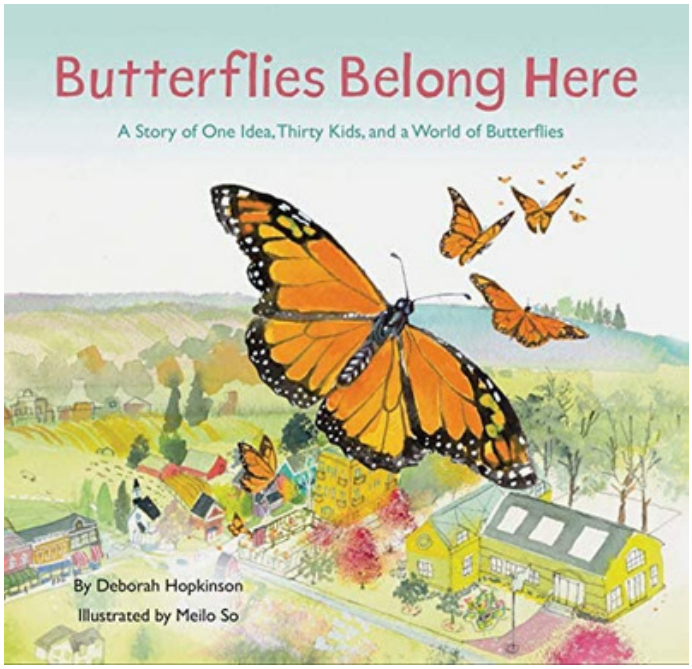
AG-ACCURATE BOOK RECOMMENDATION:



Butterflies Belong Here
Deborah Hopkinson

In this moving story of community conservation, a girl finds a home in a new place and a way to help other small travelers.

This book is about the real change children can make in conservation and advocacy–in this case, focusing on beautiful monarch butterflies.

ACCOMPANYING IAITC LESSON:

Throw and Grow

Create a new habitat for pollinators using wildflower seeds, modeling clay, and potting soil.

See following page(s) for lesson plan!

Throw & Grow

Grade Level
2-5

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will be able to explain the importance of pollinators.

Materials Needed
- Air dry clay
- Compost
- Wildflower seeds (native to your area)
- Small spray bottle with water

Standards
Common Core
CCSS.ELA-Literacy.RI.4.7; SL.4.1

NGSS
2-LS2-1; 3-LS1-1; 3-LS3; 3-LS4; 5-LS2-1

Lesson Summary
This lesson is a fun, hands-on activity designed to teach students more about the importance of pollinators. Students will also learn about seed germination and plant growth as you watch your flowers grow!

Suggested Sequence of Events:
1. Read "Up in the Garden and Down in the Dirt" by Kate Messner to snag student interest!
2. Read through the IL AITC Pollinator Ag Mag to learn about pollination. Interactive online versions can be found on our website.
3. Complete the activity following the procedures:
    - Have each student pull off a piece of clay and spread it out to be large enough to pour the compost on it.
    - Have them pour a pinch of compost on the clay and then pour the seeds on top of it.
    - Then, have students spray a small amount of water (one or two sprays) on their seeds.
    - Allow each student to fold together and knead the mixture until the mixture is thoroughly mixed together.
    - Have them roll it into a ball and bring it out to dry in the sun.
    - Now it is time to "throw and grow." Have them throw their seeds into their yard and wait for them to grow.
5. Whole class discussion and reflection of activity.

TEACHER RESOURCES

Background Information:
Spring is the best time to toss your throw and grows into your yard or an approved location at your school. Try to time it before a heavy rainfall in order to help the seeds germinate.

The clay helps hold the soil and seeds together. Once thrown, the clay will hold the compost and seeds together so the seeds have a nutritious home to germinate. Over time, the seeds will root into the ground and weather conditions will break down the clay.

Extension Ideas:

- Read "Our School Garden" by Rick Swann and talk about the importance of flower gardens. Talk with your principal and maintenance staff and see if there's an approved location on the school grounds where you can grow a pollinator garden.
    - Have students measure, design, and build the garden before you complete this activity.
    - If there is no approved location, have students 'throw' their "Throw & Grows" into a flower pot and set the pots by your classroom windows.
- Have students draw or take pictures of their observations on their plant growth.
- Have students measure the growth of their plants and record the data on a graph.
- Have students research a native Illinois flower and its usual pollinators.
    - Students can write a paper about their findings.
- Have students think more deeply about the role each material played in their throw and go; What is compost used for? What would happen if we didn't water it? How does a seed become a plant?
- Learn about the difference of "soil" vs. "dirt."
- Learn about different pollinators!
    - Invite a beekeeper in to talk about bees.
    - Get involved and learn about the Illinois Monarch Project. Available at https://www.ilfb.org/resources/ifb-in-action/illinois-monarch-project-provides-resources/
    - Watch this video from the Illinois Farm Bureau all about pollinator habitats. Available at https://www.youtube.com/watch?v=_QYvaiozsFc
- Have students write a paragraph about the importance of pollinators.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

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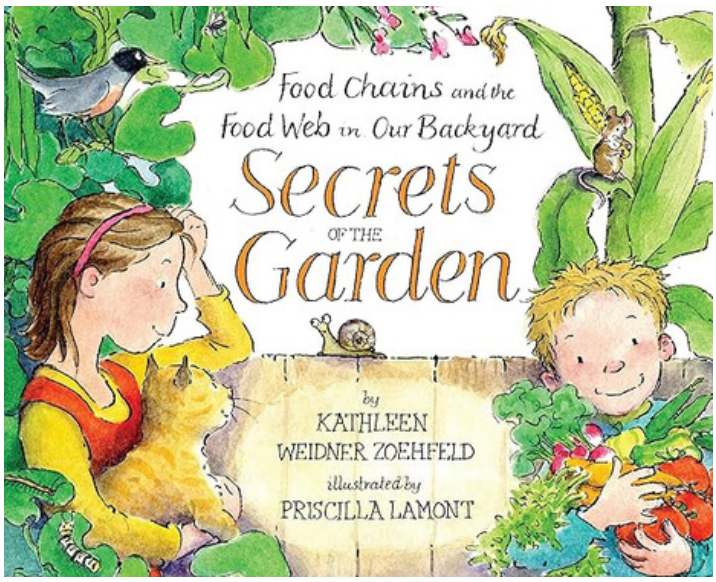

Secrets of the Garden: Food Chains and the Food Web in Our Back Yard
Kathleen Weidner Zoehfeld

Alice's family plants a vegetable garden each spring, and this budding naturalist reports all she sees about how the plants grow, what insects come to eat the plants, and what birds and animals come to eat the insects. It's the food chain, right in her own backyard! While Alice's narrative is simple and engaging, science concepts are presented in more depth in sidebars by a pair of very knowledgeable chickens!

ACCOMPANYING IAITC LESSON:

Circle of Earth Bracelet

Learn about the "circles" of the Earth and recognize the importance of the connections between natural resources.

See following page(s) for lesson plan!

Circle of Earth Bracelet

Science Literacy

Grade Level
K-4

Length of Lesson
30 minutes

Objective
After completing this lesson, students will better understand the inter-connected "circles" of the life systems on Earth.

Materials Needed:
- 1 pipe cleaner per student
- 1 small clear pony bead (people)
- 1 small blue pony bead (water)
- 1 small green pony bead (plants)
- 1 small brown pony bead (soil)
- 1 small orange pony bead (day)
- 1 small black pony bead (night)
- 1 small white pony bead (air)
- 1 small yellow pony bead (sun)
- 1 small red pony bead (animals)

Standards
Common Core
Language Arts: CCSS.ELA-Literacy.RI.4.3; RI.4.4; RI.4.5; RF.4.3a
NGSS
3-LS2-1; 3-LS4-3; 3-LS4-4; 3-LS1-1; 3-LS3-1; 3-LS3-2; 3-LESS2-1; 3-ESS3-1; 4-LS1-1; 5-ESS3-1

Lesson Summary
This lesson is designed to help students recognize the important resources our Planet Earth provides us. Students will learn about protecting the planet and will be more prepared for Earth Day!

Suggested Sequence of Events:
1. Listen to "Earth: Where Would we be Without It?" by Kathleen Kranking to get students thinking about protecting the Earth.
2. Pre-Activity Discussion:
    - Pass out materials to each students
    - Talk about what the beads represent
    - Blue: Water is a circle. Water rains down on land. Water collects in oceans, rivers, lakes, and streams. It evaporates back up into the sky and collects in clouds. The clouds become heavy, and rain falls down to land again.
    - Green and Brown: Plants and soil are circles. Plants grow from soil. Plants provide food for animals.
    - Red: Animals provide food for other animals. Animals die and decompose. New soil is made. New plants grow.
    - Black and Orange: Earth is a circle. Earth is spinning through space, rotating on its axis, revolving around the sun. The Earth and sun give us the circle of the seasons and the circle of night (black) and day (orange).
    - White: Air is a circle. Animals breathe in oxygen and exhale carbon dioxide. Plants take in carbon dioxide, use it to make food, and give off oxygen. Animals breathe it in again.
    - Yellow: The sun is a circle. The sun provides warmth for light for all of the Earth's circles. Without the sun, plants and animals would not survive. The sun binds us together.
    - Clear: People move in circles. The earth provides us with everything we need to survive. The survival of our planet hinges on how well we, the people, are stewards of Earth's resources.
3. Complete the activity following the procedures:
    - String the colored beads on to the pipe cleaner to represent the circles of the Earth.
    - String opposite end of the pipe cleaner back through the clear "People" bead. Now your clear "People" bead is an adjuster for the bracelet since everything "hinges" on the people.

