



Amazing! Maryland Agriculture and Take Me Out to the Cornfield Lessons

These lessons can be used to supplement the text from the book **Amazing! Maryland Agriculture**. They can also be used to correlate with the innings in the **Take Me Out to the Cornfield** DVD. # sign denotes the corresponding inning in the DVD.

Two Different Kinds of Chickens #1 (Primary reading piece) p.2

Landscape Lingo #2 (Intermediate stem lesson) p.3

Oh, What a Beautiful World #2 (Primary human, natural, capital resources lesson) p.16

Corn: The A-Maizing Grain #4 (Intermediate lesson) p.21

Seeds We Eat: Corn and Soybeans #4 and #6 (Primary lesson) p.30

Harvest-A-Plenty #5 (Intermediate lesson on fruits and vegetables) p.34

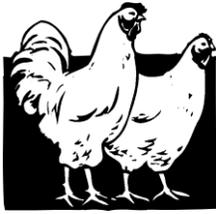
The Great Pumpkin Story #5 (Primary lesson on life cycle of a pumpkin) p.47

Soybeans: The Most Beneficial Bean #6 (Intermediate time line lesson) p.56

Bring on the Beef # (Intermediate lesson) p.63

Beef Cow or Dairy Cow #7 or #3 (Primary lesson) p.69

Two Different Kinds of Chickens



There are two different kinds of chickens raised in Maryland. One chicken is a **broiler chicken**. These chickens are raised for their meat. People eat them in many different ways. Sometimes people eat broiler chicken wings with sauce on them. Another favorite is chicken nuggets. It used to be that chicken was so expensive and special that people only ate it for Sunday dinner. Now, we eat it any time.



The other kind of chicken raised in Maryland is a **layer chicken**. A layer chicken is usually raised for the eggs it lays rather than for chicken meat to eat. Maybe you have seen brown eggs and white eggs. Both colors of eggs provide good nutrition. An egg laying hen usually lays about 240 eggs each year. White eggs are usually laid by hens with white feathers. Brown eggs are usually laid by hens with reddish-brown feathers.



Farmers take good care of their broiler chickens and layer chickens. The chickens live in chicken houses with plenty of feed, water, and fresh air. Their diet consists of soybeans and corn that are ground into meal.



Landscape Lingo

Inning #2 - Nursery, Greenhouse, and Landscape
Maryland *Ag in the Classroom*



MD State

Standard(s): Students will:

- design, plan, and construct objects in response to a particular need or problem.
- use mathematics to make connections to other disciplines and to the real world.
- describe careers in science and the preparation required for them.

Grade Level: 4 - 8

Length

of Lesson: 60 to 90 minutes

Overview:

Your students have been asked by the Department of Parks and Recreation to assist in designing an environmentally friendly park. In effect, they are carrying out the responsibilities of a **Landscape Architect** (see *Career Connections*). They will need to consider various features to be included in the park as well as the cost of such features.

Background

Information:

The Green Industry (otherwise known as Nursery, Greenhouse, and Landscape Industry) is one of agriculture's fastest growing sectors in the United States. In fact, the Green Industry crops are Maryland's #2 agricultural commodity. Landscape, greenhouse and nursery involves the growing of trees, shrubs, sod, bedding plants, and flowers to beautify homes, public spaces, and businesses while providing food and habitat for wildlife and protection against wind and soil erosion.

**Teaching
the Lesson:**

1. **Engage** student interest with a brief introduction to landscaping. Explain that landscaping is all around us (used in residential and commercial properties) and has numerous functions (such as beautification, wildlife habitat, erosion prevention, and shade).
2. Share with students the objective of the lesson -> to design an environmentally friendly park for the Department of Parks and Recreation.
3. Brainstorm as a class all possible features that people may enjoy in a park. Elicit ideas that are environmentally-friendly and write them on the board. Students list the ideas on their worksheet **Brainstorm Beginning** (Part I). If the students are slow to respond, provide examples of nearby parks.
4. Divide the class into pairs or small groups. Ask each group to discuss their personal park favorites from the brainstorm session. They can record their desirable features in **Group Design** (Part II).
5. Compare the group's features with the park necessities established by the Department of Parks and Recreation. Reinforce the State Standard: *explain how limited resources (like money) and unlimited economic wants (like desirable park features) cause people to choose certain goods and services and give up others.* The students will experience that they may need to restrict the park amenities in order to meet the park requirements.
6. Have the students calculate cost. This process may have to be repeated several times in order to meet the budget, environmental, and facility requirements. Remind students that this park needs to be as environmentally friendly as possible. Therefore, using mulch and grass is more favorable (and more economical) than using concrete for the parking lot and walkways.
7. Teacher should review the team designs and costs once all the requirements have been met. After reviewing, ask the students to glue the icons to the Park Layout and finalize any remaining features (like walkways).
8. Have each group present their final designs to the other students.

