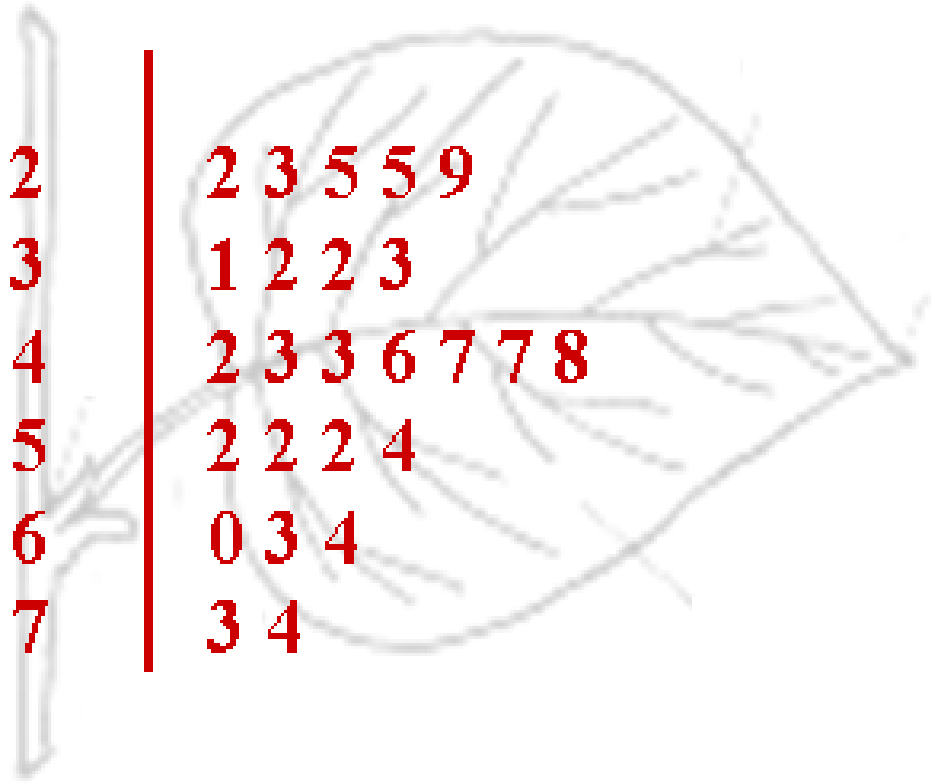
STEM and LEAF



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Explore STEM through LEAF –

__L__earning and __E__ngaging in __A__griculture __F__irst!

Illinois AGRICULTURE in the Classroom℠

Table of Contents

Apple Tower

Grade Level: K-8

Objective: Students will design and build a tower using apple fractions.

Common Core:
Mathematics: CCSS.Math.Content.K.MD.A.1; K.MD.A.2; K.MD.B.3; K.G.B.4; K.G.B.5; K.G.B.6; 1.G.A.1; 1.G.A.2; 1.G.A.3; 2.G.A.1; 2.G.A.2; 2.G.A.3; 3.G.A.1; 3.G.A.2; 3.NF.A.1; 3.NF.A.2; 3.NF.A.3; 4.NF.A.1

Next Generation Science Standards:
Structures and Properties of Matter: 2-PS1-2; 3-PS2-1
Engineering Design: 3-5-ETS1-1; 3-5-ETS1-2; 3-5-ETS1-3; MS-ETS1-1; MS-ETS1-2

Suggested Reading Materials:
IAITC Apple Ag Mag
Apple Terra Nova
Apple Fractions by Jerry Pallotta ISBN: 9780439389013
Apples to Oregon by Deborah Hopkinson ISBN: 1416967460
From Seed to Apple by Anita Ganeri ISBN: 1403478716
Johnny Appleseed by Madeline Olsen ISBN: 9780439317054
The Popcorn Astronauts *21 Things To Do With An Apple* by Deborah Ruddell ISBN: 9781442465558

Materials Needed:
Devices with student internet access
Paper
Pencils
Pre-cut apples
Toothpicks
Measuring tape

Directions:
1. Read Apple Fractions by Jerry Pallotta. Investigate and discuss fractions as appropriate.

2. Tell students they are going to use pre-cut apple fractions to build a tower. Let students know the goal is to build the tallest tower they can construct using apple fractions and toothpicks.
3. Place students into groups. Allow time for the groups to use the internet to research the structural design of tall buildings.
4. Direct groups to draw a diagram of their planned tower on paper.
5. Have groups construct their towers.
6. Allow students to examine the towers and predict which they think is tallest based on their observations.
7. Measure the towers to determine the tallest tower.
8. Compare the results to the student predictions.
9. Guide students to reflect on their experience. Talk about other measurable attributes of the towers, such as length, width, or number of toothpicks used.
10. Suggest parents reinforce learning at the grocery store by comparing measurable attributes of items in their carts.

