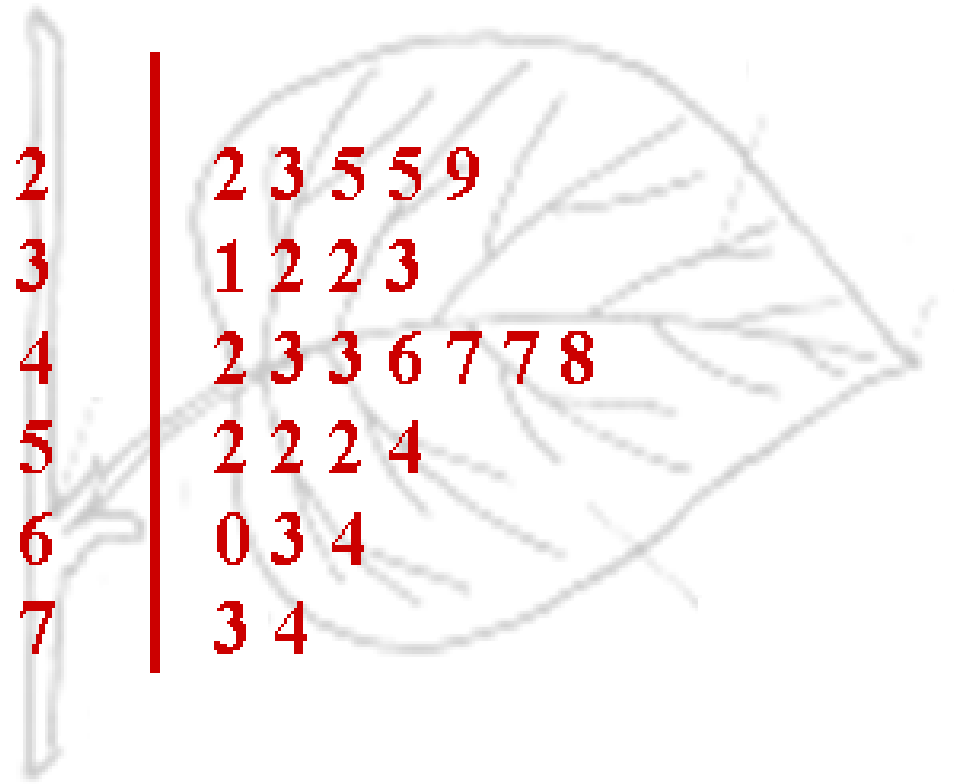
STEM and LEAF



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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 Towers

Grade Level: K-2

Objective: Students will create shapes using apple pieces and toothpicks.

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

Next Generation Science Standards:
Structure and Properties of Matter: 2-PS1-1

Suggested Reading Materials:
IAITC Apple Ag Mag
Apple Terra Nova
The Apple Orchard Riddle by Margaret McNamara and G. Brian Karas ISBN: 9780375847448
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 Legend of Spookley the Square Pumpkin by Joe Troiana ISBN:9781435120884
The Popcorn Astronauts *21 Things To Do With An Apple* by Deborah Ruddell ISBN: 9781442465558

Materials Needed:
Apple pieces (or mini marshmallows)
Toothpicks

Directions:
1. Give students three toothpicks and three apple pieces. Show them how you can create a shape using the given materials. Identify what shape was created (a triangle). Discuss the parts of the triangle, number of sides and vertices, and other attributes, such as side length.
2. Give each student one more toothpick and one more apple piece so they have a total of four toothpicks and four apple pieces. Ask them to create a new shape using all given materials. Some students will create squares, while others will create rhombuses. Let students use informal language to describe similarities

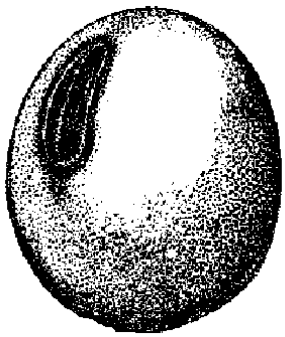
and differences of squares and rhombuses. Again, discuss the parts of the shapes as well as other attributes, such as equal side lengths.

3. Give each student two more toothpicks and two more apple pieces so they have a total of six toothpicks and six apple pieces. Ask them to compose *two* separate shapes (triangles) using the given materials. Once students have created two triangles, ask them if they can join the triangles with full sides touching to make a rectangle.
4. Continue supplying more materials and encouraging shape building as desired.
5. Give students full access to toothpicks and apples. Allow them to build Apple Towers with the supplies.