TEACHER RESOURCES

Extension Ideas:

- Read "Earth Day Hooray!" By Stuart J. Murphy to learn more about recycling.
  - Have a discussion about recycling. Talk about different ways you can help recycle.
  - Take a field trip to a park and have students help clean it up.
- Bring in items that can or can't be recycled. Have students vote on if the items are recyclable or trash.
- Have students play Recycle Round Up on National Geographic Kids to further their recycling knowledge while playing a fun online sorting game!
- Teach students consumption, conservation, and preservation.
  - Divide your students into 3 groups and pass out a small piece of candy to each student
  - Tell Group 1 that they may eat their candy. They represent consumption – the utilization of the resource.
  - Tell Group 2 that they have to make their candy last by unwrapping it slowly, eating small bites, licking on it, savoring it, etc. They represent conservation – the careful use of the resource.
  - Tell Group 3 that they get to admire their candy but they cannot eat it. Ask them to admire the wrapper, the shape, the smell, etc. They represent preservation – saving of the resource for the future.
  - Let all students eat their candy when you're done.
- Read "The ABCs of Habitats" by Bobbie Kalman to help students learn more about natural animal habitats.
- Go on a nature walk.
  - Upper Grade Levels: Have students take a nature notebook with them to keep track of the things they see or find on their walk. After the walk, have students write a paragraph about their findings.
  - Lower Grade Levels: Talk about different animals or plants you see as you are walking. After the walk, have students draw a picture of something they saw.
  - Allow both grade levels to share their work with a partner and/or the rest of the class.

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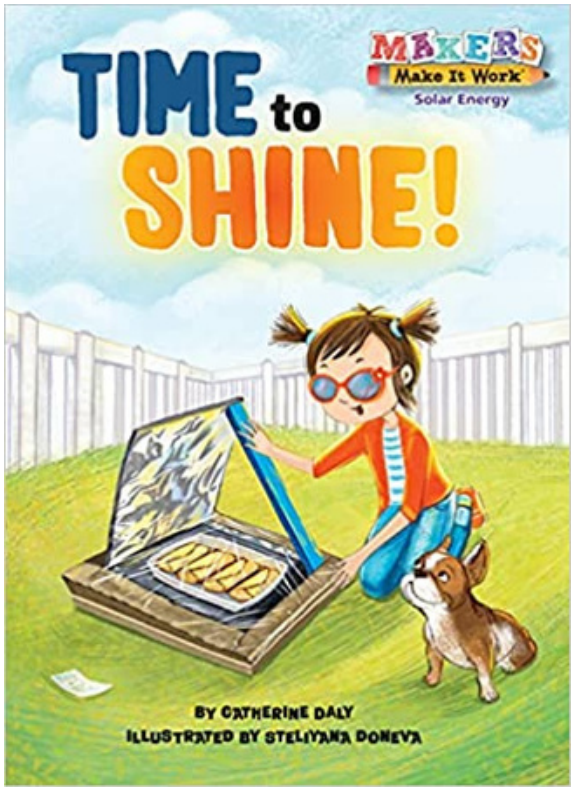


Time to Shine
Catherine Daly

Boom! Thunder crashes, and the electricity goes out. Sammi is crushed. Her parents had a fancy dinner planned! But no lights doesn't mean no power. Can Sammi use sun power to save the day?

Tying into the popular Makers Movement, Makers Make it Work is a series of fun easy-to-read stories that focus on problem-solving and hands-on action. These books show kids how to use their hands, their heads, their creativity, and their problem-solving skills to overcome every challenge facing them.

ACCOMPANYING IAITC LESSON:

Solar Oven

Learn how to harness the power of the sun to cook food with this fun STEM activity.

See following page(s) for lesson plan!

Solar Oven

Science

Grade Level
4-8

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will better understand the power of the sun's energy and how humans can use that power.

Materials Needed
- Cardboard pizza box
- Aluminum foil
- Black construction paper
- Clear kitchen plastic wrap
- Scissors
- Glue
- Stick or pencil

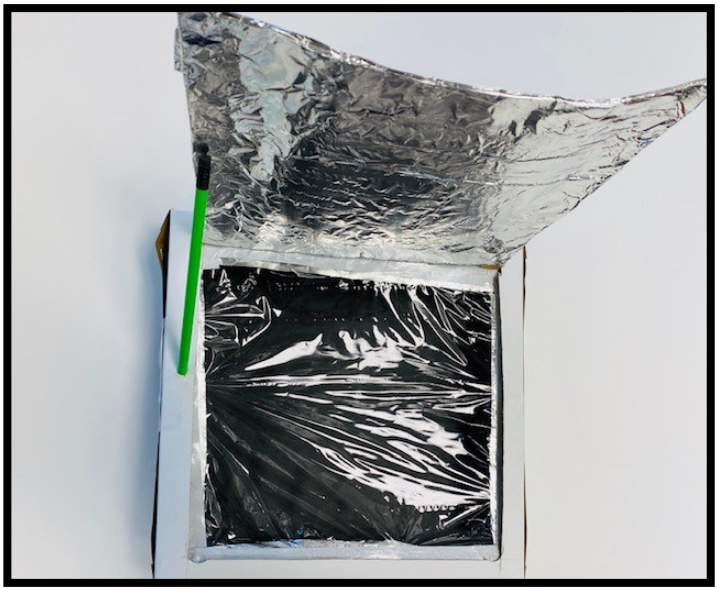
Standards
NGSS
3-5-ETS1-2; 4-PS3-2; 4-PS3-4; 4-ESS3-1, 4-ESS3-2, 3-5-ETS1-2, MS-PS3-3; MS-PS1-4; MS-PS3-3-4

Lesson Summary
This lesson is designed to provide students an opportunity to build a solar oven in order to cook food using solely the sun's energy.

Suggested Sequence of Events:
1. Read *Time to Shine* by Catherine Daly to learn more about how solar ovens can be built and used to cook food.
2. Complete the activity following the procedures:
    - Give each group the necessary materials to build their own solar ovens.
    - On the lid of the pizza box, use scissors or a box knife (with help from an adult!) to cut through the cardboard on three sides, leaving about an inch between the sides of the flap and the edges of the lid. Fold this flap out on the uncut side so that it stands when the box lid is closed.
    - Cut aluminum foil to fit on the inside of this flap. Use glue to attach.
    - Cut clear plastic wrap to fit the hole from the flap in the lid of the box. Attach from the underside of the lid with tape or glue.
    - Next, line the inside of the box with foil adhered with glue.
    - Then, cut black construction paper to the size of the bottom of the box and glue to the foil.
    - Use a pencil or stick to prop open the flap of the solar oven. Place food, such as a piece of pizza or a s'more, into the oven and position to maximize the reflection of the sun's rays into the oven chamber beneath the clear plastic.
    - Allow students to experiment by changing the types of food, the angle of the flap, and attempting to cook with different outside temperatures and cloud cover.
4. Whole class discussion and reflection of activity. In what types of situations might this solar oven be useful? What are ways this design could be perfected to cook food more efficiently? What is the purpose of the plastic wrap in the solar oven?

Extension Ideas:

- Learn more about the types of thermal transfer: radiation, conduction, and convection. This activity uses radiation—the transfer of heat without direct contact between the two objects.
- Discuss how the solar oven traps the sun's heat (thermal energy) inside to raise the temperatures.
    - Keep in mind that extreme physical changes in the food may not occur but that the temperatures of the food will increase. Recording the temperature of the food before and after would show the trapping of the heat of the sun.
- Learn more about how temperature affects the properties of materials and sometimes those changes cannot be undone.
    - For example, heating chocolate will cause melting, but a decrease in the temperature will cause the chocolate to become a solid again. But a marshmallow heated over a fire will brown and the change in properties cannot be undone.
- Learn more about renewable energies and the concept of greenhouse gases.
- Learn about how the sun's energy is important for many different reasons. Can they trace the flow of the sun's energy through the food chain? Can they explain how the sun's energy drives the water cycle?
- Discuss the pros and cons of using the solar oven for cooking their food.
- Incorporate the IAITC Pizza and Nutrition Ag Mags into this lesson to provide background information on how some of our favorite foods are grown and transported to our tables.
- Use thermometers inside the solar ovens to test how hot they can get on days with different environmental conditions.
- Provide students with materials to make their own versions and see which design is most effective in heating up food.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!



