Let Learning Grow

Illinois AGRICULTURE in the Classroom℠

Table of Contents

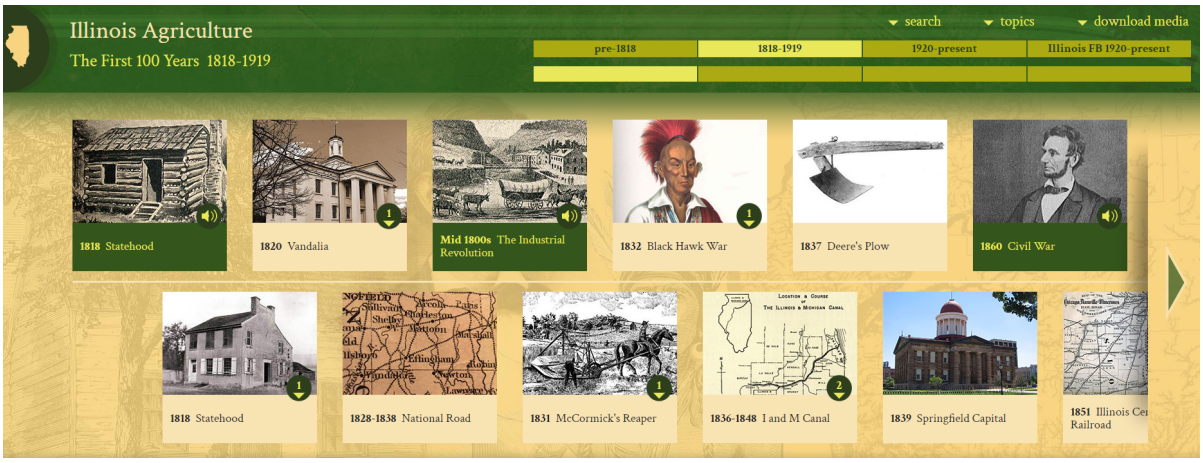
Online Resources

Website: www.agintheclassroom.org

From lesson plans and STEM activities, to recipes and chicken egg incubation video series, our website has the resources you need to incorporate agriculture into your content area classroom.

Website: il.stateaghistory.org

Check out our new history website that focuses on the innovations and inventions in agriculture in Illinois. Split into four different eras (shown to the right), students can navigate their way through a timeline of events from pre-1800s to current times.



Ag-venture With Pork

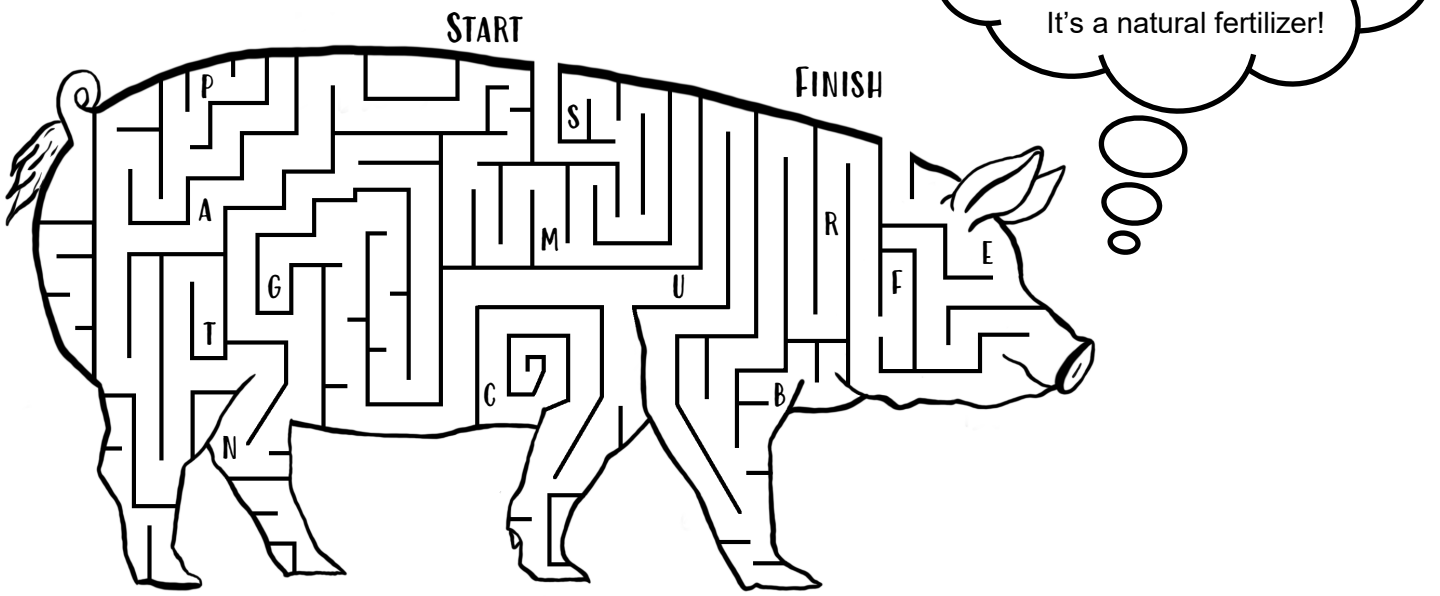
Use the IAITC Pork Ag Mag to help you work through this worksheet!

Read the section titled, “Pig Farmers Give Back: We Care Commitment.” In your own words, explain one way farmers keep their pigs healthy and why that’s an important thing to do.

Match the pig term with the correct definition!

Gilt	When the piglet is big enough to eat on its own and doesn't nurse anymore.
Pork	A female pig that has not given birth.
Wean	To give birth to piglets.
Piglet	The food products that come from pigs.
Farrow	A female pig that has given birth.
Sow	A baby pig.

Complete the maze! Draw your line through the maze on the correct path. Each time you cross a letter, write it in the space below to find the answer to the question.



What do farmers inject into their fields to increase the nutrients in the soil to grow their crops?

It’s a natural fertilizer!

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TEACHER RESOURCES

Answer Key

Read the section titled, “Pig Farmers Give Back: We Care Commitment.” In your own words, explain one way farmers keep their pigs healthy and why that’s an important thing to do.

Answers will vary. Possible answers could focus on the nutrition of feed, housing conditions, caring for the environment, training and biosecurity measures, or using antibiotics for pigs who become ill.

Match the pig term with the correct definition!

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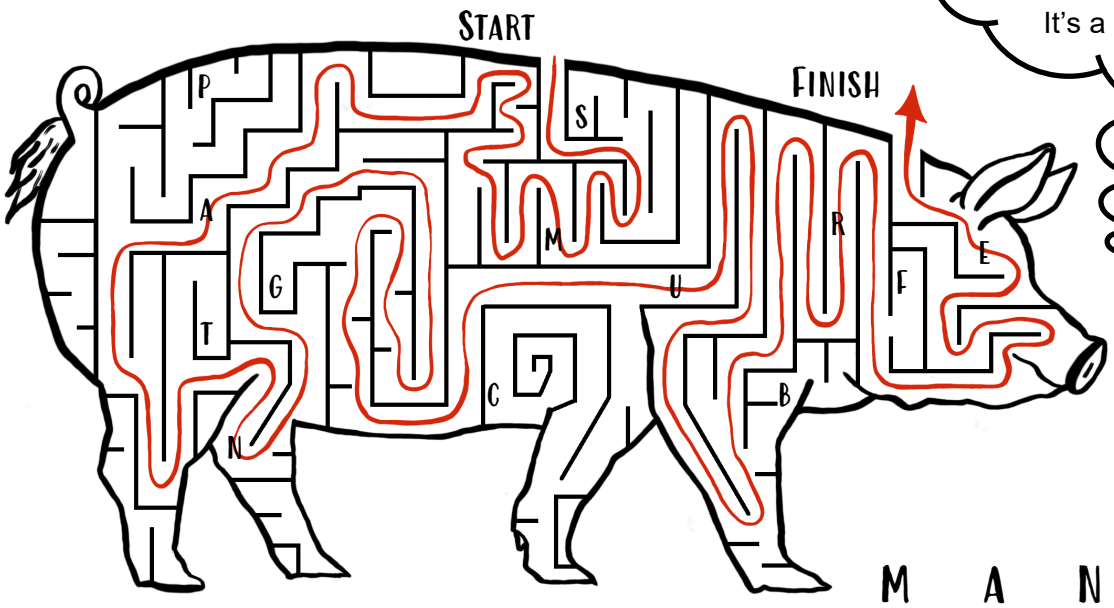

What do farmers inject into their fields to increase the nutrients in the soil to grow their crops?

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M A N U R E

Ag Mag Scavenger Hunt

Literacy

Grade Level
4-6

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will be able to identify various text features and strengthen their summarizing skills.

Materials Needed
- IAITC Ag Mags
- Access to online interactive versions of IAITC Ag Mags (optional)
- Copies of student worksheets

Standards
Common Core
CCSS.ELA-Literacy.RI.1.5; RI.2.5; RI.3.5

Resources
Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

Lesson Summary
This lesson is designed to help students recognize various text features and to help them understand that authors use text features to help readers better understand what they are reading.

Suggested Sequence of Events:
1. Review the differences between fiction and non-fiction texts. What types of text features do authors use in fictional texts and in non-fictional texts?
    - On the board, create a T-chart and label one side "fiction" and the other side "non-fiction." Make a list of all the text features your students can think of.
    - Then ask, "What is the author's purpose for using these types of text features?" and have students share their ideas with the whole class.
2. Use either a paper copy or the online version of one of IAITC's Ag Mags. Use this as an example to point out some of the text features from the list on the board.
3. Complete the activity following the procedures:
    - Give each student a paper copy of an IAITC Ag Mag or have them go to www.agintheclassroom.org and choose one of the online, interactive Ag Mags.
    - Hand out the "Ag Mag Scavenger Hunt" student worksheet and have students answer the questions using their Ag Mags.
4. Whole class discussion and reflection of activity. Revisit your text features list on the board and add any more text features they observed during their scavenger hunt.
5. Extension Ideas:
    - Have students create a one page "magazine" page, using several text features, on a topic they're studying in class.
    - Give students a variety of non-fiction texts (magazines, newspapers, etc.) to identify other examples of these text features.
    - Give students a fictional text to compare and contrast the use of text features and the author's purpose.