Extensions:

- Have students identify and explain fractional parts used in their towers.
- Include a weight-bearing requirement for the tower.
- Allow students to snack on an apple while reading Apple Fractions by Jerry Pallotta.
- Do IAITC's "Slice of Soil" lesson found at https://goo.gl/k3DJkT.

Apple Oxidation

Grade Level: K-8

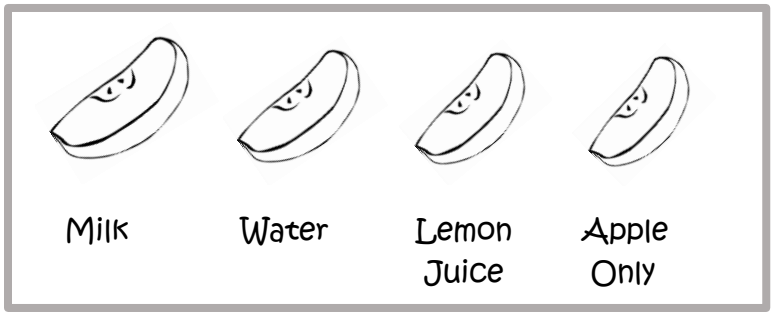
Objective: Students will discover whether apple browning can be prevented.

Common Core:
Mathematics: CCSS.Math.Content.1.MD.B.3

Next Generation Science Standards:
Structures and Properties of Matter: MS-PS1-2
Engineering Design: K-2-ETS1-1; 3-5-ETS1-3

Suggested Reading Materials:
IAITC Apple Ag Mag
Apple Terra Nova
Apple Fractions by Jerry Pallotta ISBN: 9780439389013
Apples to Oregon by Deborah Hopkinson ISBN: 1416967460
From Seed to Apple by Anita Ganeri ISBN: 1403478716
Johnny Appleseed by Madeline Olsen ISBN: 9780439317054
The Popcorn Astronauts *21 Things To Do With An Apple* by Deborah Ruddell ISBN: 9781442465558
11 Experiments That Failed by Jenny Offill and Nancy Carpenter ISBN:970375847622

Materials Needed:
Apples, 4 slices per group
Milk
Water
Lemon juice
Plastic bowls
Plastic dressing containers
Lab sheet (on next page)



Directions:
1. Ask your students to describe what an apple looks like. Use the IAITC Apple Ag Mag to show top varieties of apples.
2. Slice an apple in front of the class.

3. Ask students what happens to the appearance of the apple once sliced. (It browns.) Explain that when an apple is cut, exposing the inside surface to the oxygen in the air, a process known as oxidation occurs. Apple taste is not affected by oxidation, but appearance is affected.
4. Challenge your students to slow the process of oxidation.
5. Group students. Give each group four apple slices, a set of three plastic dressing containers with milk, water, and lemon juice, four plastic bowls, and one lab sheet.
6. Ask students if they think one of the liquids could slow the process of oxidation and have them explain their predictions.
7. Have students complete the "Question", "Hypothesis," and "Procedure" sections on their lab sheets. If needed, ask guiding questions to help students establish the following procedure.

   Step 1: Label the four bowls "milk", "water", "lemon juice", "apple only."
   Step 2: Place one apple slice in each of the four bowls.
   Step 3: Pour the milk over the apple slice in the bowl labeled "milk."
   Do the same with the water and lemon juice.
   Step 4: Check the apple slices after 30 minutes and observe the results.

8. Allow students to conduct the experiment.
9. Have students finish remaining sections of their lab sheets to explain what happened and draw conclusions.
10. Discuss the real world value of the knowledge that was gained from this experiment.

Extensions:

- Leave the apple slices overnight and conduct observations the next day.
- Let students choose the items used to try to prevent apple browning.

Scientists:_____

Materials:

Question:

_____

_____

_____

Hypothesis:

_____

_____

_____

Procedure:

_____

_____

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Results:

_____

_____

_____

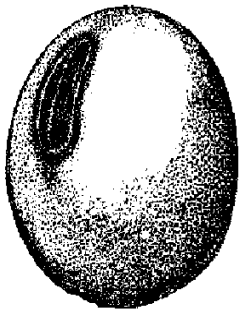
Conclusion:

_____

_____

_____

Beanie Baby



Grade Level: K-6

Objective: Upon completion of this activity, students will have a better understanding of the plant germination process.