Materials: Landscape Lingo worksheets
 Landscape Lingo Cost Table
 Landscape Lingo Icons (several copies for each group)
 Poster board (approximately 18" x 24" or larger)
 Scratch paper for cost calculations
 Scissors, glue, markers or colored pencils

Trivia: An acre of forest absorbs 6 tons of carbon dioxide (CO₂) and releases 4 tons of oxygen (O₂), meeting the annual needs of 18 people. The planting of grass, plants, and trees means improved water quality, resulting in less runoff and soil erosion. The net cooling effect of a young, healthy tree is equivalent to 10 room-size air conditioners operating 20 hours a day. The oldest living thing on Earth is a bristlecone pine tree, which is 4,700 years-old and located in Nevada.

Websites: www.kidsgardening.com
 www.garden.org
 www.nps.gov/plants/ubs/nativesMD/info.htm
 www.kidsregen.org

Extension

Activity: Ask students to research and present information pertaining to *ecological design* (designing with nature). Such environmentally friendly features include: composting toilets (as referenced in this activity), solar and wind energy, appropriate technology, urban greening and gardening, rain water harvesting, low-energy appliances, grey water recycling, as well as using locally-sourced and renewable building materials.

Lesson developed for Maryland *Ag in the Classroom* to accompany Take Me Out to the Cornfield. Funding provided by Maryland Agricultural Education Foundation 2004. This activity has been adapted from Landscape Lingo by Illinois Farm Bureau AITC. Additional information has been provided by the Ag Mag by the Minnesota AITC, Mr. Fred Doepkens of Hereford Middle School Baltimore County, Department of Natural Resource Sciences & Landscape Architecture at the University of Maryland, and Maryland Department of Agriculture.

Landscape Lingo



Name: _____

Date: _____

Overview: Your class has been asked by the Department of Parks and Recreation to assist in designing an environmentally friendly park. You will need to consider various features to be included in the park as well as the cost of such features.

The Green Industry (otherwise known as Nursery, Greenhouse, and Landscape Industry) is one of agriculture's fastest growing sectors in the United States. In fact, the Green Industry crops are Maryland's #2 top agricultural commodity! Nursery, greenhouse, and landscape involves the growing and planting of trees, shrubs, sod, bedding plants, and flowers to beautify homes, public spaces, and businesses while providing habitat for wildlife and protection against wind and soil erosion! Wow...that's a lot!!



Part 1: Brainstorm Beginning



As a class, begin by thinking about all the possible features that people might enjoy in the park. List the possibilities below:

In the ideal world, there would be adequate money to pay for all the possibilities that have been listed above. However, in the real world, financial resources are limited; therefore, you will have to choose certain features and give up others in order to meet the park **budget**. Furthermore, in addition to meeting the budget, you must also fulfill **environmental** and **facility requirements** set forth by the Department of Parks and Recreation.

Part II: Group Design

You will complete this project in your cooperative groups. List the names of your "partners" below:

As a group, discuss and list the features you would like to have in the park. Write these items below. Next, read the requirements in the next box. Are there any matches between your personal choices and the requirements?

Group's Desirable Features:

Department of Parks and Recreation Park Necessities:

- Total cost less than \$6,500
- Grassy areas
- Perennial flower gardens
- Shade
- Three or more bird houses
- Two or more bird fountains
- Fifteen or more trees
- Compost bin and recycle container
- Place to store bicycles and park cars
- Place to sit down
- Bathroom with composting toilets
- Two or more trash containers

Now, begin the preliminary design by including your group's wants while following the Department of Parks and Recreation's requirements. Cut out the icons and place (not glue) them on the Park Layout. With a pencil, fill in the cost list on the Cost Table.