Extensions:

- Have students describe measurable attributes of their Apple Towers such as height and length.
- Have students directly compare two Apple Towers to describe which tower has more or less of an attribute (e.g. height, toothpicks, apples) and describe the difference.
- Allow students to use technology to explore tower design prior to building their Apple Towers.
- Count and say the number of toothpicks and marshmallows throughout the lesson.
- As toothpicks and apple pieces are being distributed during the lesson, identify whether the number of toothpicks is greater than, less than, or equal to the number of apple pieces at any given point.
- Allow students to snack on an apple while building their towers.
- Discuss the color, texture, hardness, and flexibility of the items used to build the Apple Towers.

Bean Count to Grow



Grade Level: K

Objective: Students will practice the relationship between numbers and quantities using soybean manipulatives.

Common Core:
Mathematics: CCSS.Math.Content.K.CC.B.4.A; K.CC.B.4.B; K.CC.B.4.C; K.CC.C.6; K.MD.A.1; K.MD.A.2

Next Generation Science Standards:
Weather and Climate: K-PS3-1; K-PS3-2; K-ESS3-2
Interdependent Relationships in Ecosystems: K-LS1-1; K-SS3-3

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
Soybeans in the Story of Agriculture by Susan Anderson and JoAnne Buggey ISBN: 9780981133522

Materials Needed:
Soybeans
Jewelry size resealable bags
Planters
Soil
Water

Directions:
1. Help students gain background knowledge on soybeans. Soybeans in the Story of Agriculture by Susan Anderson and JoAnne Buggey has quick soybean facts and a nice selection of soybean images at various stages of growth.
2. Allow students to examine soybean packets containing varying amounts of seeds (e.g. 1, 10, and 20.) Have them make predictions about which packet has the most and which has the least. Use matching strategies to identify whether the number of soybeans in one packet is greater than, less than, or equal to the number of soybeans in another packet.

3. Have students count the number of soybeans. Practice pairing each soybean with only one number name.
4. Read Oh Say Can You Seed by Bonnie Worth.
5. Redirect students to the soybean packets containing varying amounts of seeds. Ask them to hypothesize about which packet of seeds is most likely to grow if planted in the same place.
6. With teacher-prepared planting supplies (planting pots, soil, water), experiment with planting different numbers of seeds. Have students count each seed as it is placed in the planter and write the number of seeds planted.
7. Watch the soybeans grow. Reinforce the relationship between numbers and quantities by counting the elapse of days and number of soybean plants that grow.

Extensions:

- Use corn packing peanuts to design and build a structure that will reduce the warming effect of sunlight on an area.
- Vary the soybean plants exposure to sunlight and assess the soil temperature.
- Discuss the role of weather forecasting in agriculture.
- Use observations of the soybean growth to describe what plants need to survive.
- Discuss the role of plants in reducing the impact of humans on the land.
- Complete the IAITC Beanie Baby lesson found at http://agintheclassroom.org/.

Corn Packing Peanuts

Grade Level: K-3

Objective: Students will demonstrate Math, Science, and Literacy learning goals using corn packing peanuts.

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:
Interdependent Relationships in Ecosystems: K-ESS3-3
Weather and Climate: K-PS3-1; K-PS3-2
Engineering Design: K-2-ETS1-1; K-2-ETS1-2
Structures and Properties of Matter: 2-PS1-1; 2-PS1-3

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. Then have them write the number or letter.
2. Have students use the packing peanuts to build a structure that will reduce the warming effect of sunlight on an area. To make it more interesting, give students some stipulations, such as:

- Time Limit—Give students a specific amount of time to design and build a structure.
- Height—Challenge students to build the tallest structure.
- Sturdiness—Structures should be free-standing. When time is up, have students let go and then measure the tallest structure that can stand on its own.

Extension:

- 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 design a ramp to change the speed of a marble 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. Review ramps, forces, and movement.

4. 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.
5. Give students time to build their ramps. Students may use scissors and tape, if desired.
6. Examine ramps to ensure they are made of corn-related materials.
7. Test ramps to determine if a marble rolls down it and meets the two-foot distance requirement. Practice procedures for recording results.
8. Discuss areas for design improvement, why different ramps work better than others, and the function of ramps in the real world.

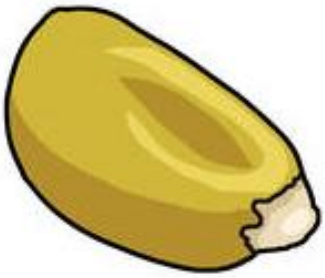
Extensions:

- Conclude the corn ramp building challenge by enjoying a snack that contains corn.
- Use the corn ramps to investigate pushes and pulls. For example, have students attach a string to an object and pull it up the ramp or allow objects rolling down the ramps to collide and push on each other.
- 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, waterparks, 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.