List of text features: **Bolded**/underlined/*italicized* words, graphs and charts, images, maps, illustrations, diagrams, color, all caps, highlighting, headings, sub-headings, table of contents, insets and sidebars, bullets, numbering, asterisks, stars, timelines, glossary, captions, labels, index.

Ag Mag Scavenger Hunt

Student Worksheet

Understanding the parts of a text, whether it's fiction or non-fiction, is an important skill to have. Let's practice strengthening these skills using a non-fictional text focused on agriculture.

Ag Mag Title: _____

First, take a quick look through the Ag Mag. **Observe** some of the images, headings and sub headings, and features (like vocab or labeled models).

Next, do a quick read of your Ag Mag! This means, <u>scan</u> through the paragraphs of the entire Ag Mag. You're not taking the time to read the whole paragraphs, just scanning to get an idea of the information within the text.

Now, write two questions you hope to learn from this Ag Mag based on your quick read!

1.

2.

The title at the head of the page or a section of a book is called a <u>heading</u>.

<u>Find the **first** section of the Ag Mag.</u>

What is the heading of this section?

Now, read the section. Once you're done reading, summarize the section in two to three sentences using your own words.

Ag Mag Scavenger Hunt

Student Worksheet

Now, choose a different section
What is the heading of this section?

Before you read: Predict what you think this section is about, just based on the heading.

Now, read the section!
Was your prediction correct? If not, why do you think you guessed incorrectly?

Summarize the section in one to two sentences using your own words.

Now head to the Career Corner, which will be at the end of the Ag Mag!
Read the titles of the careers held by those interviewed. What are the careers?

Have you heard of any of these careers? (Circle one) Yes No

Choose **one** of the careers that sounds interesting to you and write two questions you have about what that career entails.

1.

2.

Now read the interview!

Were your questions answered? (Circle one) Yes No

What is something cool or interesting you learned about that career?

Ag Mag Scavenger Hunt

Student Worksheet

Find a word that you're unfamiliar with, or don't know what it means, and write it on the blank line in the scroll to the right. Read the section that the word is in.

Then, using context clues and inferences from the surrounding text, define the unfamiliar word in your own words in the blank space in the scroll to the right.

This cannot be a word from a vocabulary section, or one that is already defined in the text

_____

Now that you've sharpened your literacy skills, let's reflect!

Write down at least two new facts you've learned from this Ag Mag.

Go back to your original questions from the first page. Were these answered?

Think about the information you looked at in this Ag Mag. How does the information relate to your personal life or any experiences you've had?

Somethin' Extra: If you're using the online, interactive Ag Mag, click on a video or resource link. In your own words, summarize the secondary resource that you watched or read.

Social Studies | Literacy

Apple Pie Journey

Grade Level
3-6

Length of Lesson
50-60 minutes

Objective
After completing this activity, students will have a better understanding of how and where foods are grown and produced around the world.

Materials Needed
- Copy of *How to Make an Apple Pie and See the World* book by Marjorie Priceman
- Copies of student worksheets
- Crayons or colored pencils
- Individual World Maps (optional)

Standards
Common Core
CCSS.ELA-Literacy.RI.2.1- 4.1; RI.2-6.7; RI.4.2; RI.4.3; RI.4.6; RI.4.7; RF.4.4; W.4.3; W.4.7; SL.4.2

ISSS
SS.G.1.2; SS.G.1.K-3; SS.G.3.3; SS.G.4.5; SS.G.1.6-8

Lesson Summary
This lesson is designed to help students recognize and better appreciate that the ingredients from their favorite foods come from agriculture systems across the world.

Suggested Sequence of Events:
1. Read through the AITC Apple Ag Mag to learn more about trees. Interactive online versions can be found on our website.
2. Complete the activity by following these procedures:
    - Read *How to Make an Apple Pie and See the World*.
    - Ask your students if they have ever heard about any of the countries the main character visited. Ask them if they knew that other countries have farmers who produce food just like the U.S. does.
    - Pass out the student worksheet and explain that you're going to read the story to them again, but this time they will have a reading/listening purpose.
    - Pass out individual world maps if you have them. If individual world maps are not available, pull up a world map to project so all students can see.
    - Read through the directions on the student worksheets.
    - Read the story again, this time stopping to make sure students can identify the locations of the countries visited.
    - Have students ensure they followed all the directions on the worksheet.
3. Whole class discussion and reflection of activity.

TEACHER RESOURCES

Extension Ideas:

- Learn about the history of apple pies. Where were they first made?
- Research what variety of apple is best for baking. Are there different varieties that are better for specific uses?
- Have students re-write the story using a different recipe like a cheeseburger or banana split.
    - Once they're done with their story, have them get with a partner and track the voyage on a world map just like in this activity.
- Choose one ingredient from the story and have your students do a little more research to create a concept map. What countries farm this commodity? What farming techniques are used? What recipes around the world use this ingredient?
- Turn this activity into a stations activity to get your students up and moving. Give each station some information about the country being visited in the story.
- Have students identify the latitude and longitude of the places the main character visited.
- Learn how to say the names of the commodities in the languages from the countries visited in the story.
- Have students do a gallery walk with these images of what kids around the world eat for lunch in a week, available at https://time.com/what-kids-eat-around-the-world-in-one-week/.
- Watch this school lunches around the world video, available at https://www.youtube.com/watch?v=Po0O9tRXCyA.
- Use this interactive map from National Geographic to show students the different climate regions around the world and how those impact the food we eat. Map available at mapmaker.nationalgeographic.org.
- Go to agintheclassroom.org to contact your County Ag Literacy Coordinator for free classroom sets of our Ag Mags!

Apple Pie Journey

Student Worksheet

Directions: Complete the steps below using your blank world map!

1. Turn your map so that it is facing the correct direction. Then, draw a compass on the bottom, right side of the map. Make sure to label your compass with North, South, East and West.
2. As your teacher reads the story, locate the countries the main character visits and color in the country.
3. Label the countries. Make sure to spell their names correctly!
4. Draw the path of the route our main character takes.
5. Answer the questions below:

What countries did our main character visit?

Using your compass skills, navigate us through the route the main character took in the story.

The ingredients we use to make food are products that come from original sources. Match the ingredient our main character needed with its original source.

Sugar	Wheat
Eggs	Kurundu tree
Apples	Cow
Cinnamon	Seawater
Salt	Chicken
Butter	Sugar cane
Flour	Orchard

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!

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.

Pumpkin Catapult

STEM

Grade Level
4-6

Length of Lesson
2 class periods

(1 day of building, 1 day of testing)

Objective
By the end of this lesson, students will learn more about the design and use of simple machines.

Materials Needed
- Large popsicle sticks
- Rubber bands
- Plastic Bottle Caps
- Hot Glue
- Assorted additional building materials
- Small pumpkin-shaped candy
- Protractors
- Container or bin ("wagon" for challenge)
- Copies of student worksheet

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

Lesson Summary
This lesson is designed to help students learn more about simple machines and provide opportunities to design and test their own pumpkin catapult. Additionally, there is a design for a large catapult made from PVC pipe that will launch small pumpkins up to 40 feet.

Suggested Sequence of Events:
1. Set Up: Teachers may also want to build their own example to inspire students' creations.
2. Read *The Great Pumpkin Smash* by Lori Haskins Houran to capture student interest and introduce the concept of catapults.
3. Read through AITC Pumpkin Ag Mag to learn about pumpkins. Interactive online versions can be found on our website.
4. Watch a short pumpkin harvesting video to show students some of the machines used to harvest processing pumpkins in Illinois. Here is one good example: https://youtu.be/5Ac98DrsKmY
5. Complete the activity following the procedures:
    - Discuss the concept of a catapult and the simple machines used to make a catapult work.
    - Pass out the student worksheets to each student and read the "STEM Challenge" together. Explain that they will be trying to catapult a candy pumpkin into a container.
    - After passing out the necessary building materials have students brainstorm how the pieces work together and then draw a blueprint. They should do this before they start building.
    - Provide students time to build, discuss, and test their creations. *See Background Information on the Teacher Resources page.
    - Complete the STEM Challenge as a class and see whose catapult can launch the candy pumpkin into the wagon!
6. Additionally, the teacher could construct a PVC Pumpkin Catapult and have students experiment with launching small pumpkins outside.
7. Whole class discussion and reflection of activity. Pair students together and have them share their catapult designs with their partner. What variables can be changed to make the pumpkins launch farther?

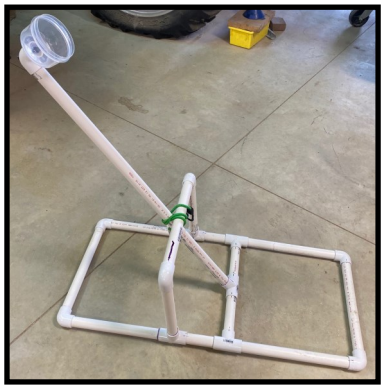
TEACHER RESOURCES

Background Information:
A part of STEM fields is the testing that takes place behind the scenes! Your students are trying to launch a candy pumpkin into a container placed at a specified distance, determined by you. Students will need to test their catapults to determine the force needed to launch the pumpkin the correct distance. Meaning, what is the best angle or how many posicle sticks need to be stacked for the correct force. They will choose two angles to test and complete three trials for each, then find the average of those trials for each angle. This will help them determine the angle they need for the challenge.

Extension Ideas:
- Have students define the bolded words on their student worksheets.
- Talk about why the pumpkin doesn't stay in the air, what happens to the pumpkin's motion when it hits the ground, and what causes the pumpkin to travel a further distance.
- Add another variable into their tests and have students use objects of different weights to compare results.
- Read "Pick a Pumpkin" by Patricia Toht. Look at the pictures and have students analyze the images.
- Have students write pumpkin facts from the AITC Pumpkin Ag Mag on their catapults.
- Have students create a comic strip including pumpkin facts.
- Watch a time lapse video of a pumpkin growing.
- Watch a video from a local farmer discussing pumpkin growth and harvest.
- Take a field trip to a pumpkin patch and pick your own pumpkins.
- Take a closer look at squash bees and other pollinators. What is pollination? Why is it important for pumpkins?
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

Catapult made with instructions

Catapult designed by a 1st grader



PVC Catapult

Science

Milk Plastic

Grade Level
4-6

Length of Lesson
30 minutes

Objective
By the end of this lesson, students will have a better understanding of how sensitive the fats and proteins of milk are to new substances.