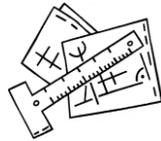
| | | |
|---|-----|----|
| Does your preliminary design meet the budget? | YES | NO |
| Are the environmental requirements fulfilled? | YES | NO |
| Are the facility requirements met by your design? | YES | NO |

If you answered NO to any of the three questions, then you must modify the design to successfully meet all the requirements. You may want to start with the basic environmental and facility needs and compute the costs for those needs. Using that initial cost, add other features to the layout until the total cost is less than or equal to the allowed budgeted amount. Complete the cost table again for your new design and answer the questions above.

Once you answer YES to all three questions, then you have met all the constraints set forth by the Department of Parks and Recreation. Now think about these questions:

- Are you content (satisfied) with the layout?
- Are the park features spaced evenly across the layout?
- As a community resident, would you like to visit this park?

As a group, decide upon the final design and show it to your teacher. Once this layout is reviewed, glue the icons to the layout page and draw in any remaining features.



Lesson developed for Maryland *Ag in the Classroom* to accompany Take Me Out to the Cornfield. Funding provided by Maryland Agricultural Education Foundation 2004. This activity has been adapted from Landscape Lingo by Illinois Farm Bureau AITC. Additional information has been provided by the Ag Mag by the Minnesota AITC, Mr. Fred Doepkens of Hereford Middle School Baltimore County, Department of Natural Resource Sciences & Landscape Architecture at the University of Maryland, and Maryland Department of Agriculture.



Landscape Lingo

Cost Table

Names of Group Members:

Park Features Cost List

| <u>Item</u> | <u>Unit Cost</u> | <u>Number of Items</u> | <u>Total Cost for Items</u> | <u>Check Here for Required Items</u> |
|--|------------------|------------------------|-----------------------------|--|
| Basketball Court | \$500 | | | |
| Bathroom Facility (with Composting Toilets) | \$1,200** | | | |
| Bench | \$45 | | | |
| Bike Rack | \$150 | | | |
| Bird Fountain | \$50 | | | |
| Bird House | \$15 | | | |
| Bush | \$25 | | | |
| Compost Bin | \$45 | | | |
| Concrete Parking Pad | \$750 | | | |
| Concrete Sidewalk | \$500 | | | |
| Evergreen Tree | \$50 | | | |
| Fruit Tree | \$75 | | | |
| Grass Seed | Free* | | | |
| Maple Tree | \$100 | | | |
| Mulch | Free* | | | |
| Perennial Flower Container or Box | \$15 each | | | |
| Picnic Table | \$80 | | | |
| Playground Equipment | \$1,000 | | | |
| Recycling Container | \$20 | | | |
| Small Pond | \$300 | | | |
| Top Soil | Free* | | | |
| Trash Container | \$15 | | | |
| Volleyball Court | \$250 | | | |

*Department of Parks and Recreation is able to supply local sources of such items at no cost.