Common Core:
Language Arts: CCSS.ELA-Literacy.RI.4.3; RI.4.4; RI.4.5; RF.4.3a
Mathematics: CCSS.Math.Content.K.CC.A.1; K.CC.A.3; K.CC.B.4; 1.NBT.A.1; 4.MD.A.2

Next Generation Science Standards:
Structure and Properties of Matter: 5-PS1-4
Weather and Climate: K-ESS2-2; K-ESS3-1; K-ESS; 2-ESS-1
Life Cycles and Traits: K-LS1-1

Social Science Standards:
SS.G.1-2.K; SS.G.1.1; SS.G.3.3; SS.G.3.4; SS.G.2-4.5; SS.G.2-4.6-8; SS.EC.1.K; SS.EC.1.3; SS.EC.2.1; SS.EC.1-2.5; SS.EC.1-3.6-8

Suggested Reading Materials:
IAITC Soybean Ag Mag
Soybean Terra Nova
Oh Say Can You Seed by Bonnie Worth ISBN: 0375810951
Super Soybean by Raymond Bial ISBN: 0807575496

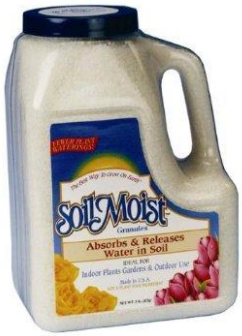
Materials Needed:
Jewelry size resealable bag
Crystal soil
Measuring spoons
Soybeans
Hole punch
Yarn

Directions:
1. Punch a hole in the top of your bag.
2. Place 1/4 teaspoon of Crystal Soil into the bag.
3. Add two soybeans to the bag.

4. Add one tablespoon of water.
5. Seal your bag firmly.
6. Insert the yarn to make a necklace.
7. Wear your Beanie Baby around your neck and under your shirt to keep it in a warm, dark place.
8. Check your Beanie Baby several times a day for germination and record the growth. Apply mathematics to ensure accurate measurements. This will help grow a healthy soybean.

Extensions:

- Turn this into an experiment. Change the variables (amount of light, type of soil medium, amount of water) and have students hypothesize the outcomes and keep a germination journal to record their conclusions.
- Research and have a class discussion about the uses of soybeans, where soybeans are grown and where they are exported. Discuss how soybeans are high in protein and are a global food source. Look at maps to determine why soybeans are grown in specific locations.



Crystal Soil/Soil Moist for Beanie Babies:

- Can purchase from gardening centers (Lowes, Menards, etc.) or plant nurseries
- Look for “Soil Moist” or “Crystal Soil”
- Can also purchase from Flinn Scientific: http://www.flinnsci.com/
- Catalog #’s, FB0381 (yellow), FB0382 (blue), FB0383 (red), FB0384 (green), or FB1602 (clear)
- $4.95 for 2.5oz

Corn Packing Peanuts

Grade Level: K-3

Objective: Students will learn about renewable and non-renewable resources, as well as building fine motor skills.

Common Core:
Language Arts: CCSS.ELA-Literacy.W.3.1; W.3.7
Mathematics: CCSS.Math.Content.K.CC.A.1; K.CC.A.3; K.CC.B.4; 1.NBT.A.1; 4.MD.A.2

Next Generation Science Standards:
Structures and Properties of Matter: 2-PS1-1; 2-PS1-3
Engineering Design: K-2.ETS1-1; K-2-ETS1-2

Suggested Reading Materials:
Corn Terra Nova
IAITC Corn Ag Mag
Corn by Gail Gibbons ISBN: 0823422453

Materials Needed:
Cornstarch packing peanuts

Introduction:
Cornstarch packing peanuts are biodegradable and decompose in water, leaving no toxic waste. Because the peanuts begin to break down in water, the peanuts can be used to construct sculptures and art. Simply "lick and stick." Cornstarch packing peanuts can be used in a variety of ways in the classroom. Here are a few ideas:

Classroom Activities:

1. For young students learning numbers or the alphabet, give them a piece of paper with a number or letter on it. Have them "trace" the number or letter with corn packing peanuts by having them lick and stick them together.
2. Use the packing peanuts as an interest approach. Each student thinks of something different when they hear the word "agriculture." Have your students build something related to agriculture. To make it more interesting, give your students some stipulations, such as:

- Time Limit—Give your students 10 minutes to construct their idea of agriculture.
- Height—You are looking for the tallest structure.
- Sturdiness—Structures should be free-standing. When time is up, have them let go and then measure the tallest structure that can stand on its own.