Materials Needed
- Milk (1 cup per student)
- White vinegar (4 tbs per student)
- Small bowls
- Spoons
- Strainer(s)
- Paper Towels
- Measuring cups
- Food coloring and cookie cutter shapes (optional)

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 proteins are sensitive to acids.

Suggested Sequence of Events:
1. Set Up: Complete this as a demonstration, group activity, or individual activity depending on time and materials. If you're using this as a student activity, make sure students use caution as the milk can be hot and burn skin in the first few steps.
2. Read through the IAITC Dairy Ag Mag to learn more about milk and other dairy products! Interactive online versions can be found on our website.
3. Complete the activity following the procedures:
    - Observe the milk and vinegar solutions, noting their color, texture, scent, etc.
    - Measure 1 cup of milk into a microwaveable bowl and microwave for 1.5 minutes. The milk should be hot but not boiling.
    - Stir in 4 tablespoons of white vinegar into the milk and stir for 1 minute. The milk will start to form clumps!
    - Carefully pour this substance into the strainer. Use your spoon to push the liquid out. This may take a little elbow grease!
    - Transfer the remaining "plastic" to a paper towel and continue to press, making sure all the liquid is out.
    - Have fun and mold the plastic into a shape either by hand or using a cookie cutter. Use food coloring to add some flare!
    - Set the formed plastic aside and let it dry for 2 days.
    - Compare and contrast the original ingredients to the final product.
4. Whole class discussion and reflection of activity. Here are some prompting questions:
    - Describe how the milk reacted when you first added the vinegar (step number 2).
    - What happened when you began pressing the liquid out of the clumped milk?
    - Why do you think the milk turned into a "plastic"? Read the background information on the teacher resources page and share with your students.

TEACHER RESOURCES

Background Information:
This activity doesn't produce an actual plastic, but instead a substance called casein. Casein comes from the Latin word meaning "cheese" and is one of the several proteins that are found in milk. The acid from the vinegar does not mix with the casein in the milk, causing clumps to form. Basically your end product, the milk "plastic", is the casein proteins from the milk all clumped together.

True plastics are polymers, which are a little different than the casein substance. A polymer is a chemical compound that is made up of long chains of repeating, identical molecular units. Keep in mind that not all polymers are plastics but all plastics are polymers.

Extension Ideas:
- Have students turn their milk plastic into ornaments, toys, or gifts for their family or friends.
- Have students mold their milk plastic into a shape related to agriculture.
- Have students write the steps of this activity out, in order, including descriptive language.
- Have students demonstrate their understanding by explaining what happened in the activity using a variety of ways: draw a comic strip, create a fictional narrative, film a short video, write a lab report, etc.
- Take a closer look at polymers (plastics). What are other types of polymers? How does this milk "plastic" compare to other plastics? (Making slime is also another fun activity that focuses on polymers.)
- Scientific Inquiry: Take the experiment to the next level and have students make predictions and test different variables. (Use our Scientific Inquiry worksheet to help guide them through their experiment.)
    - Does the amount of vinegar make more casein?
    - What would happen if you used skim milk or soy milk?
    - What if you used other types of vinegars?
    - If the acid from the vinegar caused the reaction, will acids from citrus and fruits cause the same reaction?
- Read "Clarabelle: Making Milk and So Much More" by Cris Peterson. Look at the pictures and have students analyze the images.
    - Have students write a short story or create a comic strip from Clarabelle's perspective.
- Take a field trip to a dairy farm and learn about dairy farming.
- Invite a dairy farmer into the classroom.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

Science

Oobleck

Grade Level
4-8

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will have a better understanding of the properties of solids and liquids.

Materials Needed
- Bowl
- Forks
- Water
- Cornstarch
- Measuring spoons
- Food Coloring (optional)

Standards
NGSS
K-PS3-2; 2-PS1-1; 3-LS2-1; 3-LS3-2; 3-LS4-1; 3-LS4-4; 4-PS3-4; 5-PS1-3; MS-PS1-3; MS-ESS2-4

Lesson Summary
This lesson is a fun, hands-on activity designed to engage students by using corn-based materials to make "Oobleck" and experiment with the properties of solids and liquids!

Suggested Sequence of Events:
1. Read through the IAITC Corn Ag Mag, IAITC Soybean Ag Mag, and the IAITC Water Ag Mag to learn more about products that come from corn and soybeans and the impact water has on agriculture! Interactive online versions can be found on our website.
2. Discussion Starters:
    - Is corn used for more than just food?
    - Corn, like soybeans, other crops, and animal products, can often be used to create secondary products we call "by-products."
    - Have students brainstorm the properties of solids and liquids and create a list as a class.
3. Complete the activity following the procedures:
    - Place 4 teaspoons of cornstarch in a bowl.
    - Add 2 teaspoons of water to the cornstarch.
    - Add a few drops of food coloring to the bowl (optional).
    - Blend the mixture with a fork. It should flow when the bowl is tipped but feel solid to the touch. If the substance is too thick, add a little more water. If the substance is too runny, add a little more cornstarch.
    - Play and have fun!
4. Whole class discussion and reflection of activity.
    - Is the Oobleck a solid or a liquid? Refer back to the list you made as a class and use your observations from the experiment to explain your answer.
    - What kind of crop is your Oobleck a by-product of?

TEACHER RESOURCES

Background Information:
Sir Isaac Newton is known for his properties in Physics. During his career, he described solids, liquids, and gasses as having a set of properties that are distinct to their state of matter. When focusing on liquids, he proposed that fluids should flow at a predictable, constant rate. These fluids are called “Newtonian” fluids.

Although Oobleck looks like a liquid, it does not always behave a liquid. Oobleck is a type of material belonging to the “non-Newtonian” class of fluids. Non-Newtonian fluids respond differently depending on how quickly you try to move it around. When a force is acted on Oobleck quickly, it will behave like a solid because the pressure forces all the particles of the corn starch together. When the force is slower, the particles of the corn starch have time to move around the object, just as a normal Newtonian liquid would.

Extension Ideas:

- Have students try using different measurements of the ingredients and observe how that affects the oobleck.
- Let the oobleck sit in a glass for a few hours and observe the separation of the solid and liquid. This is because oobleck is a suspension and not a mixture.
- Have students look into non-Newtonian products in the food industry. Can they think of any? Some examples include mayonnaise, jelly, ketchup, and cranberry sauce.
- Use the Corn and Soybean Ag Mags and read about by-products from those two crops. Do you have any of these items at home?
    - Use our “Indoor BINGO” activity to help students identify common household by-products of agricultural commodities!
- For older students, show them this video and then have them brainstorm how non-Newtonian liquids could be beneficial to engineers. Video can be found at https://www.youtube.com/watch?v=XrvzZewPUJA
- Introduce the scientific term “viscosity” and apply the understanding to this experiment.
- Invite a corn farmer into the classroom to talk about types of corn, their uses, and what it takes to be a corn farmer.
- Make your own biodegradable packing peanuts from cornstarch using our “Packing Peanuts” activity.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

A Trip Through Illinois

Social Studies | Literacy

Grade Level
4-8

Length of Lesson
15 minutes

Objective
By the end of this lesson, students will be able to identify multiple counties of Illinois.

Materials Needed
- Copies of "A Trip Through Illinois" student worksheet
- Copies of Illinois Counties map

Standards
Common Core
CCSS.ELA-Literacy.RI.5.7; RH.6-8.7; W.4.8

Social Studies
SS.G.1.4.

*Adapted from a lesson created by FCAE.

Lesson Summary
This lesson is designed to increase student interest about Illinois and learn the names of the counties within the state in a fun way! Students will use clues to try to figure out the name of the counties. Have students work individually or with a partner in this fun activity!

Suggested Sequence of Events:
1. Set Up: Make enough copies of the student worksheet and Illinois Counties map for each student.
2. Read through AITC IL History Ag Mag to learn about Illinois. Interactive online versions can be found on our website.
3. Complete the activity following the procedures:
    - Give each student a copy of the student worksheet and an Illinois Counties map. Have students work individually or with a partner.
6. Whole class discussion, share answers, and reflection of activity.
7. Extension Activities:
    - Read about the Illinois State Symbols
    - Put students into small groups and assign them an IL State Symbol to research and present to the class.
    - Read more about the IL State Soil-Drummer Silty Clay Loam. Why is this soil beneficial for agriculture in Illinois? Go to https://www.soils4teachers.org/state-soils for information about our state soil and soils around the country.
    - Look more into soils around the country and compare the type of commodities grown and raised in that state.
    - Read "The Superlative A. Lincoln: Poems About Our 16th President" by Eileen R. Meyer.

Answers:
1. Bureau; 2. Lake; 3. Will, Henry, Scott, Warren (and more); 4. Jersey; 5. Greene, Brown, White; 6.Mason; 7. Cook; 8. Washington; 9. Sangamon; 10. Masaac, Iroquis; 11. Adams; 12. Jackson; 13. Union; 14. Jefferson; 15. Shelby, Carroll, Morgan (and more); 16. Clinton; 17. Scott; 18. (will vary); 19. Ford; 20. Bond; 21. Cumberland; 22. Pike

Social Studies

Literacy

A Trip Through Illinois

Student Worksheet

The left column is a list of clues that describe Illinois County names! Use your Illinois County Map to help you figure out what county or counties are being described by the clue. When you think you've figured out the clue, write the county name on the line to the right of the clue.

1.	A piece of furniture	
2.	A fishing place	
3.	A boy's name	
4.	Breed of dairy cattle	
5.	Colorful county	
6.	Well know fruit jar	
7.	Person who prepares food	
8.	A state or variety of apple	
9.	Our state capital is here	
10.	Indian tribe	
11.	Two presidents with this last name	
12.	President on the $20 bill	
13.	Railroad	
14.	First signer of the Declaration of Independence	
15.	A girl's name	
16.	42nd President of the U.S.	
17.	Brand of tissue	
18.	County you live in	
19.	Brand of car	
20.	Form of money or interest	
21.	Mountain range	
22.	A famous mountain	

Social Studies

Literacy

A Trip Through Illinois

Illinois Counties

Math

Plot-a-Lot

Grade Level
3-6

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will be able to plot and calculate the area of geometric shapes based on a scale.