Most corn grown in the United States is fed to livestock. That means corn helps us have good food to eat.



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

Corn is good for humans too. It gives us things like protein and fiber that are part of a good diet.

Now that you are a corn detective, see if you can find 5 items in your home that contain corn and list them below.

1. _____
2. _____
3. _____
4. _____
5. _____

Be sure to bring Corn Ramp building supplies to school!

Adapted from Missouri Corn Growers Association

Pizza Plate

Grade Level: K

Objective: Students will use shapes to create a pizza plate.

Common Core:
Mathematics: CCSS.Math.Content.K.CC.A.3; K.CC.B.4; K.CC.B.4.A; K.CC.B.4.B; K.CC.B.4.C; K.CC.B.5; K.CC.C.6; K.CC.C.7; K.MD.A.1; K.MD.A.2; K.G.A.1; K.G.A.2; K.G.B.5

Next Generation Science Standards:
Interdependent Relationships in Ecosystems: K-ESS3-3
Engineering Design: K-2-ETS1-1; K-2-ETS1-2
Weather and Climate: K-PS3-2

Suggested Reading Materials:
IAITC Pizza Ag Mag
IAITC Pizza Terra Nova
The Little Red Hen Makes a Pizza by Philemon Struges ISBN: 0142301892
"Hi, Pizza Man!" by Virginia Walter ISBN: 0531071073
Hold the Anchovies! By Shelley Rotner & Julia Pemberton Hellums ISBN: 053109507
Little Nino's Pizzeria by Karen Barbour ISBN: 0152463216

Materials Needed:
Red tempera paint
White paper plate
Construction paper
Scissors
Oregano
1 gallon Ziploc bag

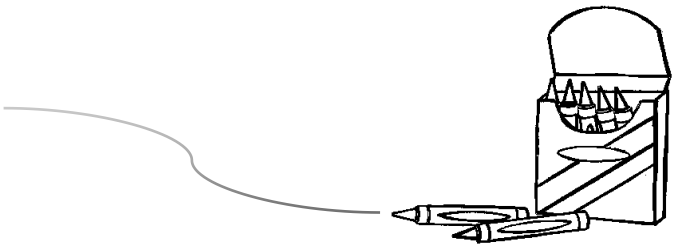
Directions:
1. Read one of the suggested books from the list above, focusing attention on the shapes. Stop and allow students to comment on the geometry they notice in the illustrations.
2. Discuss the idea that shapes are not just in books but are all around us – in the classroom, the cafeteria, the foods we eat, etc.
3. Show students a picture of a pizza with a variety of toppings. Consider using the IAITC Pizza Ag Mag here.

4. Have students brainstorm ingredients, and their associated shapes, that could be present on a pizza, such as triangular or rectangular slices, circular pepperonis, crescent onions, etc.
5. Allow students to make pizzas from the list of ingredients they came up with. Have them focus on the shapes of the ingredients they are using. To make pizzas:
    - Have students paint white plates red or use red plates to create the look of pizza sauce. Let the paint dry.
    - Discuss different types of pizza toppings, the shapes they resemble, and the farms these toppings come from. You may want to use the Pizza Ag Mag for this portion.
    - Have students cut pizza toppings such as pepperonis, peppers, cheese, mushrooms, etc. from construction paper and glue them to the plate.
    - Have students sprinkle oregano on the plate and put it in a Ziploc bag.
    - Have students open the bag and smell their pizza!
6. Remind students that shapes are all around them. Encourage them to talk about foods and the shapes they look like while cooking, eating, and shopping for groceries.

Extensions:

- Challenge students to build a box for their pizza or make their ingredients three-dimensional.
- Specify certain amounts of ingredients that need to be used.
- Discuss “more than/less than” relationships using the pizzas.
- Brainstorm ways humans can reduce their impact on the environment as related to pizza production and consumption.

Soy Crayons



Grade Level: K

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

Common Core:
Mathematics: CCSS.Math.Content.K.CC.A.3; K.CC.B.4; K.CC.B.4.A; K.CC.B.4.B; K.CC.B.4.C; K.CC.B.5; K.CC.C.6; K.CC.C.7; K.MD.A.1; K.MD.A.2; K.G.A.2; K.G.B.5; K.G.B.6;

Next Generation Science Standards:
Interdependent Relationships in Ecosystems: K-ESS3-3
Engineering Design: K-2-ETS1-1; K-2-ETS1-2

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 write numbers from 0 to 20.
- Count the soy crayons to work on the relationship between numbers and quantities.
- Group the soy crayons by color, then identify if the number of crayons in one group is greater than, less than, or equal to the number of crayons in another group.
- Compare measurable attributes (e.g. height) of the soy crayons and describe the difference.

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

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