3. Another interest approach idea: Give students the title of an upcoming reading assignment or book. What does each student think of when they hear that title? What will the book be about? Have each student construct their idea.

Corn Packing Peanuts:

www.uline.com

Search “Cornstarch Peanuts”

Corn Ramp

Grade Level: K-3

Objective: Students will engineer a ramp using corn related materials.

Common Core:
Language Arts: CCSS.ELA-Literacy.SL.K.1; SL.1.1; SL.2.1; SL.3.1
Mathematics: CCSS.Math.Content.K.MD.A.1; K.MD.A.2; K.G.B.4; K.G.B.5; K.G.B.6

Next Generation Science Standards:
Structure and Properties of Matter: K-PS2-1; K-PS2-2
Engineering Design: K-2-ETS1-1; K-2-ETS1-3

Suggested Reading Materials:
IAITC Corn Ag Mag
Corn Terra Nova
Corn by Gail Gibbons ISBN: 0823422453

Materials Needed:
"Finding Corn in Your Home" worksheet (found on following page)
"Corn Uses Poster" at https://goo.gl/QC2h7D
Materials for ramp construction (provided by students)
Scissors
Tape

Note to Instructor:
This lesson is designed to be a multi-day lesson to allow time for students to gather ramp building materials and bring them to school. The lesson could be done in one day if materials for ramp construction are provided for students.

Directions:
1. Assign the "Finding Corn in Your Home" worksheet to help students discover the many uses of corn. Consider including a stipulation that students find a product that contains corn that is not food.
2. Review the students' findings and facilitate discussion to reinforce the many uses of corn.

3. Challenge students to build a ramp with products made from corn and/or the containers of corn products. A marble should be able to roll down the ramp and continue a distance of two-feet once on a flat surface. Students need to bring the materials to school so they should be informed of the challenge prior to ramp building day.
4. Give students time to build their ramps. Students may use scissors and tape, if desired.
5. Examine ramps to ensure they are made of corn-related materials.
6. Test ramps to determine if a marble rolls down it and meets the two-foot distance requirement. Practice procedures for recording results.
7. Discuss areas for design improvement, why different ramps work better than others, and the function of ramps in the real world.

Extensions:

- Conclude the corn ramp building challenge by enjoying a snack that contains corn.
- Time how fast different objects roll down the ramp. Have students predict which will roll quickly and which will roll slowly. Ask students to write their predictions on a sheet of paper.
- Compare the time measurements of the lighter objects to those of the heavier objects.
- Refer back to the earlier discussion on the uses of ramps. Ask students to think of times when they would want objects to go down the ramp more slowly (strollers, wheelchairs, "kiddie" slides). Ask students to think of times when they would want objects to go down the ramp more quickly (slides for bigger kids, waterpark, skateboarding).

Finding Corn In Your Home

When you go home, become a corn detective. Just how many items can you identify that contain corn or a corn co-product? The number will a...maize you! Corn is used in many food and non-food products that are a part of our daily lives.

Nearly 40% of all the corn grown in the United States is fed to livestock. Corn provides a safe and nutritious feed that helps produce quality meat, dairy and egg products for us to eat.

Did you know the main ingredient in most dry pet food is corn? Corn helps keep our dogs and cats healthy and active.

Corn has long been recognized as a good source of nutrition for humans. Corn provides protein and fiber, essential elements in our diet.

That little kernel of corn can be used in so many ways. Over 4,000 everyday products are made using the fiber, protein, oil and starch from the corn kernel.

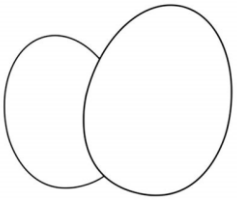
Oil from the germ of the kernel is low in saturated fat. This low fat product is ideal for health conscious Americans. Starch from each corn kernel provide carbohydrates to our diet. This provides needed energy for growth and activities. Fructose, from cornstarch, is a sweetener similar to refined table sugar. Since high fructose corn syrup and sugar are so similar, the human body uses them the same way.

Fewer calories, higher fiber, reduced amounts of sugar and less fat are all parts of a desirable diet. Corn in the human food chain helps provide all of these.

Now that you are a corn detective, see if you can find 15 items in your home that contain corn and list them below.

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Egg Drop Challenge



Grade Level: K-12

Objective: Students will design a package that will protect an egg from cracking or breaking when it falls.