Materials Needed
- Rulers
- Copies of student worksheet
- Graph paper
- Calculators (optional)

Standards
Common Core Math
CC.3.OA.3; CC.3.MD.5-8; CC.5.MD.2-4; CC.6.G.1

Lesson Summary
This lesson is designed to help students strengthen their math skills by plotting shapes and calculating their perimeters and areas.

Suggested Sequence of Events:
1. Read *The Pig War* by Emma Bland Smith to capture student interest.
2. Read through our AITC Ag Mags that tie with this activity to learn more about those commodities.
3. Complete the activity following the procedures:
    - Review how to calculate area with your students. Make sure students label using the correct measurements.
    - Next, review how to calculate perimeter with your students. Again, make sure students are labeling with the correct measurements.
    - Keep the review up on the board as a guide for students as they complete their work.
    - Hand out the student worksheet and a piece of graph paper.
    - Read through the directions together and then give students time to work.
6. Whole class discussion and reflection of activity.

TEACHER RESOURCES

Background Information:
In the early days of America, land was divided in many different ways that caused a lot of arguments over what land belonged to which person. The Land Ordinance of 1785 created a standard way of plotting and dividing government land. Unsettled territory was divided into a 6-mile square, called a township. The township was further divided into 36 sections, each measuring 1 square mile, or 640 acres. At first, settlers had to buy an entire section if they wanted to own land!

Farmers both then and today must also decide how to divide their land to make the best use of it on their farms. Some land is best used to grow crops, and other land is best used to raise livestock. In some cases, farmers must build fences to contain their animals, keep them safe from predators, keep them close to food and water, and keep them from wandering into fields and eating the crops. Sometimes the needs of a farm changes and the land must be divided in a different way to make the farm more productive. This activity asks students to think like a farmer and plot-a-lot!

Extension Ideas:
- Farmers raise and harvest their commodities for profit. Have students calculate their farm's earnings based on the information below. Does this change how they would plot their farm? See if they can re-plot their farm to make the most money while still using the rules from their worksheet.
    - Corn: earn $2 for every 5 units^2
    - Soybeans: earn $1 for every 2 units^2
    - Cattle: earn $5 for every 10 units^2
    - Pigs: earn $3 for every 6 units^2
- Read through our Corn, Soybean, Beef, and Pork AG Mags to learn more about farming different commodities.
- Students could experiment with spacings of seeds and grouped seeds to calculate the ideal spacing by completing our "DIY Seed Tape" activity.
    - Ask your students if there are ways to use less space but still plant the same amount of seeds. Then introduce "Square Foot Gardening," a popular garden spacing method.
- Have students design a cattle and/or pig barn. What do these animals require to stay healthy?
- Use our "Play-Doh Core Sampling" activity to learn more about soil types. Why is it important to test the soil before plotting a commodity?
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

Math

Plot-a-Lot

Student Worksheet

Think like a farmer and try to figure out the best use of space on your farm! Some land is best used to grow crops, and other land is best used to raise livestock. Other land must be used to build homes, sheds to store farm equipment, and many other uses. To create the most productive and efficient farm, you have to "plot-a-lot"!

Plotting Directions:

1. On your graph paper, 1 square = 1 unit. Draw a rectangle that is 20 units by 30 units. This space represents all the land you own.
   What is the total area of land you own? _____ units^2.
2. You need a house to live in. Somewhere on your land, draw a plot for your house that has is 3 units by 3 units. Label your house.
3. With the remaining space, plot and label the areas where you will raise cattle, raise pigs, grow corn, and grow soybeans. You can plot as much space as you like for each commodity as long as it fits on your land. You must plant all four commodities following the rules below:
   A. Commodity plots cannot overlap, or overlap with your house.
   B. All plots must use only use vertical and horizontal lines, no diagonal.
   C. Your cattle plot must have an area of **at least** 50 units^2.
   D. Your corn plot must have a **length** of at least 10 units.
   E. Your soybean plot must have **equal length and width**.
   F. Your pig plot must have a perimeter of **exactly** 32 units.
4. Complete the chart below with the measurements of each commodity plot:

Commodity	Length (units)	Width (units)	Perimeter (units)	Area (units^2)
Corn				
Soybeans				
Cattle				
Pigs				

Science

Egg-Cellent Embryology

Grade Level
3-6

Length of Lesson
5-10 minutes each day for 21 days

Objective
By the end of this lesson, students will have a better understanding of how chickens develop inside an egg.

Materials Needed
- Copies of chicken development pictures*
- White, plastic eggs
- Egg cartons

Standards
NGSS
3-LS1-1; 3-LS4-4; 4-LS1-1; MS-LS1-1; MS-LS4-3

*To print the embryo pictures so that the pictures line up with the facts, set your printer settings to print on both sides and to flip sheets on the short edge.

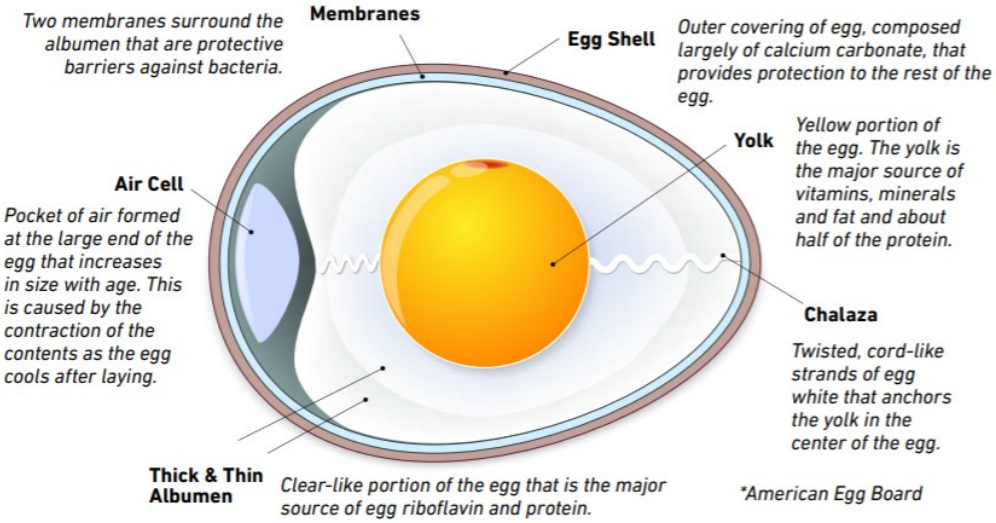
Lesson Summary
This lesson is a fun activity that allows students to see how the chick is developing inside of the egg, whether you are incubating eggs in your classroom or not! Students should have a basic understanding of the life cycle of a chicken (Egg—Embryo—Hatchling—Chick—Chicken).

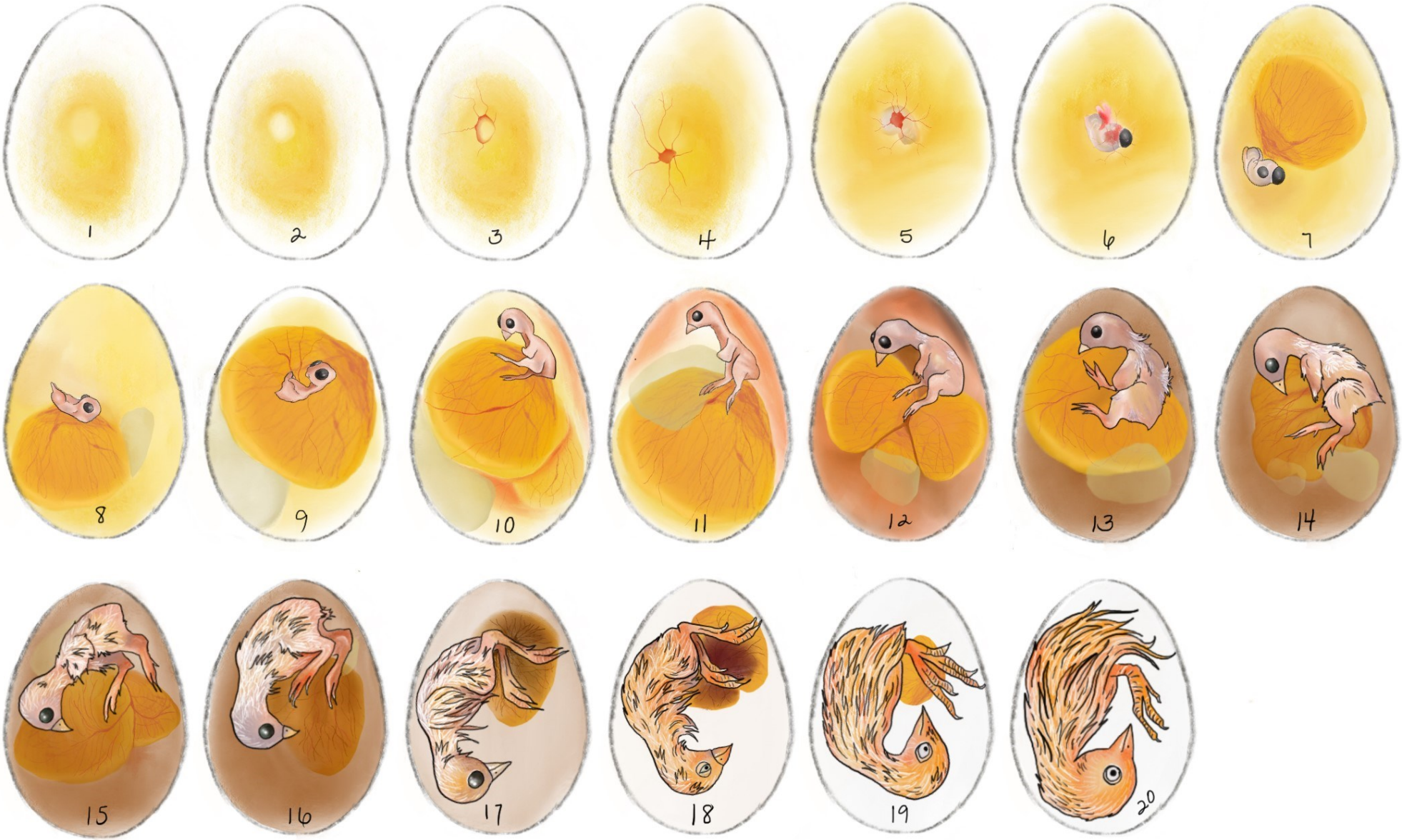
Suggested Sequence of Events:
1. Set Up: Print the embryo development pictures on printer paper or cardstock, cut them all out, and then laminate for multiple uses! Then number the plastic eggs 1-21 and place the embryo development picture into its matching numbered egg. Lastly, place the eggs in the egg cartons. Make enough sets for students to work in small groups of two or more.
2. Read through the IAITC Poultry Ag Mag to learn more about chickens and other poultry facts! Interactive online versions can be found on our website.
3. Complete the activity following the procedures:
    - Define the word ***embryology*** as a class and talk about how this is an important part of all plant and animal life cycles!
    - Ask your students if they know how the embryo develops in its egg. Have your students brainstorm and share.
    - Read the background information on the Teacher Resources page to your class and then have students write a few questions they hope to have answered about chick development.
    - Talk about what chicken eggs require for a healthy chick to grow (temperature, rotation, tools used to help, etc.)
    - Each day, have students open the egg with the correct day on it, and observe what the embryo looks like. Then, have them flip over the laminated egg and read about what is developing on that day.
4. Whole class discussion and reflection of activity. Have students read the questions they wrote before beginning the activity and answer them either by writing complete sentences and/or sharing with the class. Here are some other discussion starters: How could you tell the differences between the stages? What happens to the yolk, vitelline membrane, and the albumen?