** Local environmental society has subsidized the cost of composting toilets.



TOTAL COST FOR
LANDSCAPE

Landscape Lingo Icons



Flower Box



Flower Box



Flower Box



Flower Box



Flower Container



Flower Container



Flower Container



Flower Container



Flower Box



Flower Box



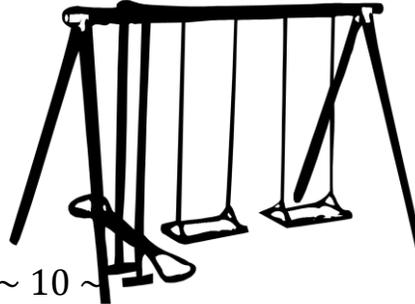
Flower Box



Flower Box



Playground Equipment



~ 10 ~
Playground Equipment



Maple Tree



Maple Tree



Fruit Tree



Fruit Tree



Bush



Bush



Bush



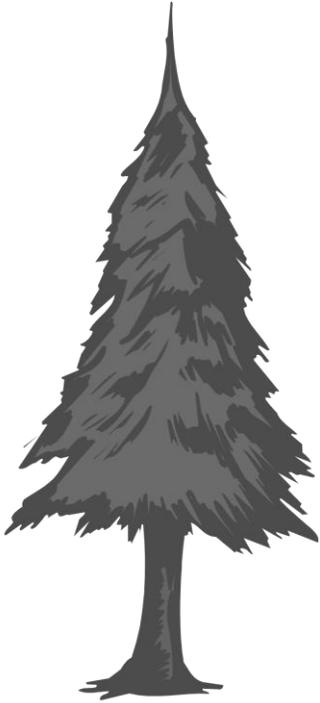
Bush



Bush



Bush



Evergreen
Tree



Evergreen
Tree



Evergreen
Tree



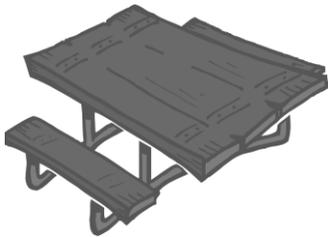
Bench



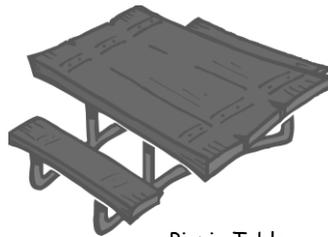
Bench



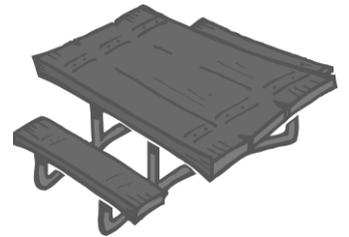
Bench



Picnic Table



Picnic Table



Picnic Table



Bird Fountain



Bird Fountain



Bird Fountain

Landscape Lingo Park Design



Bird House



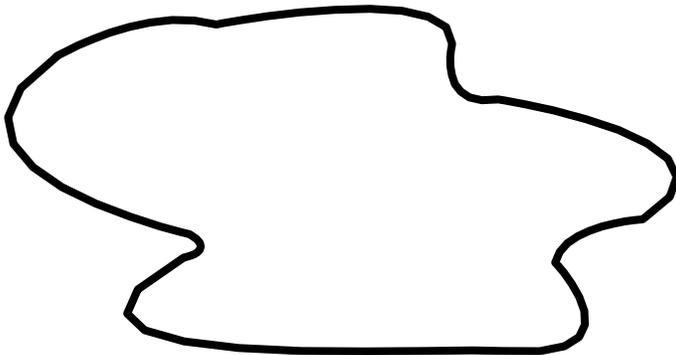
Bird House



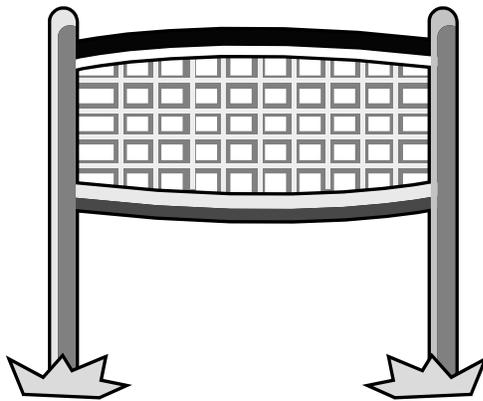
Bird House



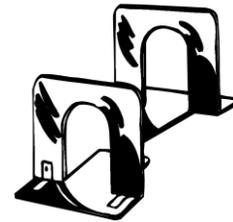
Bird House



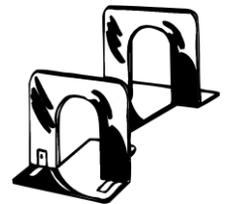
Small Pond



Volleyball
Court



Bike Rack



Bike Rack



Basketball
Court



Recycling Container



Recycling Container



Trash Container



Trash Container



Trash Container



Trash Container



Compost Bin