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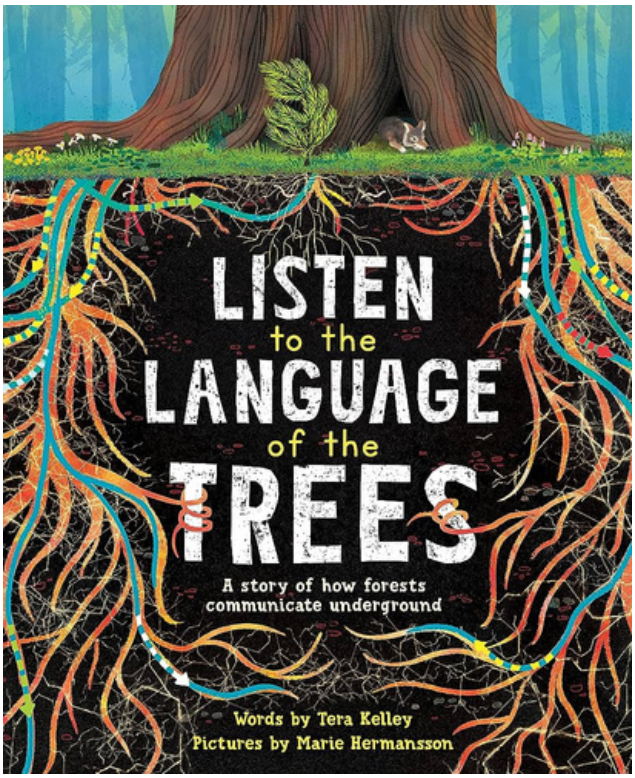


Listen to the Language of the Trees
Tera Kelley

This captivating book explores the real connection and communication that runs underground between trees in the forest. The well-researched details about trees' own social network will help readers see that the natural world's survival depends on staying connected and helping others–just like us! The fascinating mycorrhizal fungi network runs underground through the roots of trees in the forest allowing for connection and communication. Readers will discover that trees have their own social network to help each other survive and thrive.

ACCOMPANYING IAITC LESSON:

Healthy Trees: Apple Addition

Get students out of their seats to learn about the many factors necessary to grow healthy apple trees.

See following page(s) for lesson plan!

Healthy Trees: Apple Addition

Math

Grade Level
2-3

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will better understand factors that influence tree health.

Materials
- Poker chip set with at least 10 different colors (this is the one we purchased - if you have a different one, you may have to modify the colors on the worksheet)
- Student handouts

Standards
Common Core
CCSS.Math.Content.2.OA.1, 2.OA.2, 2.NBT.5, 2.NBT.6, 3.OA.3, 3.OA.7

NGSS
3-LS4-3, 3-LS4-4

Lesson Summary
This lesson is designed to help students better understand the many factors necessary to grow healthy apple trees, all while practicing multiple step math equations.

Suggested Sequence of Events:
1. Set Up: Print student handouts for each student.
2. Read through the IAITC Apple Ag Mag to learn more about apples. Interactive online versions can be found on our website. Additional books to pair with this lesson can be found on the Teacher Resources page.
3. Ask students to spread out in the classroom (or on the playground). They should stand with enough room to "spread their branches." Once they have evenly spread out, they are now apple trees and are "rooted" to the ground.
4. Randomly throw out the poker chips to scatter the floor around the students. Each student should be able to grab some chips, but do not worry about making it exactly even.
5. Following the order on the student worksheet, ask students to quickly pick up the poker chips of that color after you say "go." Students cannot move their feet (they are trees, after all) and must only gather what they reach from their position.
6. After each color has been collected, explain to students what that color represents and why it is important to consider for apple tree growers focused on the health of their apple tree. Use the "Tree Health Indicators" handout to assist with this Some colors are beneficial to the tree, and others are harmful. It is important to not tell students ahead of time what each represents, so they will always attempt to gather as much as they can.
7. Once all colors have been collected, have students return to their seats to start counting their chips and completing the math equations on the Student Handouts. The students with the highest scores managed to grow into the healthiest trees in the orchard.
8. Discussion: Discuss with students why each of these factors is important to tree health. What can farmers and growers do to help their trees become as healthy and strong as possible?

TEACHER RESOURCES

Extension Ideas

- Learn more about each of the "Tree Health Indicators" from this lesson. Are these helpful and/or beneficial for other trees, flowers, and crops?
- Learn more about the life cycle of apple trees.
  - Show a labeled diagram of a blossom and of an apple.
  - Watch a time lapse video of an apple growing. How long does the actual process take?
- Take a field trip to a nearby apple orchard and learn more about apple farming. What do apple farmers do throughout the year to take care of their orchards?
  - Take a virtual field trip to Braeutigam Orchard in Belleville, Illinois, and learn more about apple farming. This video can be found on our website.
- Have students write a story that takes place at an apple orchard.
- Learn about Controlled Atmospheric Storage and how apples are kept ripe after they are harvested.
- Do all apples look and taste the same? Have students use their senses to compare different varieties of apples.
- Are apples native to the United States? Learn about the history of apples.
- Go to agintheclassroom.org to contact your County Ag Literacy Coordinator for free classroom sets of our Ag Mags!

TREE HEALTH INDICATORS

YELLOW - SUNLIGHT

Trees need sunlight for photosynthesis in order to create their own food for energy.

GREEN - SOIL NUTRIENTS

Trees get vital nutrients from the soil through their roots. If the soil doesn't have many nutrients, farmers add fertilizer to the soil or to irrigation water.

PINK - HARMFUL INSECTS

Apple trees have many harmful pests that can impact tree health throughout the entire growing season.

ORANGE - POLLINATORS

Pollinators are vital for apple crops. Honeybees and other native IL pollinators help blossoms turn into apples for us to eat.

WHITE - KILLING FROST

Many different plants are sensitive to temperature changes. On cold spring and summer nights, some growers spray their apple trees with water during cold spells to insulate sensitive blossoms.

PURPLE - DISEASE

A combination of heat and humidity is the perfect environment for many microorganisms to grow, some of which cause plant diseases. Some microbes can live in the soil for many years.

BLUE - WATER

Trees need substantial amounts of water, especially young trees, but most don't like their "feet wet".

RED - EFFECTIVE PRUNING

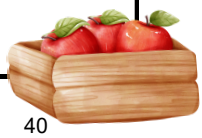
Effective pruning of apple trees is essential for tree and fruit health. Apple trees need a leader branch and a lot of room between branches for airflow and sunlight.

BLACK - PROPER THINNING

Apple trees must be properly thinned to allow fewer number of fruits to reach maturity. This helps the remaining fruit grow larger and protect the tree limbs from being too heavy.

FUCHSIA - STAKING & TRELLISING

Young trees are not as strong as mature trees. Using a trellis or stake to hold it upright will help the young tree stay standing if it gets really windy outside.



Name: _____

HEALTHY TREES: APPLE ADDITION

Just like all other plants, apple trees need certain things to be healthy! But there are also things that can be harmful to apple tree health. Each color chip represents something that is either beneficial (good) or harmful (bad) for the overall health of an apple tree. Complete the math equations below based on the number of chips you collected to see how healthy your tree is!

1. Sort the color chips you collected into separate piles.
2. Record (write) the number of chips collected into the box labeled with the same color. That number of chips represents how each thing affects your tree's overall health.
3. Fill in the remaining blanks in the box to write the multiplication equation.

YELLOW = SUNLIGHT

Beneficial, earn double points!

Number of chips collected: _____

_____ x 2 = _____

The number of color chips collected | Total score for the color

WHITE = KILLING FROST

Harmful, lose triple points!

Number of chips collected: _____

_____ x 3 = _____

The number of color chips collected | Total score for the color

ORANGE = POLLINATORS

Beneficial, earn double points!

Number of chips collected: _____

_____ x 2 = _____

The number of color chips collected | Total score for the color

PURPLE = DISEASE

Harmful, lose double points!

Number of chips collected: _____

_____ x 2 = _____

The number of color chips collected | Total score for the color

GREEN = SOIL NUTRIENTS

Beneficial, score equals number of chips collected!

Number of chips collected: _____

_____ x 1 = _____

The number of color chips collected | Total score for the color

PINK = HARMFUL INSECTS

Harmful, score equals number of chips collected!

Number of chips collected: _____

_____ x 1 = _____

The number of color chips collected | Total score for the color

Name: _____

HEALTHY TREES: APPLE ADDITION

Just like all other plants, apple trees need certain things to be healthy! But there are also things that can be harmful to apple tree health. Each color chip represents something that is either beneficial (good) or harmful (bad) for the overall health of an apple tree. Complete the math equations below based on the number of chips you collected to see how healthy your tree is!

1. Sort the color chips you collected into separate piles.
2. Record (write) the number of chips collected into the box labeled with the same color. That number of chips represents how each thing affects your tree's overall health.
3. Fill in the remaining blanks in the box to write the multiplication equation.

YELLOW = SUNLIGHT

Beneficial, earn double points!

Number of chips collected: _____

_____ x 2 = _____

The number of color chips collected — Total score for the color

WHITE = KILLING FROST

Harmful, lose triple points!

Number of chips collected: _____

_____ x 3 = _____

The number of color chips collected — Total score for the color

ORANGE = POLLINATORS

Beneficial, earn double points!

Number of chips collected: _____

_____ x 2 = _____

The number of color chips collected — Total score for the color

PURPLE = DISEASE

Harmful, lose double points!

Number of chips collected: _____

_____ x 2 = _____

The number of color chips collected — Total score for the color

GREEN = SOIL NUTRIENTS

Beneficial, score equals number of chips collected!

Number of chips collected: _____

_____ x 1 = _____

The number of color chips collected — Total score for the color

PINK = HARMFUL INSECTS

Harmful, score equals number of chips collected!