TEACHER RESOURCES

Background Information:
About 24 hours before a hen lays her egg, it must be fertilized by a rooster for it to become a chick. This process, called fertilization, forms a single cell that will begin to divide into 2, then 4, 8, 16, and so on! By the time the hen lays her fertilized egg, there will be hundreds of cells grouped together. These cells make a small, white spot, which can be easily seen on the surface of the yolk. The egg forms temporary organs that provide the embryo with nutrition, excretion, and respiration. These organs will continue to function until hatching time.

Extension Ideas:
- Have students make an "Embryo Egg-Venture" daily journal and record (write and/or draw) their observations each day.
- After the 21 days are over, talk about how the chicks crack open their shells from the inside!
    - What do chicks need to be healthy and safe once they hatch?
- If you're not incubating eggs in the classroom, learn more about the importance of temperature and moisture control for embryo development.
- Watch this video that shows the growth of the embryo each day. Video is available at https://www.youtube.com/watch?v=DW3Tw5qpfZQ
- Invite a chicken farmer or egg producer into your classroom.
- Watch a virtual field trip from the American Egg Board.
- Research what states produce the most eggs.
- Learn about different breeds of chickens!
- Have students share their favorite egg recipes and learn more about the nutrition of eggs and chicken.
- Have students strengthen their non-fiction literacy skills with our Ag-Venture with Poultry, 1-page activity sheet that pairs with our IAITC Poultry Ag Mag.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

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• Egg tooth begins to appear
• Feather tracts appear
• Beak begins to grow
• Embryo separates from yolk sac
• Voluntary movement begins
• Elbows and knees appear
• Tongue, esophagus, kidney, and intestines begin forming
• Eye pigment begins
• Allantois begins forming
• Heart begins beating
• Ears begin forming
• Blood vessels appear
• Vertebrae forming
• Embryonic membrane forms
• Cells start dividing
• Germinal disc appearing
• Organ systems begin forming
• Embryo starts turning head towards large end of egg
• Bones begin to harden
• Body covered lightly with feathers
• Feathers are becoming visible
• Cartilaginous skeleton almost complete
• Tail feathers forming
• Scales on claws and toes appear
• Toe nails begin to grow
• Toes digits are formed and separated
• Embryo is starting to look bird-like
• Mouth opening appears
• Beak begins hardening
• Toe digits begin forming
• Yolk sac inside body
• Embryo begins breathing from the air cell, becomes a chick
• Hatching Begins
• Embryo occupies most of the space and pierces air cell
• Some lung functioning begins
• Growth of embryo nearly complete
• Intestines are now completely in the body
• Amniotic fluids decreasing
• Definitive feathers begin growing
• Down feathers cover body
• Albumen almost gone
• Intestines in yolk sac are drawn into abdominal cavity

Science

Rumination Navigation

Grade Level
4-6

Length of Lesson
45-60 minutes

Objective
By the end of this lesson, students will have a better understanding of the digestive system of ruminant animals.

Materials Needed
- Containers (resealable snack size baggies or solo cups)
- Plastic spoons
- Paint cone strainers
- Paper Towels
- Carbonated drink
- Water
- Potato Sticks*
- Pop Rocks candy
- Measuring cups: 1/4 cup, 1/8 cup, 1 tablespoon, 1/2 teaspoon
- Permanent markers
- Copies of student worksheet

Standards
NGSS
4-LS1-1; 5-PS1-4; 5-PS3-1; MS-LS1-3; MS-LS1-7

Lesson Summary
This lesson is a fun, hands-on activity designed to help students understand the process of rumination and how digestive systems break down food for energy. It is best to be used as an extension lesson as some understanding of the ruminant digestive system is beneficial to understand the steps in the activity.

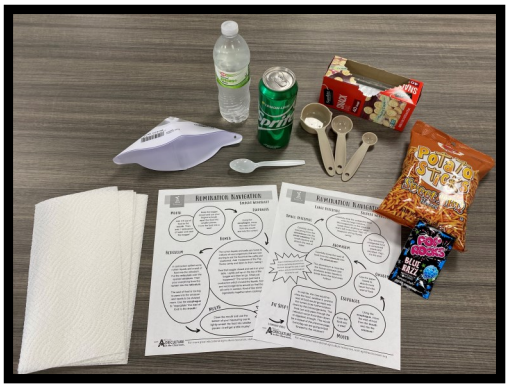
*If you don't have access to potato sticks, any type of potato chip or even a half slice of bread would work just fine.

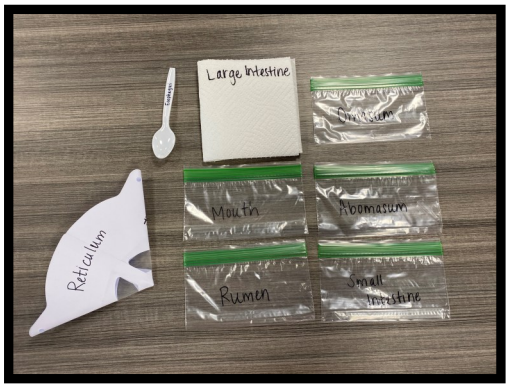
Suggested Sequence of Events:
1. Set Up: To save time, have the materials divided so that all the materials for one group are together. If time allows, you can have the 1/4 cup of potato sticks measured and ready in a container.
2. Read through the IAITC Beef Ag Mag and Dairy Ag Mag to learn more about two important ruminant animals! Interactive online versions can be found on our website.
3. Complete the activity following the procedures:
    - Divide students into groups of 2-3 and have one person from each group collect the materials.
    - Hand out the student worksheets so that each student has their own, and read through the introduction together.
    - Read through the "Set Up" on the first page of the student worksheet as a whole class so students are aware of what they need to do first.
        - Students need to label their baggies and strainer, measure the 'digestion' materials and put them into the appropriate baggies, and then follow the steps on their student worksheets.
    - When finished, have students clean up their materials according to your classroom instructions!
    - Once cleaned up, have students work together, or individually, to answer the questions on the student worksheet.
4. Whole class discussion and reflection of activity.

TEACHER RESOURCES

Extension Ideas:

- Have students color code the steps to the cattle diagram by coloring in the instruction shape and the matching digestive system part the same color.
- Have students write map directions for the route food takes in ruminant digestive systems.
- Read through our “Moovin’ On Through” non-fiction text that explains the different parts of the ruminant digestive system in more detail.
- Compare and contrast the ruminant digestive system to a monogastric digestive system.
- Have student define the word ‘rumination’. Compare that definition with the definition for ‘monogastric’.
- Invite a beef cattle farmer into your classroom to talk with your students!
- Learn more about beef by-products.
- Learn about the history of cattle in the United States.
- Have students share their favorite beef recipes.
- Learn about what cattle eat and how they are cared for by farmers and ranchers.
- Research cattle breeds in the United States and compare to cattle breeds around the world.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!





Science Literacy

Wad-O-Watershed

Grade Level
3-5

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will understand the basic geography of a watershed, how water flows through the system, and how people can impact the quality of our water.

Materials Needed
- Large, Clear Plastic tub
- Waxed Paper (at least two feet per student)
- Spray bottle filled with colored water
- Copies of student Worksheet

Standards
Common Core
CCSS.ELA-Literacy.SL.5.1; W.5.2; W.5.7

NGSS
4-MS-ESS2-1; 5-ESS3-1; 5-MS-LS2-1; 3-5-ETS1-2; 5-PS2-1

Lesson Summary
This lesson is a hands-on activity that will help students identify what a watershed is and how water moves in it. Students will also learn how easily sediment and pollution move through watersheds and the importance of working together to conserve and protect the water in their own watershed. Have students work in small groups for a better experience.

Suggested Sequence of Events:
1. Set Up: Put your students into groups and hand out materials (each group gets one of each material). Then, have them block their tub so that one end is higher than the other. Hand out the "W-O-W Student Worksheet" to each student (available on our website).
2. Read "Water is Water" by Miranda Paul to capture student interest.
3. Define a Watershed and teach the included background information. Have students write the definition on their student worksheet.
4. Look at the Major Watersheds in Illinois, which can be accessed at http://iaitc.co/watersheds.
5. Complete the activity following the procedures:
    - Have one student take the piece of wax paper and crumple it up into a ball.
    - Then, partially unfold the wax paper to form a 3D topography, complete with hills and valleys. This is your "wad-o-watershed."
    - Place the wax paper in the tub.
    - Explain to students that we all live in a watershed. Have them hypothesize about the movement of water and what would cause that movement and write it on their student worksheet.
    - Have another student spray the colored water on the high points, or "divides," of the watershed. Make sure they observe the flow of the water and fill out the next part of their student worksheet.
6. Have students work in their groups to finish their worksheets and then discuss the answers as a class.