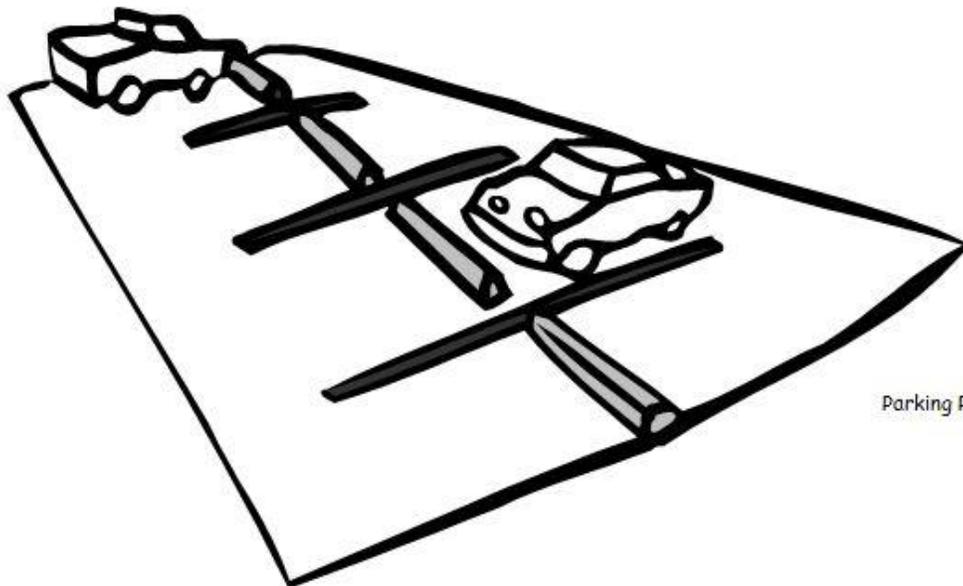
Compost Bin



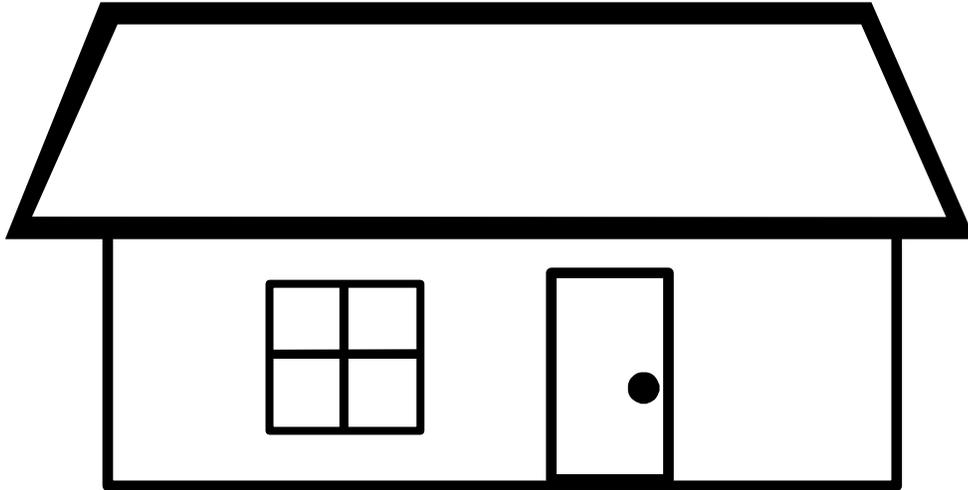
Compost Bin



Compost Bin



Parking Pad



Bathroom
Facility



Maple Tree



Fruit Tree



Evergreen
Tree

*Sketch and color the
grass, sidewalks,
and soil/mulch.*

Oh, What a Beautiful World!

Inning #2 - Nursery, Greenhouse, and Landscape
Maryland *Ag in the Classroom*



Standard(s): Students will:

- recognize the natural resources that are used to make products and identify the natural, capital, and human resources used in the production of goods or services.
- explain how human activities may have a positive consequence on the natural environment and select an activity to complete that will improve the environment.

Grade Level: 1 - 3

Length of Lesson: 60 minutes

Overview: Students consider the nature of the Nursery, Greenhouse, and Landscape Industry and examine the Maryland commodity maps to determine the counties where this industry is concentrated. After reading informational text, students sort various items into human, natural, and capital resources. The lesson concludes with students visually creating landscaped/non-landscaped homes, explaining the benefits provided by the Nursery, Greenhouse, and Landscape Industry, and acting upon a personal choice that will improve the environment.