Number of chips collected: _____

_____ x 1 = _____

The number of color chips collected — Total score for the color

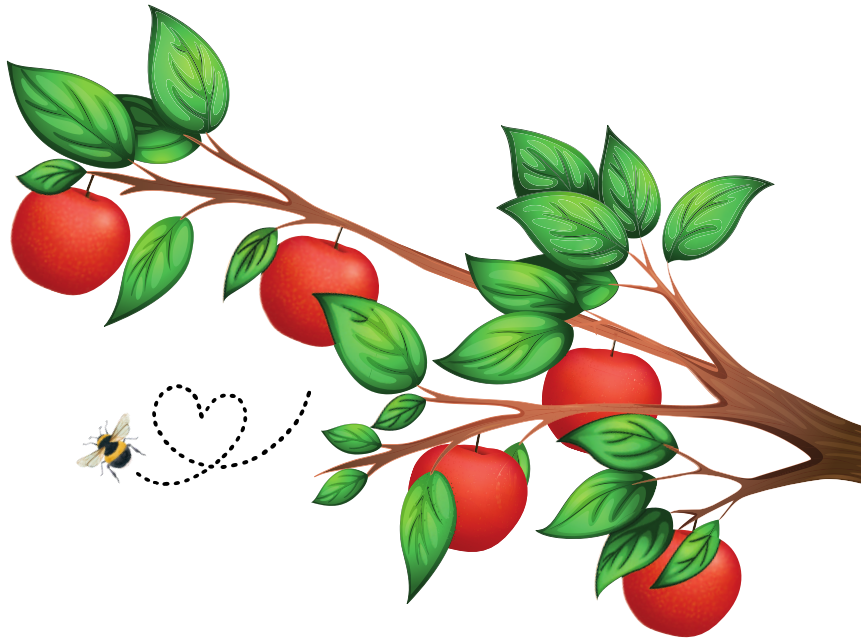
FUCHSIA = STAKING & TRELLISING

Beneficial, score equals number of chips collected!

Number of chips collected: _____

_____ x 1 = _____

The number of color chips collected



BLUE = WATER

Beneficial but possibly harmful, complete the equation to find your final score.

Number of chips collected: _____

_____ x 1 = _____

The number of color chips collected

Is this number less than or equal to 5? If yes, this is your score for this color. STOP

Is this number more than 5? If yes, then subtract 2 from your answer to find your final score.

_____ - 2 = _____

Your score from the first box

RED = EFFECTIVE PRUNING

Beneficial but possibly harmful, complete the equation to find your final score.

Number of chips collected: _____

_____ x 1 = _____

The number of color chips collected

Is this number less than or equal to 5? If yes, this is your score for this color. STOP

Is this number more than 5? If yes, then subtract 3 from your answer to find your final score.

_____ - 3 = _____

Your score from the first box

BLACK = PROPER THINNING

Beneficial but possibly harmful, complete the equation to find your final score.

Number of chips collected: _____

_____ x 1 = _____

The number of color chips collected

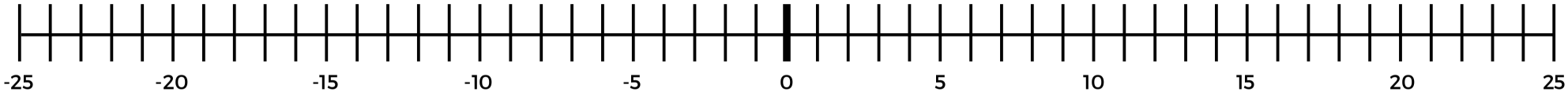
Is this number less than or equal to 5? If yes, this is your score for this color. STOP

Is this number more than 5? If yes, then subtract 2 from your answer to find your final score.

_____ - 2 = _____

Your score from the first box

1. Write the total score for each color in the box below. These are the scores for each color from the previous pages.
2. Use the number line to help you determine your overall apple tree health score! Put your beneficial (positive) score on the number line first, then subtract your harmful (negative) score second. This final number is your overall apple tree health!



Yellow _____

Orange _____

Green _____

Blue _____

Red _____

Black _____

Fuchsia _____

Add all your beneficial totals together to determine your total positive score.

TOTAL _____

White _____

Purple _____

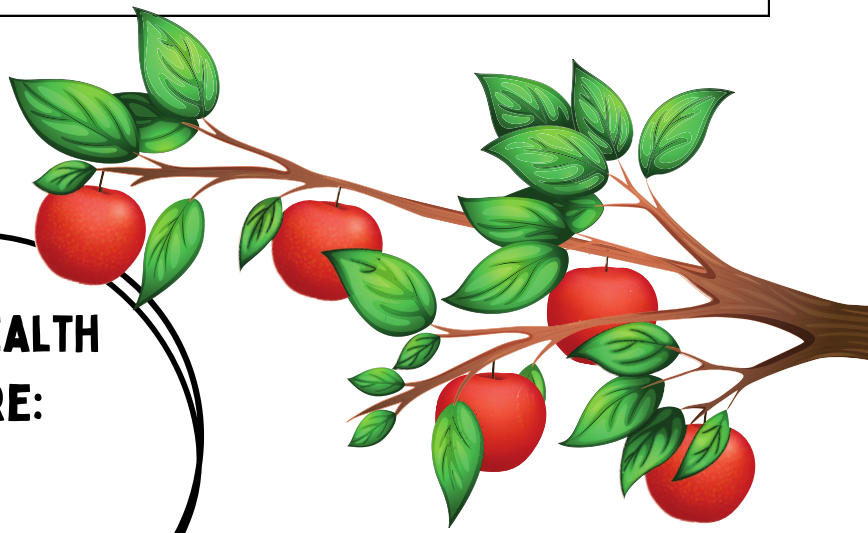
Pink _____

Add all your harmful totals together to determine your total negative score.

TOTAL _____

Using the beneficial total minus the harmful total, write an equation in the box below to show how to find the final tree health score.

TREE HEALTH SCORE:



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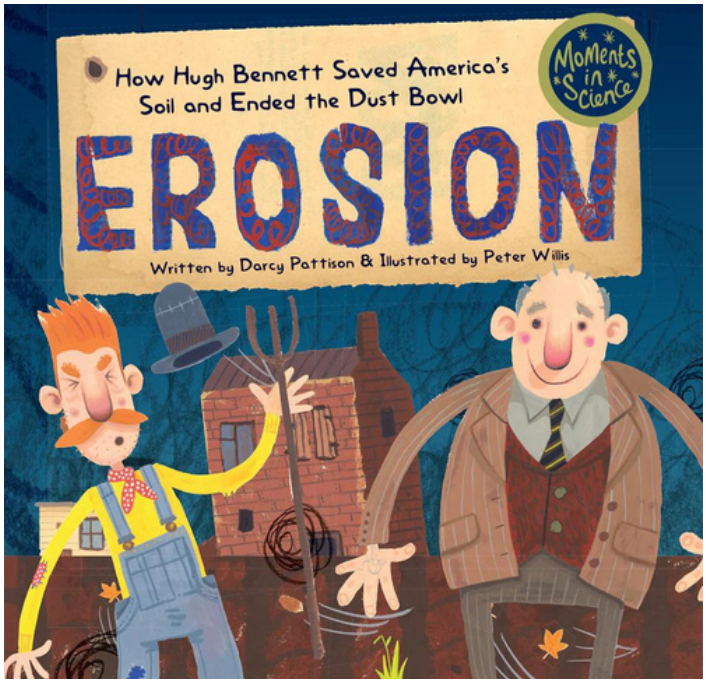
AG-ACCURATE BOOK RECOMMENDATION:



Erosion: How Hugh Bennett Saved America's Soil and Ended the Dust Bowl
Darcy Pattison

When the dust storms of the 1930s threatened to destroy U.S. farming and agriculture, Hugh Bennett knew what to do. For decades, he had studied the soils in every state, creating maps showing soil composition nationwide. He knew what should be grown in each area, and how to manage the land to conserve the soil. He knew what to do for weathering and erosion.

ACCOMPANYING IAITC LESSON:

Soil Your Undies

Bury your undies underground and let the critters in the soil decompose them over time.

See following page(s) for lesson plan!

Science

Soil Your Undies!

Grade Level
K-12

Length of Lesson
30 minutes
recurring over several months

Objective
By the end of this lesson, students will understand how soil organisms impact soil health and the environment.

Materials Needed
- White cotton underwear (pack of six recommended)
- Shovel
- Locations where you can dig and bury
- Underwear Diary (one copy for each student)

Standards
Common Core
CCSS.ELA-Literacy.RI.4.3; RI.5.2, RI.6.2

NGSS
K-ESS2-2, K-ESS3-1, 2-LS4-1, 3-LS4-3, 4-ESS2-1, 5-LS2-1, MS-LS2-1, MS-LS2-5, HS-LS2-7

Lesson Summary
This lesson is a fun, hands-on activity where students will be able to understand what makes a soil healthy by burying pairs of cotton underwear and watching them decompose over time.

Suggested Sequence of Events:
1. Set Up: Purchase a pack of six white boy's or men's cotton underwear like these.
2. Set Up: Find five locations (ideally with varying soil types) where you are able to dig and bury.
    - Extension idea for grades 7-12: have them help you brainstorm and decide where to bury.
3. Read a few books from The Scoop on Soil: Recommended Reading list to capture student interest.
4. Read through the IAITC Soil Ag Mag to learn about soil. Interactive online versions can be found on our website.
5. Pre-Activity Discussion: Learn about all the living things inside soil and how they interact with each other. Discover soil types in your area and discuss the correlation between presence of more microorganisms and overall soil health.
6. Preview the Activity: Inform students that in this activity, they will be burying five pairs of underwear in the soil and then digging them back up at various points through the school year. They will be examining the underwear before and after to see what impact the soil organisms had on the underwear while it was buried. Pass out an Underwear Diary to each student.
7. Make a Prediction: On the first page of their Underwear Diary, allow students to predict what might happen to the underwear buried in soil over time. Discuss their predictions and ask them to explain why their two predictions might be different.
8. Bury the Undies: Take a picture of the undies to document what they looked like on the day of burial. Have students sketch or describe the undies in the left columns of their Underwear Diary. Bury the undies in your five locations with as much or little student involvement as your students can handle.
9. Dig 'em up: Dig up the undies at different times through the year. (Example: Bury them week 1 of school. Dig up at/before Labor Day, Columbus Day, Veteran's Day, Thanksgiving, and Winter Break). Have students make observations in their packets.
10. Whole class discussion and reflection of activity.