Common Core:
Language Arts: CCSS.ELA-Literacy.SL.K.1; SL.K.3; SL.K.6; SL.1.1; SL.1.6; SL.2.1; SL.2.6; SL.3.1; SL.3.6
Mathematics: CCSS.Math.Content.K.MD.A.1; K.MD.A.2; K.MD.B.3; K.G.B.5; K.G.B.6; 1.MD.C.4; 1.G.A.1; 1.G.A.2; 2.MD.A.1; 2.MD.A.2; 2.MD.A.3; 2.MD.A.4; 2.G.A.1; 3.MD.B.3; 3.MD.B.4

Next Generation Science Standards:
Structures and Properties of Matter: MS-PS2-1; MS-PS2-2; HS-PS2-1; HS-PS2-3
Engineering Design: K-2-ETS1-1; K-2-ETS1-2; 3-5-ETS1-2

Suggested Reading Materials:
IAITC Corn Ag Mag
IAITC Poultry Ag Mag
IAITC Water Ag Mag
IAITC Wheat Ag Mag
11 Experiments That Failed by Jenny Offill and Nancy Carpenter ISBN: 970375847622

Materials Needed:
Eggs
Quart sized Ziploc bags
Any combination of the following items

- Water
- Ice
- Dry cereal
- Oats
- Flour
- Pasta
- Popcorn (popped and/or unpopped)
- Pipe cleaners
- Paper towel

Directions:

1. Begin with a word splash on the topic of “protective packaging.” Encourage students to write any words or phrases that come to mind when they think of protective packaging.
2. Link the ideas shared during the word splash to the importance of protective packaging in the real world. Highlight the shipping industries use of protective packaging to protect the wide-range of items they transport throughout the world. Consider other areas influenced by package engineering. For example, agriculture where packaging helps preserve the food we eat.
3. Tell students they are going to design packaging to protect an egg from breaking when it hits the floor. Students may use any of the teacher-provided materials. All protective materials used, plus the egg, MUST be sealed in a Ziploc bag.
4. Allow students to design their protective packages.
5. Perform the drop tests starting at a height of 4 feet. Dispose of packages with broken eggs. Retain packages with intact eggs for further testing.
6. Allow the class to examine the packages that protected the eggs from the 4-foot drop.
7. After examining the packages, perform a class survey. Have students indicate which package they think is most likely to protect the egg from breaking when dropped from a higher height. Display the survey results in a data display.
8. Perform the drop tests from 5 feet.
9. Look at how the actual results compare to the previous class survey.
10. Continue the drop tests from higher heights, if desired.
    Reflect on successful approaches and areas for design improvement, noting that engineers and scientists reflect on their work too.

Extensions:

- Change the materials used in the egg drop challenge.
- Complete “The Bouncing Egg Experiment” found in the IAITC Poultry Terra Nova.
- Hatch eggs in the classroom.

Milk and So Much More

Grade Level: K-4

Objective: After completing this activity, students will understand how sensitive fats and proteins are to new substances and how this sensitivity helps control the molecules in milk so different products can be made from milk.

Common Core:
Language Arts: CCSS.ELA-Literacy.RI.4.3; RI.4.4; RI.4.5; RF.4.3a
Mathematics: CCSS.Math.Content.4.MD.A.2; 4.MD.B.4

Next Generation Science Standards:
Structure & Properties of Matter: 5-PS1-1; 5-PS1-2; 5-PS1-3; 5-PS1-4

Suggested Reading Materials:
Dairy Terra Nova
IAITC Dairy Ag Mag
Clarabelle by Cris Peterson ISBN: 1590783107

Materials Needed:
Whole milk
Dinner plates
Cotton swabs
Food coloring (red, yellow, green, blue)
Dish-washing soap (Dawn brand works well)

Introduction:
Milk is mostly water, but it also contains vitamins, minerals, proteins and tiny droplets of fat suspended in solution. Fats and proteins are sensitive to changes in the surrounding solution (the milk).

When you add soap, the weak chemical bonds that hold the proteins in the solution are altered. It becomes a free-for-all! The molecules of protein and fat bend, roll, twist and contort in all directions. The food coloring molecules are bumped and shoved everywhere, providing an easy way to observe all the invisible activity.

At the same time, soap molecules combine to form a *micelle*, or cluster of soap molecules. These micelles distribute the fat in the milk. This rapidly mixing fat and soap causes swirling and churning where a micelle meets a fat droplet.

Milk is mostly water and it has surface tension like water. The drops of food coloring floating on the surface tend to stay put. Liquid soap wrecks the surface tension by breaking the cohesive bonds between water molecules and allowing the colors to zing throughout the milk. What a party!