TEACHER RESOURCES

Background Information

- A watershed is a geographic area in which water, sediments, and dissolved minerals all drain into a common body of water like a stream, creek, reservoir, or bay (the land that water flows across or under on its way to a stream, river, or lake).
- Large watersheds like the ones for the Mississippi River, Columbia River, and Chesapeake Bay are made up of many smaller watersheds across several states.
- A watershed includes all the plants, animals, and people who live in it, as well as the non-living components like rocks and soil. We are all part of a watershed, and everything we do can affect the surface and ground water that runs through this system.
- People influence what happens in watersheds, good or bad, by how the natural resources – the soil, water, air, plants, and animals – are treated. The quantity and quality of water draining from a watershed are dependent upon the climate, vegetation, soils, geology, and development of that watershed.
- Watersheds come in many different shapes and sizes. Landscape is made up of many interconnected basins or watersheds. Within each watershed, all water runs to the lowest point, such as a stream, river, or lake, due to the force of gravity. On its way, water travels over the surface and across farms, fields, forest lands, suburban lawns, and city streets, or it seeps into the soil and travels as groundwater.
- Activities that change the vegetation and surface characteristics of some watersheds will affect the quantity and quality of water contributed to a stream. What happens in small watersheds, such as pollution, also affects the larger watersheds downstream. Point source pollution is water pollution from an activity originating from an identifiable source. Nonpoint source pollution is water pollution from sources not easily identified.

Possible Answers for List on Student Worksheet

Agriculture	Household	Recreational	Industrial	Natural Events
• Crops • Animals • Golf Course • Horticulture Crop	• Homes: Drinking, Bathing, Washing Dishes, Washing Cars • Lawns/Gardens • Waste Water Treatment Systems	• Parks • Meadows • Woods • Camping Areas • Bike Paths • Swimming Areas • Boating Areas • Sporting Fields	• Factories • Schools • Storage Units • Warehouses • Parking Lots • Gas Stations • Shopping Malls • Offices	• Flooding • Drought • Mudslides • Fires • Storms/Severe Weather

TEACHER RESOURCES

Extension Ideas:

- Have students experiment with the amount of water they spray to see different ways the watershed functions.
- Let's see what happens when we have pollutants in our environment. Find some items to serve as your "pollutants." For instance, Orange Kool-Aid powder could be excess fertilizer on a golf course. Purple Kool-Aid could be a dump site. Mini chocolate chips could be dog poop at the local park. Place the "pollutants" on the watershed and then spray the water. What happens to the pollutants?
    - Connect this with the questions on the student worksheet.
- Have students find where they live on the watershed map of Illinois and share what they notice about it.
- Look at the Watershed Map of North America, accessible at http://iaitc.co/NAwatershed. This is a government-created map of all the watersheds in North America. Each color represents a different watershed.
    - Consider these questions:
        - How many different watersheds do you see in North America? In the United States?
        - What do you notice about the size and shape of these watersheds?
        - Why is it important to have a better understanding of watersheds in our country?
- Read A Drop Around the World by Barbara Shaw McKinney to learn more about the journey that water takes as it cycles through the water cycle.
    - Have students draw a comic strip or write an essay from the perspective of the drop of water.
- Collect samples of water from around town and do a water quality test to each sample. Which samples are more polluted and why?
- Complete our "Drop in a Bucket" activity that shows how much fresh water is available on Earth for human use. Then discuss the importance of protecting and conserving water. What can they do to practice water conservation and protection? This lesson and more available at agintheclassroom.org.
- Talk about soil erosion and how that can also impact the watershed.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

Science

Beanie Baby

Grade Level
K-7

Length of Lesson
45 minutes

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

Materials Needed
- Jewelry size resealable baggies (found in craft stores)
- Crystal Soil (order from Flinn Scientific at 800-452-1261)
- Hole Punch
- Water
- Measuring Spoons
- Soybeans
- Yarn
- Copies of student worksheet

Standards
Common Core
CCSS.ELA-Literacy.RI.4.3; RI.4.4; RI.4.5; RF.4.3a

Social Studies
SS.EC.1.4; SS.EC.2.4; SS.EC.FL.1.4; SS.G.2.4; SS.G.3.4
NGSS

NGSS
5-PS1-4

Lesson Summary
This lesson is designed to give students a hands-on activity that shows how seeds germinate. Students will create a "beanie baby" which allows them to observe not only the process of seed germination, but also the environment a seed needs for growth.

Suggested Sequence of Events:
1. Set Up: Pre-cut yarn into pieces long enough to tie as a necklace. Hole punch baggies above the seal.
2. Read "Full of Beans: Henry Ford Grows a Car" by Peggy Thomas to capture student interest. Ask if they know what other things we use soybeans for/in.
3. Read through AITC Soybean Ag Mag to learn about soybeans. Interactive online versions can be found on our website.
4. Pre-Activity Discussion: Hand out the student worksheet and ask them what a seed needs to start growing. Have them work individually to fill out the "Think" column to answer that question. Then have students pair up and share their ideas. They can add new information in the "Share" column. Then, as a whole class, have students share their ideas from the "Think" column. Go through the list one at a time and discuss whether a seed actually needs that to begin growing. Cross off the ones that are not necessary. Once your class comes to a final consensus, have each student write the class list in the "Share" column.
5. Complete the activity following the procedures:
    - Give each student a hole-punched baggie.
    - Have each student put 1/4 teaspoon of Crystal Soil into their baggie.
    - Add 2-3 soybeans into the baggie with the Crystal Soil.
    - Then add 1-2 tablespoons of water into their baggie.
    - Have them seal their baggies firmly so that they won't leak.
    - Then have them insert one end of yarn through the hole of the baggie and tie the ends of the yarn in a knot to make a necklace.
    - Tell them to wear the beanie baby around their neck, tucked under their shirts (warm, dark place). Have them check their beanie babies several times a day to observe germination and growth!
6. Whole class discussion and reflection of activity.

TEACHER RESOURCES

Extension Ideas:

- Read Dr. Seuss' "Oh Say Can You Seed" by Bonnie Worth and discuss the different parts of plants. Have students record unknown words as you read and go back to look up definitions.
- Have students create a comic strip showing the process of germination.
- Have students write a story from the soybeans perspective.
- Show a labeled diagram of a soybean plant.
- STEM: Have students build and label a model using recyclable materials.
- Introduce or teach about photosynthesis.
- Scientific Inquiry: Have students think more deeply about plant growth and create their own question, hypothesis, and experiment to test! Will soybeans grow faster in Mountain Dew, Coffee, or water? Does the amount of light affect the growth of the plant? Do different fertilizers, potting soils, temperature, etc. affect plant growth differently?
  - Have students use the "Student Inquiry Sheet" to test their variables.
- Watch a time lapse video of a soybean growing.
- Watch a video from a local farmer discussing soybean growth and harvest.
- Take a field trip to a farm.
- Invite a soybean farmer into the classroom.
- Watch the TEDx Talk "Sitting on Soybeans: Building the Bio-Based Automobile" presented by Debbie Mielewski. Discuss the idea of inventions and creativity. Discuss the broad possibilities of careers in Agriculture. Discuss how Debbie is a female in a stereotypically "male" career and how she is breaking that stigma.
- Research the "accidental" invention of the Crystal Soil used in the activity (which happened in Peoria, IL)
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

Wheat Milling

Science Literacy

Grade Level
K-4

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will have a better understanding of wheat as a plant.

Materials Needed
- Wheat Stalks (available at agclassroomstore.com)
- Salt or Pepper Grinder

Standards
Common Core
CCSS.ELA-Literacy.RI.K.10; RI.1.6

CCSS.Math.Content.K.CC.A.1

NGSS
K-LS1-1; 2-LS2-2; 3-LS1-3

Lesson Summary
This lesson is designed to help students identify the parts of a wheat plant while learning about its uses in various food products.

Suggested Sequence of Events:
1. Set Up: Gather enough wheat stalks for each student in your class or for small groups of students. Draw or print out a diagram of a wheat stalk as a guide for you and your students.
2. Read "Farmer George Plants a Nation by Peggy Thomas to capture student interest.
3. Read through the AITC Wheat Ag Mag to learn more about wheat. Interactive online versions can be found on our website.
4. Complete the activity following the procedures:
    - Show students wheat stalks.
    - Go over the parts of the wheat stalk with the students to familiarize them with the parts so they can understand the directions for dissection.
        - Stalk—the entire plant.
        - Head—the part of the wheat plant that contains the kernels.
        - Beard—the bristle-like parts of the wheat plant that cover and protect the kernels.
        - Kernel—the seed from which the wheat plant is grown or that people harvest from the wheat plant to grind into flour.
        - Stem/Straw—the part of the wheat plant that supports the head and is known as straw after harvest.
    - Dissect the wheat using the following steps:
        - Break the head off the stem.
        - Make a straw out of the stem by breaking it to avoid the nodes.
        - Lay the wheat head flat on a hard surface and pat with your hand to shake out the kernels.
        - Have the students count their kernels.
    - Put the kernels of wheat into a salt or pepper grinder and have the students mill their wheat into flour. What simple machines are being used?
    - Talk about different ways to grind wheat. The Native Americans did it using rocks, etc. Have students design their own method of grinding wheat and then test their machines.