TEACHER RESOURCES

Class Discussion:

- Results should show the more “healthy” a soil is (the more life—insects, microorganisms, etc.—a soil contains), the more damage will be done to the underwear. Organisms in the soil should ultimately “eat” all of the cotton of the underwear and leave just the elastic band, which is made of plastic and not biodegradable or consumable.
- If you dug up undies that were intact, but simply discolored: no presence of life in the soil.
- If you dug up undies that were any level of destroyed or decomposed: presence of life in the soil. More life = more damage to the undies.

Extension Ideas:

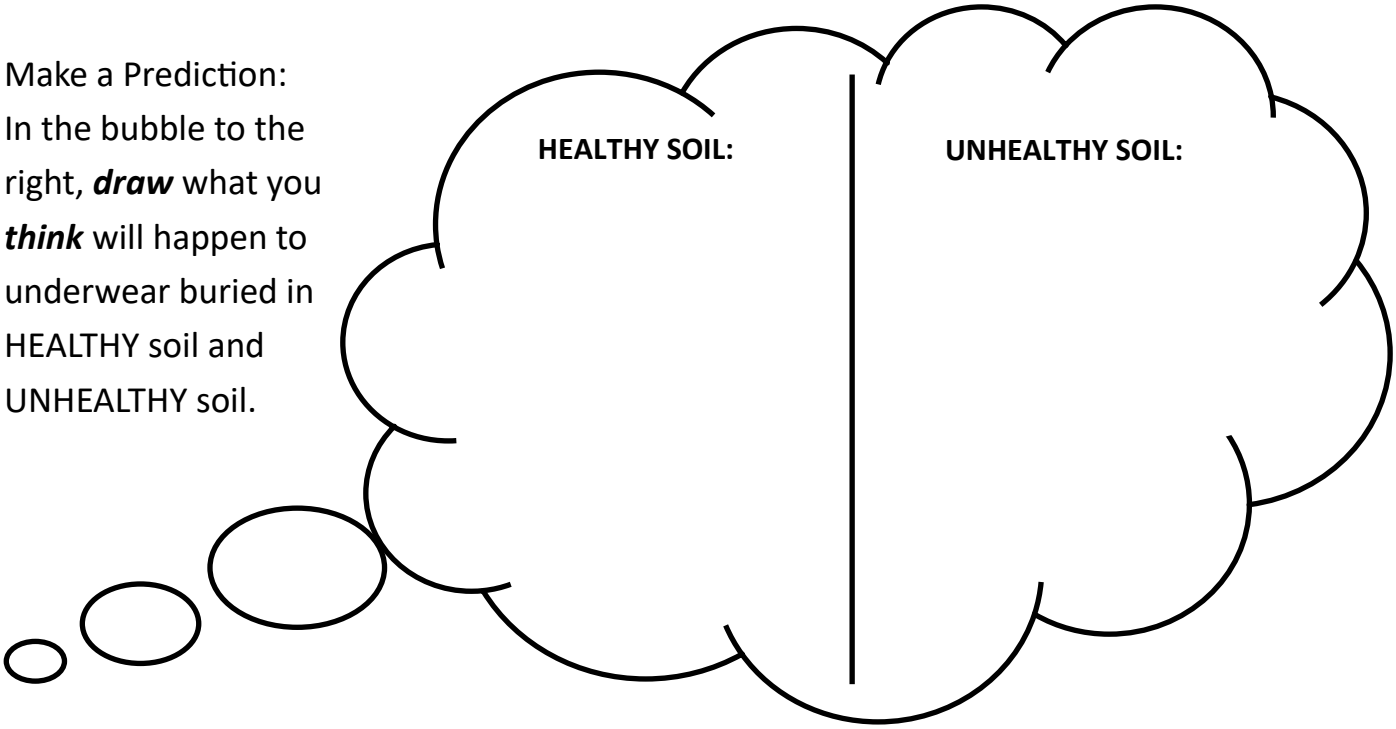
- Discuss the importance of soil to the agricultural system and to life in general.
- Discuss how life in the soil can be both beneficial and harmful to plant matter.
- Discuss how human activity may have an impact on soil.
- Complete other IAITC Soil Lessons.
- Take soil samples from your five areas where you buried the undies. Make further observations about color, texture, presence of organic matter and other living organisms. Maybe even look at the soil under a microscope!
- Utilize the Web Soil Survey at https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx to learn more about the soil in your area.
- Have students bury underwear at home and bring back in on a later day to compare.
- Invite a soil scientist into your classroom to teach students more about soil in your area.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

Science

Soil Your Undies!

Underwear Diary

Make a Prediction:
In the bubble to the right, ***draw*** what you ***think*** will happen to underwear buried in HEALTHY soil and UNHEALTHY soil.



Undies #1	Location Buried:

Date Buried: _____

Underwear Description

Date Dug Up: _____

Underwear Description

Science

Soil Your Undies!

Underwear Diary

Undies #2	Location Buried:

Date Buried: _____

Date Dug Up: _____

Underwear Description

Underwear Description

Undies #3	Location Buried:

Date Buried: _____

Date Dug Up: _____

Underwear Description

Underwear Description

Science

Soil Your Undies!

Underwear Diary

Undies #4	Location Buried:

Date Buried: _____

Date Dug Up: _____

Underwear Description

Underwear Description

Undies #5	Location Buried:

Date Buried: _____

Date Dug Up: _____

Underwear Description

Underwear Description

Science

Soil Your Undies!

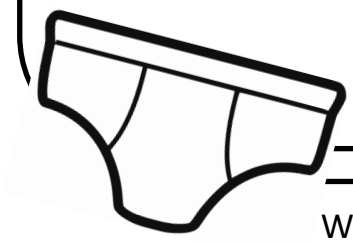
Underwear Diary

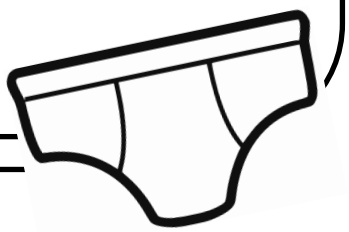
Which pair of undies changed **the most?**

Why?

Which pair of undies changed **the least?**

Why?





Were your predictions correct? Why or why not?

What does it mean for a soil to be “healthy”?

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AG-ACCURATE BOOK RECOMMENDATION:

Flowers Are Calling
Rita Gray

Flowers are calling to all the animals of the forest, "Drink me!"–but it's the pollinators who feast on their nectar. In rhyming poetic form and with luminous artwork, this book shows us the marvel of natural cooperation between plants, animals, and insects as they each play their part in the forest's cycle of life.

ACCOMPANYING IAITC LESSON:

Parts of a Flower

Make a simple model of the four flower parts and their functions.

See following page(s) for lesson plan!

Science

Parts of a Flower

Grade Level
K-6

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will be able to identify the four main parts of a flower and describe the functions of each part.

Materials
- Student Worksheets (1 for each student)
- Crayons or Colored Pencils
- Scissors
- Hole punch
- Brads (paper fasteners)

Standards
NGSS
K-LS1-1, 2-LS2-2, K-2-ETS1-2

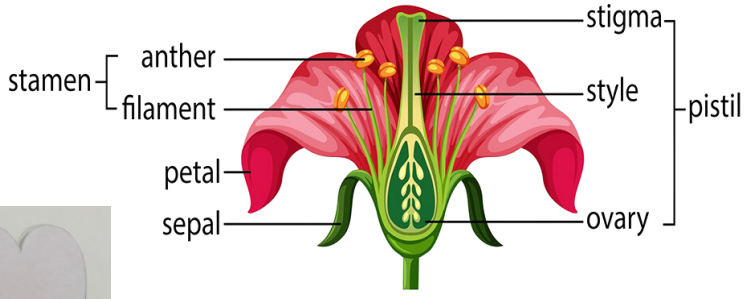
Lesson Summary
This lesson is designed to teach students about the four main parts of a flower and learn about the function of each part. Students will learn by creating and assembling a paper cross-section of a flower.

Suggested Sequence of Events:
1. Set Up: There are two ways this activity can be set up.
    1. On white paper, print the Student Worksheet that contains all four parts on one page, one for each student. The students will color in the flower before they cut and assemble. *OR*
    2. Print copies of the parts of a flower pages that contain many of one part on a page, each on a different colored paper, cut them into squares, and give to students to cut and assemble.
2. Read *Oh Say Can You Seed* by Bonnie Worth to capture student interest.
3. Read through the IAITC Pollinator Ag Mag to learn more about flowers and pollinators! Interactive online versions can be found on our website.
4. Complete the activity following the procedures:
    - Provide students with a set of flower parts. Have them color in the flower using their choice of colors (if applicable... see Set Up above).
    - Ask students to cut out the four flower parts along the thick outer border.
    - Have students use a hole punch to create a hole where there is a dot on each part.
    - On the back side of each part, have students write the name of the flower part and describe the function.
        - Sepals: protect flower bud before blooming
        - Petals: colorful to attract pollinators
        - Pistil: female part of flower, produce ovules (eggs)
        - Stamen: male part of flower, produce pollen
    - Assemble the flowers (use picture on next page as an example) using the brad fasteners. Students will be able to rotate each part down to read the function on the back.
5. Whole class discussion and reflection of activity.