Directions:

1. Pour enough milk in the dinner plate to completely cover the bottom. Allow the milk to settle. There should be no ripples in the milk before starting this activity.
2. Add one drop of each of the four colors of food coloring - red, yellow, blue, and green - to the milk. Keep the drops close together in the center of the plate of milk.
3. Find a clean cotton swab for the next part of the experiment. Predict what will happen when you touch the tip of the cotton swab to the center of the milk. Just touch it with the tip of the cotton swab. It's important not to stir the mix.
4. Now, place a drop of liquid dish soap on the other end of the cotton swab. Place the soapy end of the cotton swab back in the middle of the milk and hold it there for 10 to 15 seconds.
5. Add another drop of soap to the tip of the cotton swab and try it again. Experiment with placing the cotton swab at different places in the milk.

Review:

1. Describe how the milk reacted when you first added the food coloring drops (step number 2).
2. What did you predict would happen when you touched the cotton swab to the center of the milk, why (step number 3)? Explain what actually happened.
3. Explain what happened when the soapy cotton swab was held on the surface of the milk.
4. What happened when you placed the soapy cotton swab in different locations of the plate?
5. What makes the food coloring in the milk move?
6. Explain why this activity would or would not work with regular tap water.

Pumpkin Geoboard

Grade Level: K-2

Objective: Students will investigate the properties of shapes using a pumpkin geoboard.

Common Core:
Mathematics: CCSS.Math.Content.K.G.A.1; K.G.A.2; K.G.A.3; K.G.B.4; K.G.B.5; K.G.B.6; 1.G.A.1; A.G.A.2; 1.G.A.3; 2.G.A.1; 2.G.A.3; 3.G.A.1

Next Generation Science Standards:
Engineering Design: K-2-ETS1-1

Suggested Reading Materials:
IAITC Pumpkin Ag Mag
Pumpkin Terra Nova
Life Cycle of a Pumpkin by Ron Fridell and Patricia Walsh ISBN: 143292544X
Pumpkin Jack by Will Hubbell ISBN: 0807566667

Materials Needed:
Pumpkins
Rubber bands
Pushpins
Golf tees
Wooden mallet

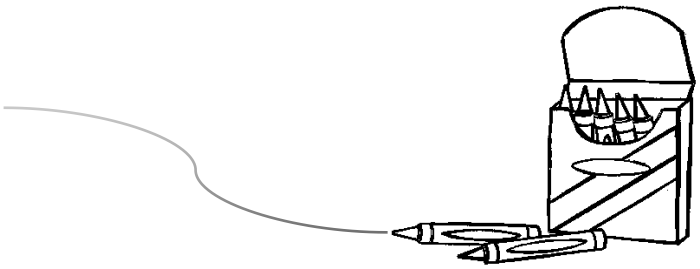
Directions:
1. Ask students if they ever carved a face into a pumpkin? Show a picture of a traditional jack-o-lantern as a sample of what their carved pumpkins looked like. Point out that shapes (e.g. triangles, circles, and rectangles) make up the jack-o-lantern's eyes, nose and mouth. Tell students they will make shapes on a pumpkin using pushpins, golf tees and rubber bands.
2. Supply students with the materials listed.
3. Show students how the pushpins and golf tees can be pushed into the skin of the pumpkin.
4. Demonstrate how the rubber bands can be stretched around the pushpins and/or golf tees to create shapes.

5. Allow students to create shapes on their pumpkins. Encourage students to think creatively. Suggest that they could create a pattern, an original work of art, or the look of a jack-o-lantern, for example.
6. Discuss student observations. Talk about what happened to the shapes when pins were added or taken away.
7. Send students home with golf tees and encourage them to use the golf tees to pin desired shapes prior to carving their next pumpkin.

Extensions:

- Enjoy “Pumpkin Patch Pie” found on the IAITC website at https://goo.gl/8Ryzmd.
- Make “3D Pumpkins” found on the IAITC website at https://goo.gl/4mkFiL.
- Examine measurable attributes of pumpkins such as circumference, weight, number of seeds.
- Study the parts of a pumpkin.