TEACHER RESOURCES

Extension Ideas:

- Read "Bread Comes to Life" by George Levinson. Then, have students find the gluten in wheat by chewing the kernels. Before there was chewing gum in the store, farmers made their own with grains of wheat!
- Ask the students to list some of the foods that can be made using flour. *(Bread, cake, cookies, brownies, pasta, crackers, etc.)*
- Have students listen to "The Little Red Hen" by Paul Galdone.
    - Bring in seeds, stems, flour, and bread and put them down in a random order. Have student pay attention to the steps the hen takes to plant her wheat . Have students work together to put items in the correct order.
- Have students label and color a wheat stalk.
- Discuss what wheat needs to grow (Light, water, air, and nutrients). Then, help students plant their own wheat.
    - As their wheat grows, you can continue to discuss this lesson by asking these questions:
    - How many days did it take for the wheat seeds to sprout?
    - What do the wheat plants look like?
    - What do the plants need to grow?
- Watch a video of wheat being harvested.
- Watch a video from a local farmer discussing wheat growth and harvest.
- Invite a wheat farmer into the classroom.
- Have students research each step of growing wheat and write a paragraph explaining what happens at each phase. How long does each phase take?
- Bring in different types of bread (sweet, rye, sourdough, white, etc) and have students sample each type. After sampling have students write about which kind they liked the best and why.
- Encourage students to try making their own bread at home.
- Have students do IAITC's Soil Sam lesson, using wheat seeds for the "hair."
- Go to agintheclassroom.com to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

Say it with Soil!

Grade Level
5-8

Length of Lesson
45 minutes

Objective
By the end of this lesson, students will be able to demonstrate through writing how soil interconnects with all living things.

Materials Needed
- Soil Quotes**
- Copies of student Worksheet

Standards
Common Core
CCSS.ELA-Literacy.RI.4.3; RI.4.4; RI.4.5; RF.4.3a; SL.4.1; W.4.2; W.4.6; W.4.7; W.4.8

NGSS
3-LS4-4; 3-LS3-2; 5-ESS3-1

Lesson Summary
This lesson is designed to help students learn about quotes from our history that highlight information about soil.

Suggested Sequence of Events:
1. Set Up: Cut the soil quotes from the quote pages (available on our website) into strips. Laminate for multiple uses.
2. Read "This Land is Your Land" by Woody Guthrie to set up a conversation about history and the land.
3. Read through IAITC Soil Ag Mag to learn more about soil and its history. Interactive online versions can be found on our website.
4. Complete the activity following the procedures:
    - Hand out the student worksheet and distribute one quote to each student.
    - Have students read the soil quote and answer the questions on the student worksheet.
        - What does the quote mean to me?
        - What did this quote mean to the author?
        - Has this quote withstood the passage of time
            - Why or why not?
        - Is this quote relevant in today's world?
            - Why or why not?
5. Have students share their writing with a partner, small groups, or the entire class.

**A handful of our soil quotes are included on the following Teacher Resources page for this lesson. These can easily be typed or copied and cut apart.

Go to www.agintheclassroom.org to find our complete list of soil quotes!

TEACHER RESOURCES

Soil Quotes:

"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect." -Aldo Leopold; 1949

"We are part of the earth and it is part of us...What befalls the earth befalls all the sons of the earth." -Chief Seattle; 1854

"I know of no pursuit in which more real and important services can be rendered to any country than by improving its agriculture." -George Washington; July 20, 1794

"The soil is the source of life, creativity, culture and real independence." -David Ben Gurion, Hazon VeDerek; 1950's

"Plowed ground smells of earthworms and empires." -Justin Isherwood; 1990

"When tillage begins, other arts follow. The farmers, therefore, are the founders of human civilization." -Daniel Webster; 1840

"I bequeath myself to the dirt, to grow from the grass I love; If you want me again, look for me under your boot soles." -Walt Whitman; 1855

"We spend our lives hurrying away from the real, as though it were deadly to us. "It must be somewhere up there on the horizon," we think. And all the time it is in the soil, right beneath our feet." -William Bryant Logan; 1996

Extension Ideas:

- Have students read through all the quotes and choose their favorite. Why did they choose that quote? What does it mean to them?
- Have students create their own say it with soil quotes.
- Have students create a Bio Cube about one of the authors of the quotes.
    - Students can go to http://www.readwritethink.org/files/resources/interactives/cube_creator/ to fill out their own Bio Cube.
    - A few examples of authors to choose would be: George Washington, Franklin D. Roosevelt, Walt Whitman, etc.
- Invite an Illinois farmer into the classroom to talk to your class about soil health and sustainability within agriculture.
- Have students participate in a "Living Wax Museum". They can dress up as the person they researched for their bio cube and then perform a short monologue for their peers.
- Have students write a paper about one or two of the quote authors.
- Read "Sand and Soil: Earth's Building Blocks," by Beth Gurney, and "A Handful of Dirt," by Raymond Bial, to teach students more about soil, its properties, and its importance to our planet.
- Complete our lesson "Soil Slurry" to deepen your student's understanding of soil properties.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

Social Studies

Literacy

Say It With Soil

Student Worksheet

1. My Quote:

2. What does this quote mean to me?

3. What did this quote mean to the author?

4. Has this quote withstood the passage of time? Why or why not?

5. Is this quote still relevant to today's world? Why or why not?

Science Math

Walking Paper Horse

Grade Level
2-6

Length of Lesson
45 minutes

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

Materials Needed
- Cardstock or construction paper
- Pencils
- Scissors
- Rulers
- Foam poster board
- Books or box for ramp
- Copies of Student Worksheet
- Copies of Horse Template (optional)

Standards
Math
CC.2.MD.1-1; CC.2.G.1

NGSS
K-PS2-1; K-PS2-2; 3-PS2-1; 3-PS2-2; 4-PS3-1; 5-PS2-1; MS-PS2-2; MS-PS2-4

Lesson Summary
This lesson is a fun activity to help students use basic shapes to recognize the role gravity has when it comes to motion. Students will have to figure out what adjustments need to be made to get their horse to walk!

Suggested Sequence of Events:
1. Set Up: For younger students or to save time, print the provided template out ahead of time to give to your students.
2. Read through the IAITC Horse Ag Mag to learn more about horses! Interactive online versions can be found on our website.
3. Complete the activity following the procedures:
    - Have students use their rulers to draw their horse template, following the directions on the Student Worksheet.
    - Next have them cut out the perimeter of the rectangle, cut on the dotted lines, and also cut the diagonal lines on the corners.
    - Fold the four “legs” down at a ninety degree angle. Fold the base of the “head” upward (this would be the “neck” of the horse) and then fold a small part of the top of the “head” down to create a face. Lastly, curl the ‘tail’ upward.
    - Set up the ramps and test the horses! Students will need to make adjustments to their horse and/or the ramp if their horse doesn’t walk right away.
4. Whole class discussion and reflection of activity. Ask students what adjustments they had to make in order to get their horse to walk down the ramp.

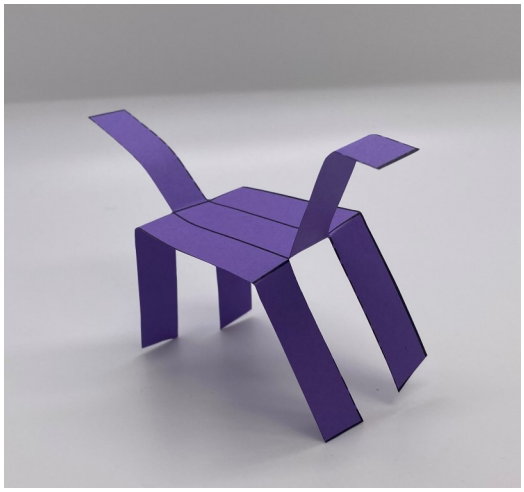
TEACHER RESOURCES

Background Information:
When the horse is placed at the top of the ramp, it has potential energy. Once the horse is nudged and it begins 'walking' down the ramp due to being pulled by gravity, the horse then has kinetic energy. The material you place on the ramp will determine the amount of friction there is, causing the horse to move faster or slower.

The 'walking' is due to the angles that were cut on the 'hooves' of the horse. These angles allow the horse to rock back and forth like a rocking chair. As the horse rocks to the right side, the left legs are lifted and gravity pulls them forward. The horse then rocks to the left side and the right legs are lifted and pulled forward.

Extension Ideas:

- Have students go to this website and learn about a variety of horse breeds! Website can be found at http://afs.okstate.edu/breeds/horses/
    - Have students color their templates to match their favorite horse coat color.
- Have students convert measurements into mm and/or inches. Have students find the area of all the squares and rectangles within the template.
- Learn about the Kentucky Derby and have students give their paper horses a derby name. When their horse is ready, have them race their horses down the ramp.
- Learn about the different types of gaits of horses and how horses are trained.
- Take a closer look at horses on farms and ranches. What are some of the purposes of having a horse? How are they used for work, for hobby, or for sport? How are horses useful beyond the farm?
    - Take this a step further and learn about how the use of horses has changed over time.
- Have students complete the "Ag-Venture With Horse" worksheet that pairs with the Horse Ag Mag to strengthen student non-fiction skills while learning more about horses.
- Read "Horses" by Gail Gibbons to learn more about horses and their history.
- Show a labeled diagram of a horse and have students label their own horse diagram.
- Invite a horse handler into the classroom.
- Have students tell a fictional story about a horse.
- Learn about what it takes to care for a horse.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!



Science Math

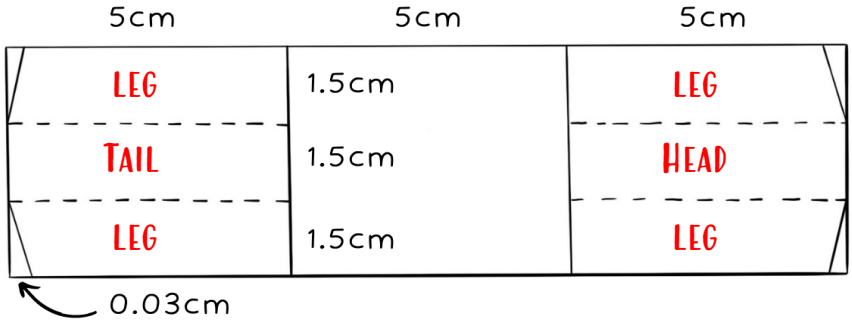
Walking Paper Horse

Student Worksheet

Can you engineer a walking paper horse? The answer is YES! With some basic supplies, a ramp, and patience, you can have a walking paper horse in no time. Follow the directions below to create your own walking paper horse.