TEACHER RESOURCES

Flower Assembly

Parts of a Flower Diagram



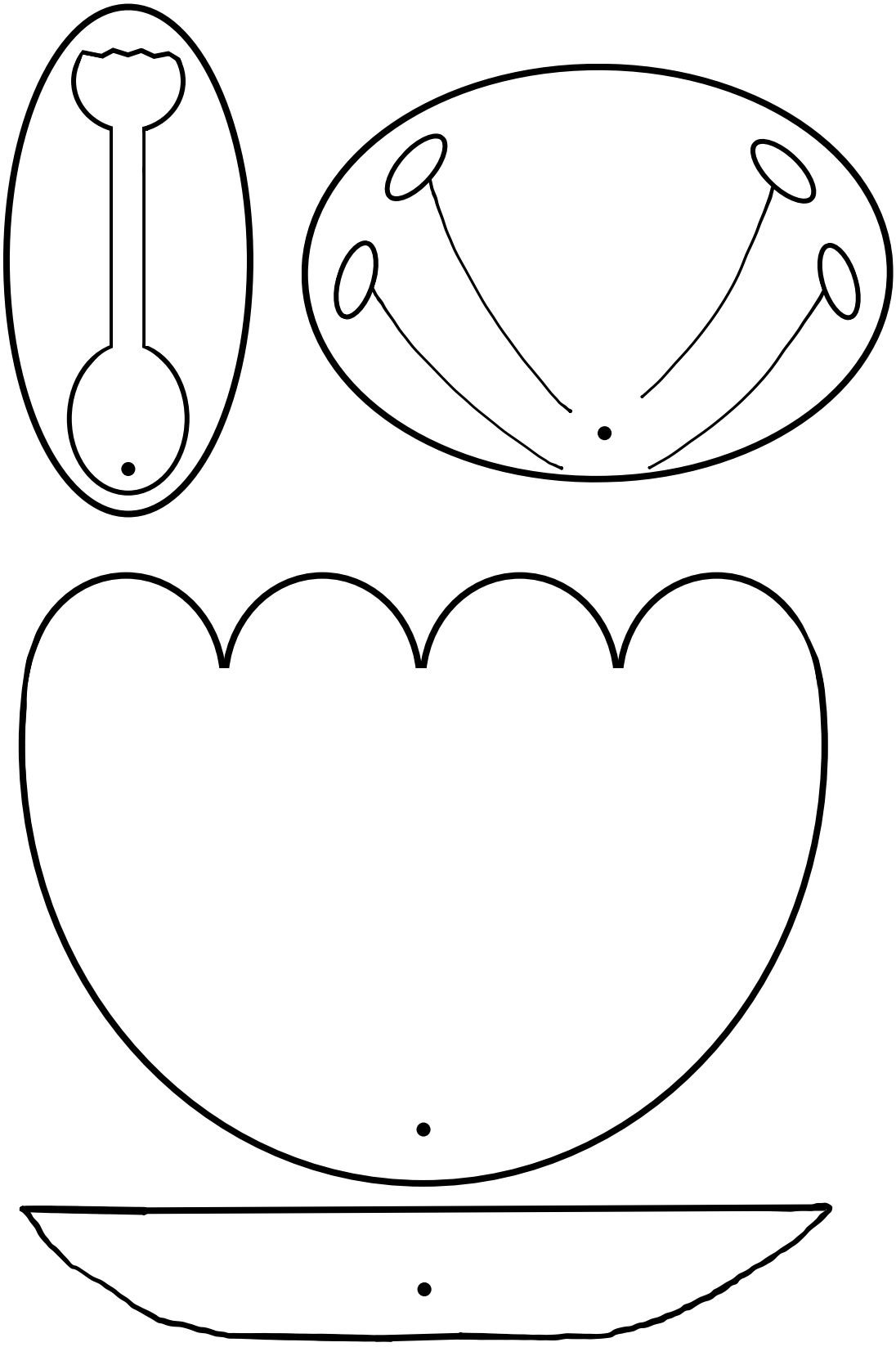
Extension Ideas

- Visit a local floral shop and ask for leftover flower stems. Allow students to "dissect" the flower and try to find each of these four parts.
- The Pistil and Stamen are each comprised of many different parts with specialized functions. Learn about each part and how it plays into the process of pollination.
- Print petals in different colors and talk with students about how different colored flowers attract different pollinators.
  - Read *Flower Talk* by Sara Levine or *Flowers are Calling* by Rita Gray to connect to this idea.
- Complete IAITC lesson Powder-Powered Pollination to learn about how each of these parts plays a role in pollination.
- Go to agintheclassroom.org to contact your County Ag Literacy Coordinator for free classroom sets of our Ag Mags!