Soy Crayons



Grade Level: K-5

Objective: Students will observe fully hydrogenated soybean oil undergo a physical change by making soy crayons

Common Core:
Mathematics: CCSS.Math.Content.K.MD.A.1; K.MD.A.2; K.G.A.2; K.G.B.5; K.G.B.6; MP.4; MP.5; 5.MD.A.1; 5.MD.C.3

Next Generation Science Standards:
Engineering Design: K-2-ETS1-1; K-2-ETS1-2
Matter and Its Interactions: 5-PS1-2; 5-PS1-3; 5-PS1-4

Suggested Reading Materials:
IAITC Soybean Ag Mag
Soybean Terra Nova
Super Soybean by Raymond Bial ISBN: 0807575496
Oh Say Can You Seed by Bonnie Worth ISBN: 0375810951

Materials Needed:
600 ml beaker
Hotplate
Candy molds
166 g (about 1 ½ cups) fully hydrogenated soybean oil *(soyflakes)
14 g (4 teaspoons) pigment

Background:
Soy crayons are similar to regular crayons, except they are made from biodegradable and renewable soy oil. In fact, Soy Crayons are 85% soybean oil. Most crayons are made from paraffin which is a petroleum product. Follow the recipe below to make your own soy crayons.

Directions:
1. Fill the beaker with 166 g fully hydrogenated soybean oil.
2. Place the beaker on the hot plate on the low setting.
3. Allow the solid oil to liquefy while stirring occasionally.

4. Add 14 g of pigment after the oil is liquefied. Stir until it is evenly distributed in the oil.
5. When the pigment is evenly distributed, remove the beaker from the heat.
6. Pour into candy molds.
7. Cool for 30 minutes.
8. Remove the crayons.

Extensions:

- Model shapes in the real world by drawing shapes using soy crayons.
- Research and have a class discussion about the uses of soybeans, where soybeans are grown and where they are exported. Discuss how soybeans are high in protein and are a global food source. Look at maps to determine why soybeans are grown in specific locations.
- Have students use the soy crayons to draw their idea of agriculture.

*Soyflakes can be found at many major craft and hobby stores.

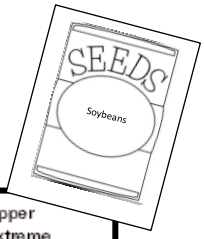
Soybean Plot

Grade Level: K-8

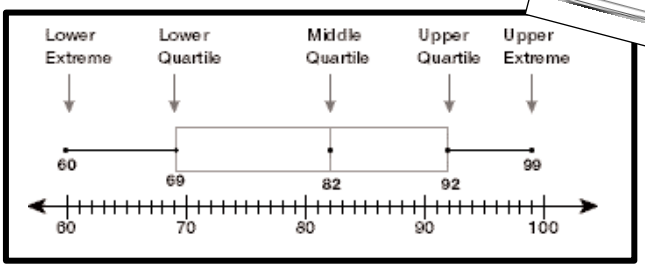
Objective: Students will construct a box and whisker plot using soybeans.

Common Core:
Language Arts: CCSS.ELA-Literacy.SL.6.1.A; SL.6.1.C; SL.6.6; SL.7.1; SL.7.1.C; SL.7.6; SL.8.1.A; SL.8.1.C; SL.8.6
Mathematics: CCSS.Math.Content.K.CC.A.1; K.CC.A.3; K.CC.B.4; K.CC.B.5; K.CC.B.6; K.CC.C.7; 1.NBT.A.1; 1.NBT.B.2; 1.NBT.B.3; 1.NBT.C.4; 2.NBT.A.1.B; 2.NBT.A.3; 2.NBT.B.5; 2.MD.D.10; 3.NBT.A.2; 4.NBT.B.4; 5.MD.B.2; 6.NS.C.5; 6.NS.C.6; 6.NS.C.6.C; 6.SP.A.2; 6.SP.B.4; 6.SP.B.5.C; 6.SP.B.5.D; 7.NS.A.3; 7.SP.B.4

Suggested Reading Materials:
IAITC Soybean Ag Mag
Soybean Terra Nova
Oh Say Can You Seed by Bonnie Worth ISBN: 0375810951
Super Soybean by Raymond Bial ISBN: 0807575496



Materials Needed:
Soybean packets (one per student)
Number line
Stapler
Flags (found on following page)