Measuring:

1. Use a ruler to measure out a 15cm x 4.5cm rectangle. Finish drawing your template, using the diagram below for the correct measurements.



Cutting:

1. Cut around the perimeter of the rectangle.
2. Cut the triangles off of the four corners.
3. Cut on the dotted lines of the outside squares up to the center square.

Folding:

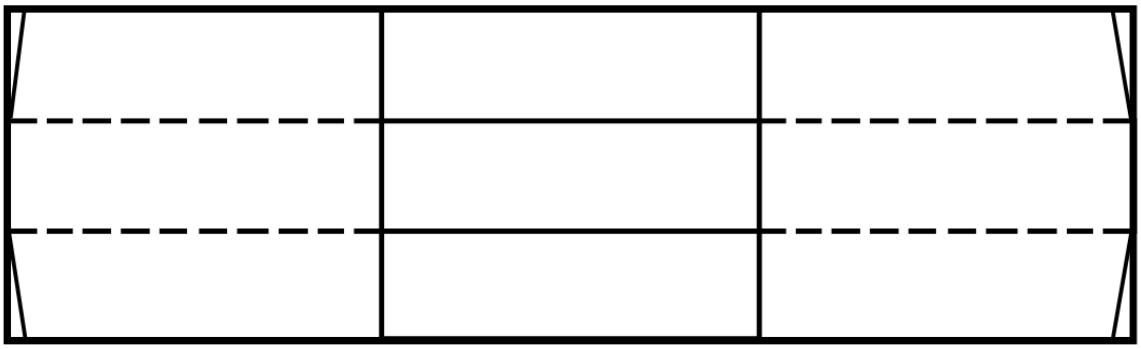
1. Bend the 'legs' downward at a ninety degree angle, perpendicular to the body.
2. Bend the 'tail' upward and use your finger or the edge of the table to curl it a little.
3. Bend the 'head' upward. Then, fold the top of the head downward to create a 'face'.

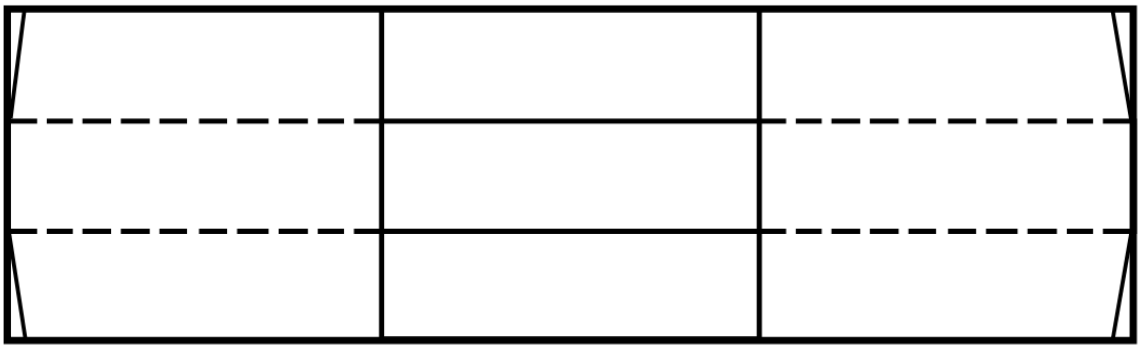
Testing:

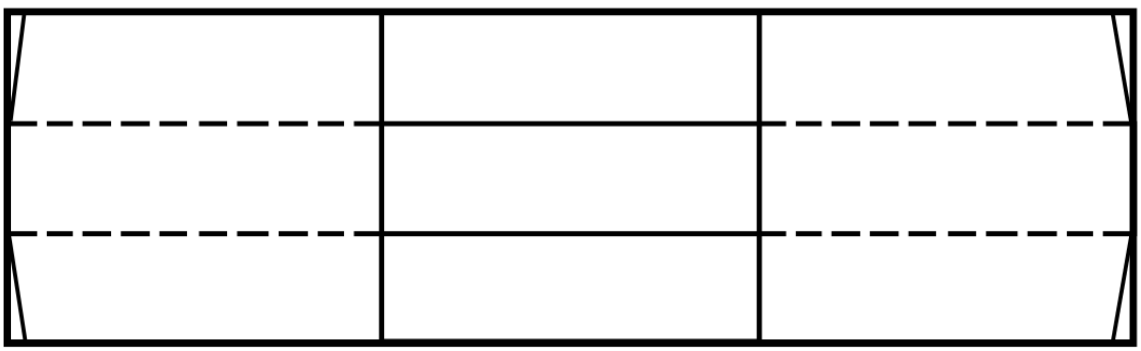
1. Using the materials you have, build a ramp.
2. Place your horse at the top of the ramp and give it a slight nudge to start moving.

Science and engineering is all about trial and error so stay patient if your horse doesn't start walking right away—it's a part of the process. If your horse isn't walking, consider some of these variables and make adjustments until your horse is walking:

- The angle of the 'hooves'
- The folds of the 'legs'
- The angle of the ramp
- The material of the ramp







Ag Mags and Readers

non-fiction based texts

Written at the 4th grade level, our Ag Mags are 4 -page, colorful agricultural magazines for kids! Each Ag Mag focuses on a different agricultural topic and includes brightly colored pictures, agricultural lessons and activities, and a "Career Corner" with interviews from people in Illinois who work in a field related to the Ag Mag topic. The information within is cross-curricular and helps students to deepen their understanding of agriculture.

Interactive versions can be found on our website!

Best of all, you can get a classroom set of 30 of any of our Ag Mags! They are FREE to any Illinois teacher!

Topics:

- Apples
- Beef
- Careers
- Corn
- Dairy
- Farmers Market
- Horse
- Horticulture
- IL History
- Livestock
- Nutrition
- Pizza
- Pollinator
- Pork
- Poultry
- Pumpkin
- Renewable Energy
- Soil
- Soybean
- Specialty Crops
- Tree
- Urban
- Water
- Wheat

Go to our website and click on "Contact Your Agricultural County Literacy Coordinator" to get your free pack!

Our Ag Readers are written at an upper elementary level and are easy to share with students online or can be easily printed in black and white or in color! Like the Ag Mags, our Ag Readers also have a variety of topics. Find the Ag Readers on our website! We are in the process of translating all Reader topics into Spanish.

Topics:

- Apples
- Beef
- Cooperatives
- Corn
- Cotton
- Dairy
- Horses
- Invasive Species
- Pizza
- Pollinator
- Pork
- Poultry
- Pumpkins
- Renewable Energy
- Sheep
- Soil
- Soy
- Specialty Animals
- Water
- Wheat

Our Favorite
ag-themed books

Apples

The Year Money Grew on Trees
by Aaron Hawkins

Applesauce Day
by Lisa Amstutz

Apples to Oregon
by Deborah Hopkinson

Pumpkins

Pumpkinheads
by Rainbow Rowell

The Great Pumpkin Smash
by Lori Haskins Houran

Pick a Pumpkin
by Patricia Toht

Corn

Let's Pop, Pop, Popcorn!
by Cynthia Schumerth

Anna's Corn
by Barbara Santucci

Corn
by Gail Gibbons

Water

Water is Water
by Miranda Paul

Cloudette
by Tom Lichtenheld

The Water Lady
by Alice McGinty

A Long Walk to Water
by Linda Sue Park

Dairy

Clarabelle
by Cris Peterson

Chuck's Ice Cream Wish: Tales of the Dairy Godmother
by Viola Butler

Louis Pasteur and Pasteurization
by Jennifer Fandel

From Milke to Cheese
by Bridget Heos

Pollination

Pollen: Darwin's 130-Year Prediction
by Darcy Pattison

Butterflies Belong Here
by Deborah Hopkinson

Honeybee: The Busy Life of Apis Mellifera
by Candace Fleming

Flowers Are Calling
by Rita Gray

Soybeans

Full of Beans: Henry Ford Grows a Car
by Peggy Thomas

Auntie Yang's Great Soybean Picnic
by Ginnie Lo

Pod to Plate: The Life Cycle of Soybeans
by Julie D. Blunier

Wheat

The Thing About Luck
by Cynthia Kadohata

Farmer George Plants a Nation
by Peggy Thomas

Bread Lab!
by Kim Binczewski

Pork

Pigs and Pork in the Story of Agriculture
by Susan Anderson and JoAnne Buggey

Pigology
by Daisy Bird

The Pig War
by Emma Bland Smith

Soil

Handful of Dirt
by Raymond Bial

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

The Dirt Book
by David L. Harrison

Beef

Amazing Grazing
by Cris Peterson

Little Joe
by Sandra Neil Wallace

Beef Princess of Practical County
by Michelle Houts

Social Emotional Learning

The Bad Seed
by Jory John

Grow Happy
by Jon Lasser

Different Just Like Me
by Lori Mitchell

Country Kid, City Kid
by Julie Cummins

History

The Great American Dust Bowl, by Don Brown

Lincoln Clears a Path: Abraham Lincoln's Agricultural Legacy
by Peggy Thomas

Buzzing With Questions: The Inquisitive Mind of Charles Henry Turner, by Janice N. Harrington

The Hundred-Year Barn, by Patricia MacLachlan

In the Garden with Dr. Carver, by Susan Grigsby

Try It: How Frieda Caplan Changed the Way We Eat
by Mara Rockliff

Gardening/ Urban Gardening

Stepping Stones, by Lucy Knisley

Gardener, by Sarah Stewart

How to Grow a Monster, by Kiki Thorpe

City Green, by DyAnne DiSalvo-Ryan

Harlem Grown: How One Big Idea Transformed a Neighborhood
by Tony Hillary

The Extraordinary Gardener
by Sam Boughton

Underrespresented Groups

Prairie Lotus
by Linda Sue Park

Tomatoes for Neela
by Padma Lakshmi

The Girl Who Thought in Pictures
by Julia Finley Mosca

Let Me Fix You a Plate
by Elizabeth Lilly

The Old Truck
by Jerome Pumphrey

Return to Sender
by Julia Alverez

A Song for Lena
by Hilary Horder Hippely

Fry Bread
by Kevin Maillard

When the Shadbush Blooms
by Carla Messinger

Thirteen Moons on a Turtle's Back
by Joseph Bruchac

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