Science

Parts of a Flower

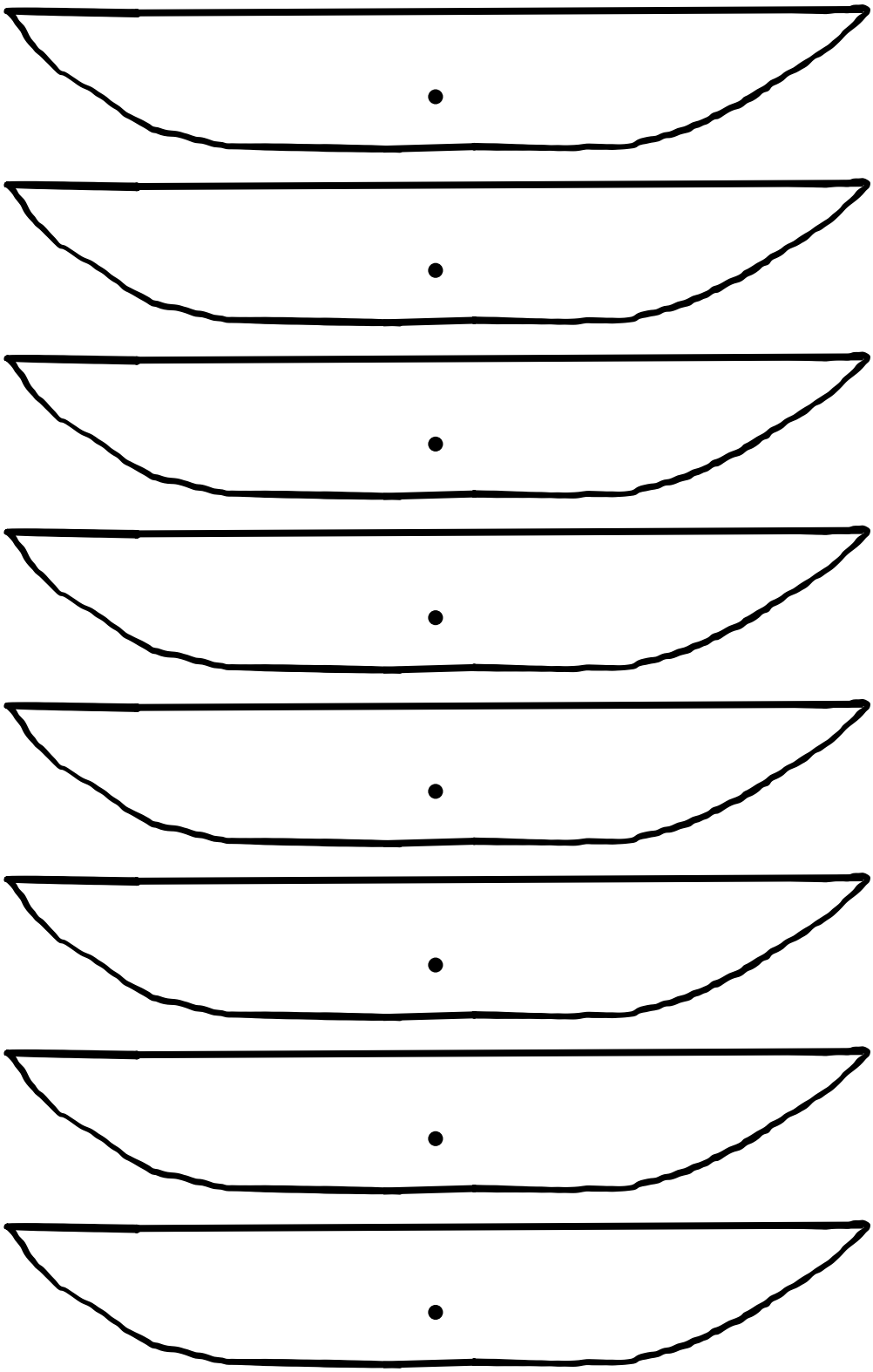
Student Worksheet



Science

Parts of a Flower

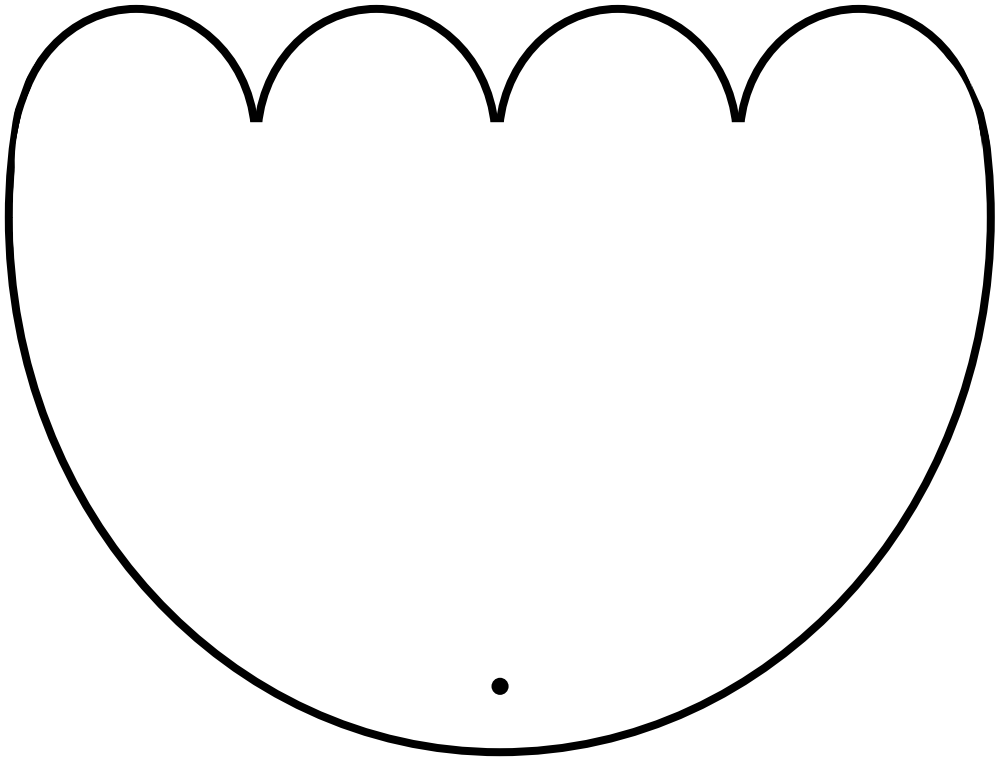
Sepals

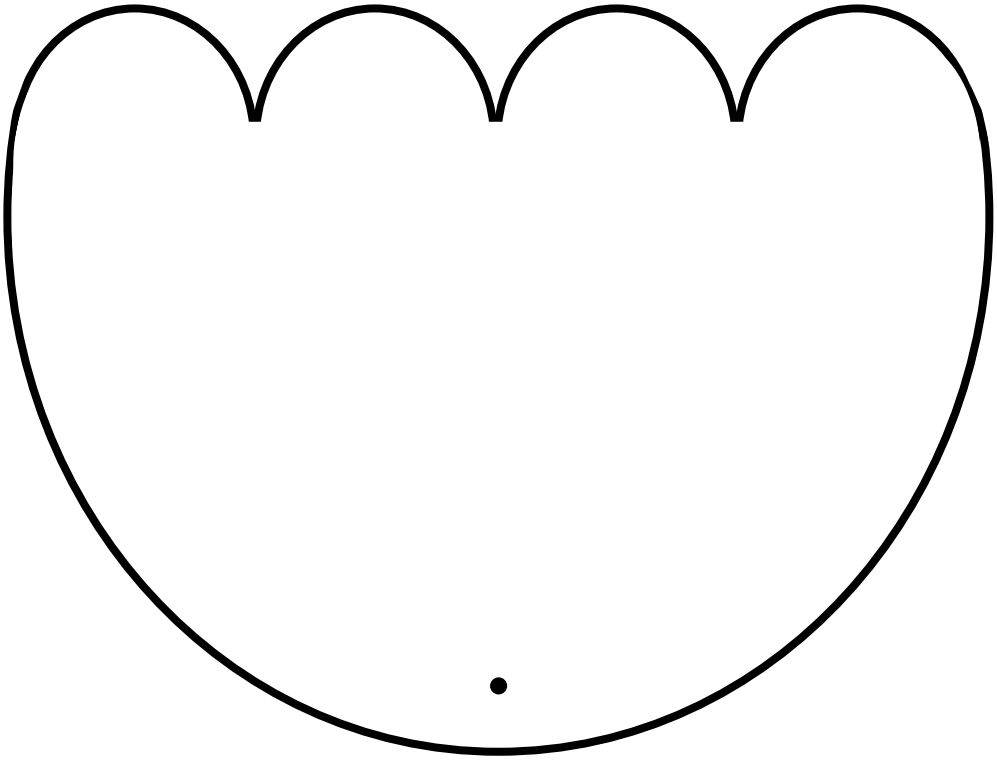


Science

Parts of a Flower

Petals

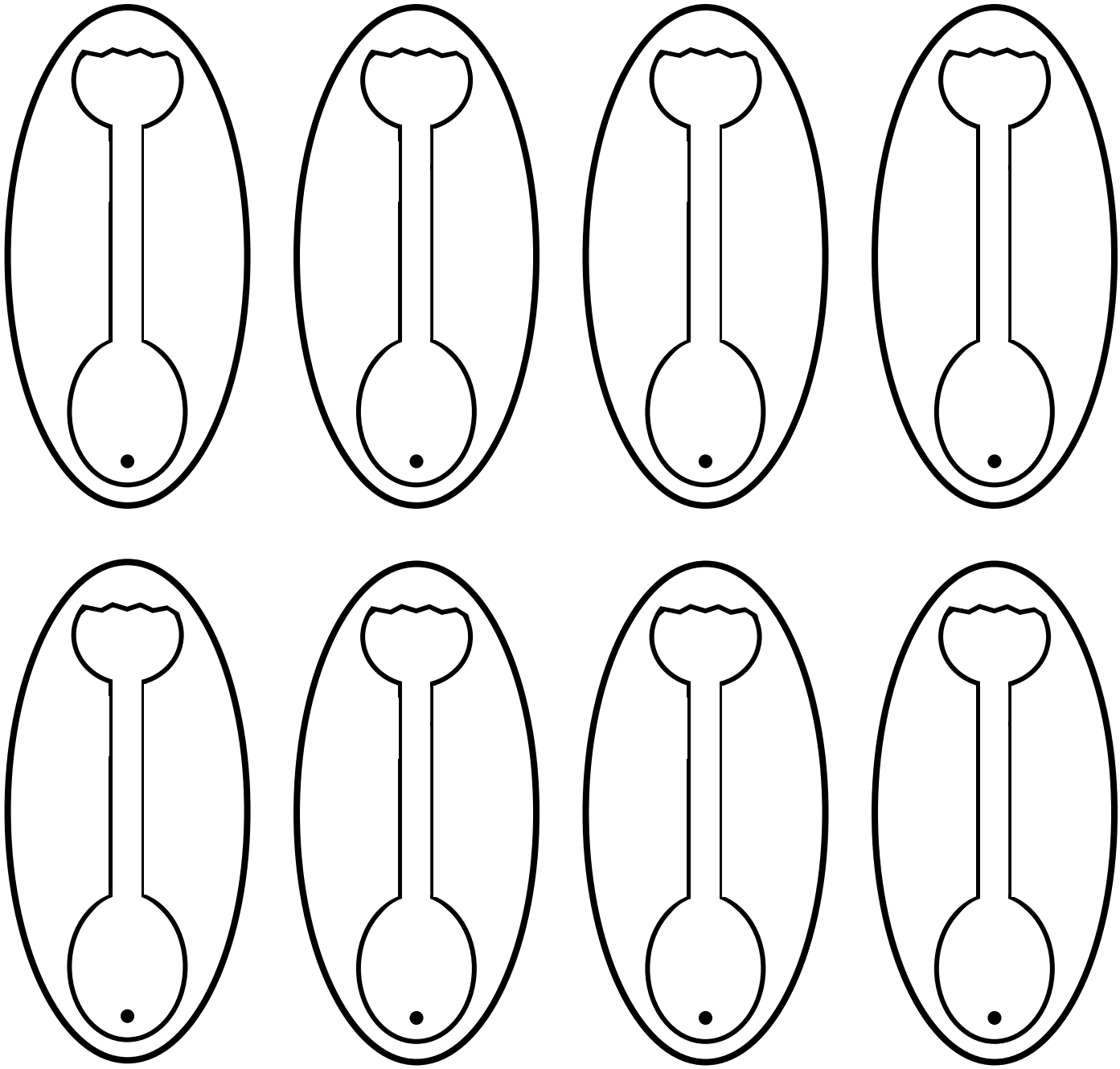




Science

Parts of a Flower

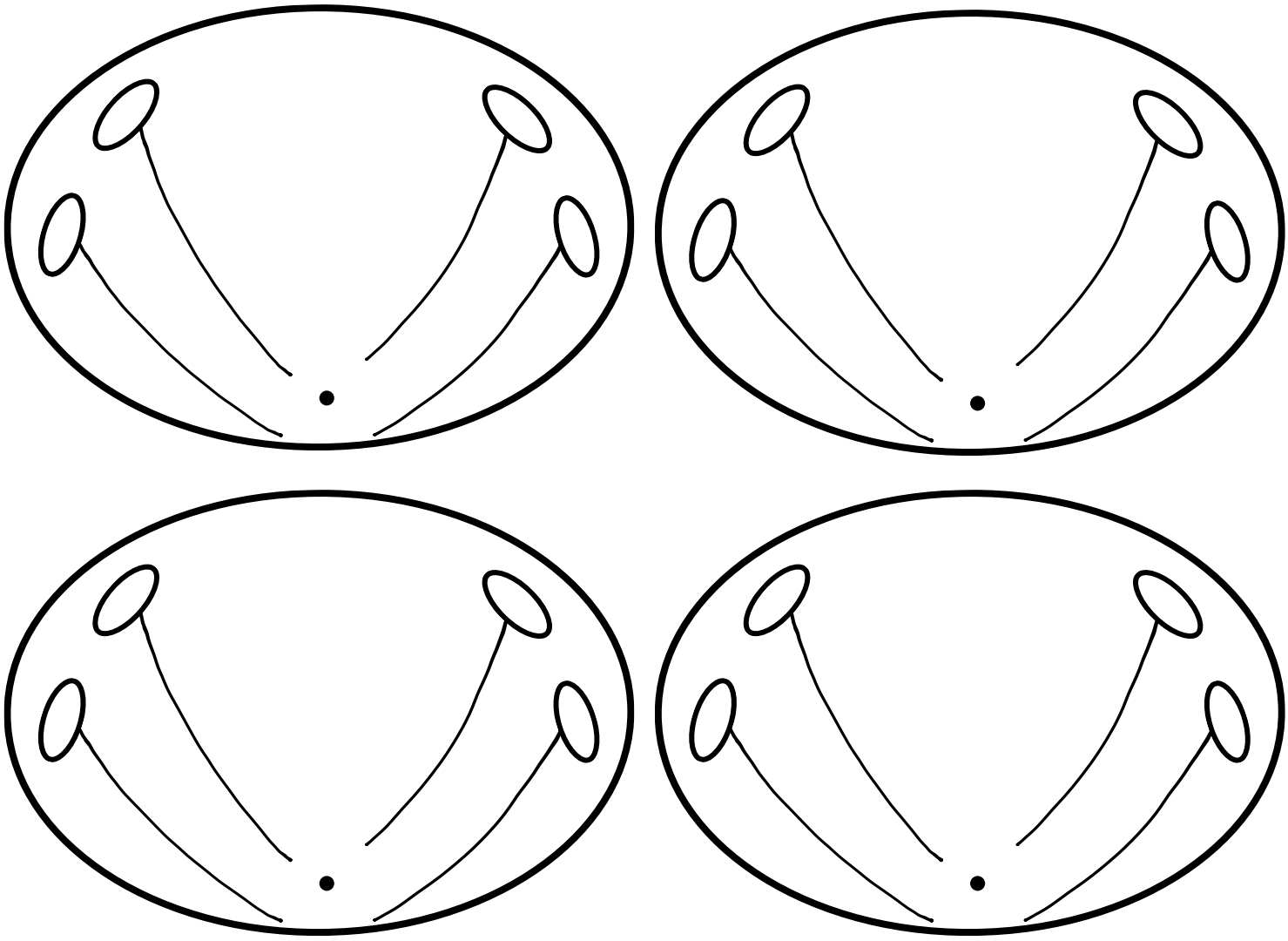
Pistils



Science

Parts of a Flower

Stamens



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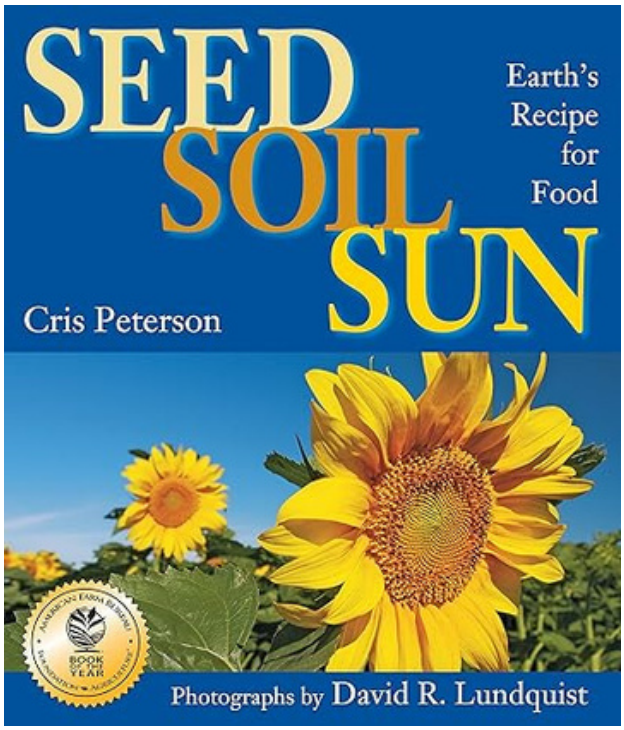
AG-ACCURATE BOOK RECOMMENDATION:



Seed, Soil, Sun: Earth's Recipe for Food
Cris Peterson

Seed, soil, and Sun are three of the key ingredients for growing food. In this clearly written and beautifully photographed book, Cris describes the seemingly miraculous process by which air and water combine with seeds, soil, and sunshine to create nearly all the food we eat. The book describes the makeup of the soil and the amazing creatures that live there–from microscopic one-celled bacteria to moles, amoebas and earthworms. This book celebrates the cycle of growth, harvest and renewal that is the essence of the natural world.

ACCOMPANYING IAITC LESSON:

A Slice of Soil

Demonstrate how little of Earth's surface we can grow food on.

See following page(s) for lesson plan!

Science Math

Slice of Soil

Grade Level
2-7

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will have a better understanding of our natural resources and their connection to agriculture.

Materials Needed
- 1 Apple (keep sticker on, if possible)
- Paring Knife
- Cutting Board

Standards
Common Core
CCSS.ELA-Literacy.RI.4.7; RF.4.4; W.4.1; W.4.9

CCSS.Math.Content.4.NF.3

NGSS
3-LS4-1; 3-LS4-4; 3-LS2-1; 3-LS3-2; 4-PS3-4; ETS1.A

Lesson Summary
This lesson uses an apple as a small scale model of earth to give students a different perspective on the amount of land available for agriculture. Students will follow along the demonstration, using fractions to divide the earth into decreasing segments. Students should be familiar with the term *natural resource*.

*This activity should be completed as a teacher demonstration.

Suggested Sequence of Events:
1. Read "A Handful of Dirt" by Raymond Bial to capture student interest.
2. Read through AITC Soil Ag Mag to learn about soil. Interactive online versions can be found on our website.
3. Pre-Activity Discussion: Tell students that soil is one of our most important natural resources on earth's surface. Many living things, including people, depend on it for food. Not all soil is good enough for plants to grow. Let them know that this activity is going to show them how much soil we have on earth to grow our food.
4. Complete the activity following the procedures on page two.

Science Math

Slice of Soil

Grade Level
2-7

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will have a better understanding of our natural resources and their connection to agriculture.

Materials Needed
- 1 Apple (keep sticker on, if possible)
- Paring Knife
- Cutting Board

Standards
Common Core