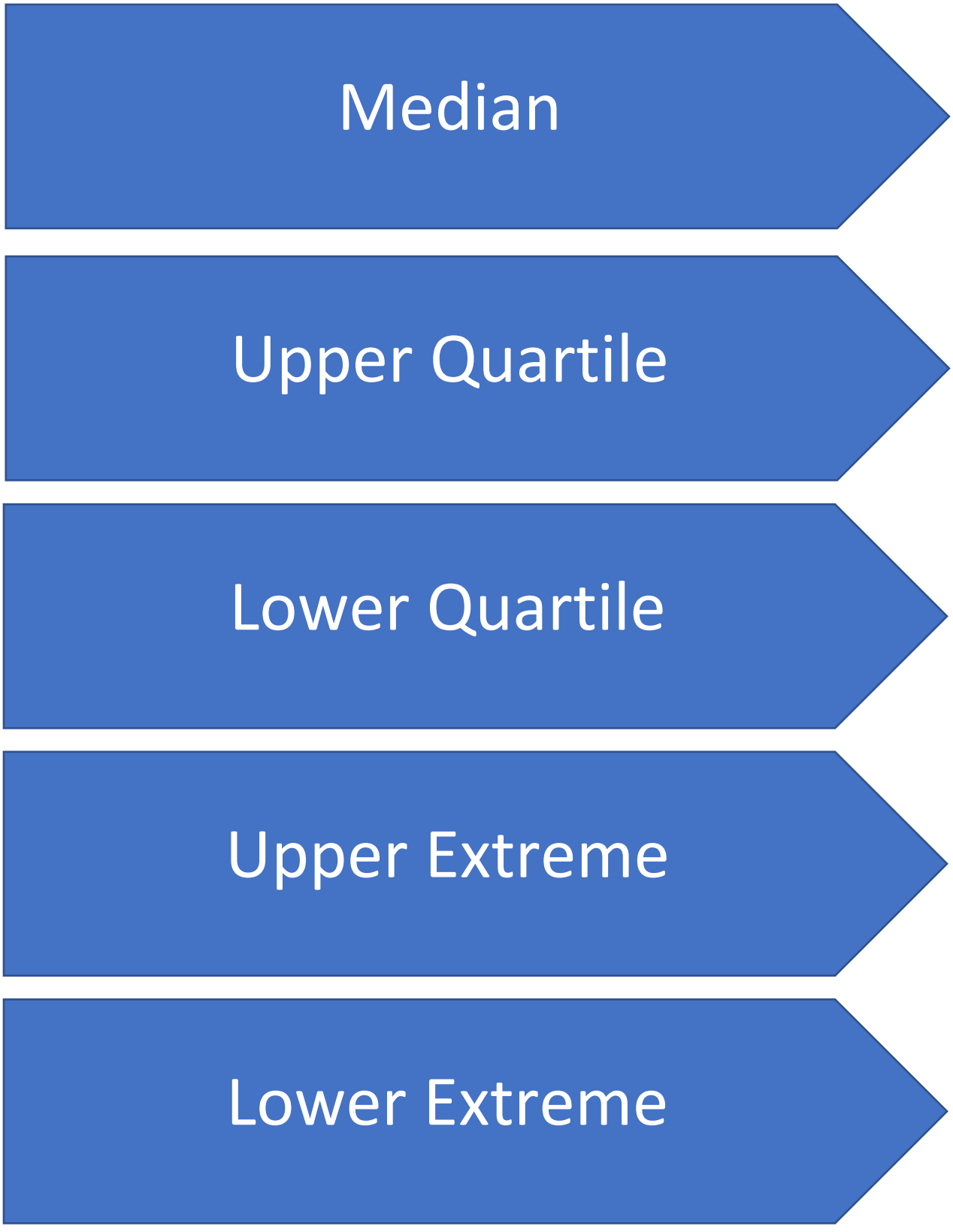
Note to Instructors:
Make this lesson lower grades appropriate by focusing on directions 1-3 below.

Directions:
1. Distribute individual soybean gardening packets. Have students open their packets and count the soybeans. Have students write the number of soybeans counted on the packet.
2. Order the soybean packets from least to greatest number of soybeans. Do the ordering exercise by having students staple their packets to a large number line. If a number occurs more than once, overlap the packets so they are all visible and able to be counted.

3. Determine the median of the data set. Place the “median” flag on the number line. The flag will divide the soybean data set into two halves – an upper half and a lower half.
4. Find the quartiles of the data set by finding the median of both the upper half and lower half of the soybean data. Place the “upper quartile” flag on the median of the upper half and the “lower quartile” flag on the median of the lower half. The median, upper quartile, and lower quartile make up the “box” of the box-and-whisker plot.
5. Identify the greatest and least number of soybeans in the data set. Place the “upper extreme” flag on the greatest number and “lower extreme” flag on the least number. These numbers represent the “whiskers” of the box-and-whisker plot.
6. Draw the box and whiskers on the large number line to complete the plot.
7. Discuss with students when box and whisker plots might be useful in the real world.

Extensions:

- Incorporate the IAITC “Beanie Baby” lesson. Measure soybean growth regularly and display graphically.
- Make a human box and whisker plot using student heights. Use the activity to start a discussion about human similarities (e.g. need food) and differences (e.g. height). Within similarities, focus on soybeans being a global food source.


Median
Upper Quartile
Lower Quartile
Upper Extreme
Lower Extreme

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