CCSS.ELA-Literacy.RI.4.7; RF.4.4; W.4.1; W.4.9

CCSS.Math.Content.4.NF.3

NGSS
3-LS4-1; 3-LS4-4; 3-LS2-1; 3-LS3-2; 4-PS3-4; ETS1.A

Suggested Sequence of Events:

4. Complete the activity following these procedures:
    - Explain to your students that the apple is going to represent a smaller model of the earth.
    - Cut an apple into four equal parts. Three parts represent the oceans of the world. Set these three aside. The fourth part represents the land area.
    - Cut the land section into three equal wedges. Each of these represents 1/12th of the earth.
        - One of these wedges represents inhospitable land (including deserts, mountains, and polar regions) where it is not suitable for life or plant growth.
        - The second of these wedges represents habitable land that has been protected (like nature preserves or public lands) or developed for roads, schools, houses, businesses, etc.
        - Set these two aside. One 1/12th wedge remains for us to grow food on.
    - Slice this 1/12th section crosswise into four equal parts. Each of these represents 1/48th of the earth.
        - Three of these pieces represent land that is used for grazing or for growing feed crops for livestock. Set these aside.
    - One 1/48th piece of the earth remains. This final piece is what is left for us to grow food crops for humans to eat, such as beans, fruits, vegetables, and grains.
    - Slice the peel off of the flesh of the apple. The peel on this small piece represents the amount of soil on which we have to grow food. This amount of soil will never get any bigger, but will only get smaller as the population grows and more land is developed for roads, schools, houses, business, etc.

5. Whole class discussion and reflection of activity. Ask your students to explain why soil is so important.

TEACHER RESOURCES

Extension Ideas:

- Give students a photo of an apple cut open. Have them label the layers of the earth. Have them explain what layer of the earth the soil is a part of.
- Have students draw or fill in a pie chart that shows the fractions from the activity. Color the sections to identify the types of areas described.
- Look at pictures of places around the world that have the types of land described in the demonstration.
- Introduce or review photosynthesis.
- Introduce or review sustainability.
- Invite a farmer into the classroom to talk about soil health.
- Have students research other types of natural resources. Students could present their research using a slide show or poster.
- Have students explain how weather and climate affect different regions in the world.
- STEM: Have students think more deeply into accessibility of natural resources. Can they design a way to be able to grow crops on the other parts of the land where there isn't good soil? Have students use the "STEM: Student Worksheet" to record their research and experiment.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

Media Resources:

Use this short video to introduce, review, or demonstrate this activity: http://iaitc.co/Slice