**Teaching
the Lesson:**

Depending on the reading level of students, teachers may choose to use the reading selection as a read-aloud for grade one.

To improve student comprehension, teachers may want to **commodity, turf grass, harvested, beautify, ingredients, process of photosynthesis, fertilizer, constantly, erosion, environment, human-natural-capital resources**. introduce the following vocabulary words to students:

1. **Engage** student interest by eliciting the meaning of **nursery, greenhouse, and landscape**. Students then look at the **Maryland Agriculture** map to determine which counties have the Nursery, Greenhouse, and Landscape Industry as one of their top three commodities.
2. Students read article **Oh, What a Beautiful World!**
3. Students cut apart **Nursery Pictures** and classify them on the **Human, Natural, or Capital Resource** worksheet (which may be increased by 145% to fit on 11" by 17" paper) in the proper column. If some pictures can be placed in more than one category, students need to explain their choice. When pictures are placed to the student's satisfaction, they may be glued.
4. On a plain piece of paper, students draw one house with no landscaping; then, they make a copy of that house and add turf, shrubs, trees, flowers, hanging baskets, and wildlife. Students write a caption to describe their illustration and explain the benefits that turf, trees, flowers, shrubs, and other plants provide to both people and animals.
5. Students select and implement, either at home or school, one action related to this lesson that will have a positive consequence on the natural environment.

Materials: **Oh, What a Beautiful World!** article
Nursery Pictures handout
Human, Natural, Capital Resources worksheet
Drawing paper/crayons/colored pencils

Lesson developed for Maryland *Ag in the Classroom* to accompany **Take Me Out to the Cornfield**.
Funding provided by Maryland Agricultural Education Foundation 2004.



Oh, What a Beautiful World!



The Nursery, Greenhouse, and Landscape Industry is Maryland's number two commodity. Sometimes they call themselves **The Green Industry**. Can you guess why they would pick that name? It might be because most everything they grow is green.

The Nursery, Greenhouse, and Landscape Industry grows trees and shrubs for homes, parks, and even along the highways where you travel. The Green Industry also grows flowering plants and vegetable plants for your yard. Another part of their "green" plan is growing turf grass or sod. Turf grass is planted and harvested much like any other crop. Machines with blades cut and roll sections of the turf grass. This grass may be laid in your yard like carpet is laid in your house. Turf grass also is used in parks, golf courses, and ball fields.



Let's take a quick look at what it takes to produce some of the beautiful flowers and hanging baskets that beautify our yards and communities throughout the year. First, a grower needs a special place to produce healthy plants. Some growers use a greenhouse because they can control the temperature and water. Fans and heaters provide the perfect temperature. Sunshine comes through the plastic or glass in the greenhouse allowing plants to make their own food through the process of photosynthesis. Next, growers need good quality seeds and pots in which to plant them.



Soil that has all the right ingredients to grow healthy plants is necessary. Then growers carefully water their plants and provide fertilizer when needed. Finally, a

grower constantly checks for any signs of disease or insects.



When the plants are the proper size, they may be replanted in larger containers. At last, the plants are ready to be loaded on a truck and taken to the local nursery or store

where they will be sold.



Flowers, trees, shrubs, and turf grass help us in many ways. They make our homes, highways, and parks more beautiful with their color. The roots from these plants protect the soil from erosion. Plants and trees make oxygen that we need to breathe. Plants also provide a home for wildlife - birds, squirrels, rabbits, and chipmunks. Some of the plants and trees provide us with fruits, nuts, and vegetables. The Green Industry surely makes our world a more beautiful place to live!



1. What goods or products does the Nursery, Greenhouse, and Landscape Industry provide?
2. How do these products help us and the environment?
3. What can I do to make our world a more beautiful place?

Lesson developed for Maryland *Ag in the Classroom* to accompany *Take Me Out to the Cornfield*.
Funding provided by Maryland Agricultural Education Foundation 2004.



Human, Natural, and Capital Resources

Name: _____

Date: _____

Human Resources

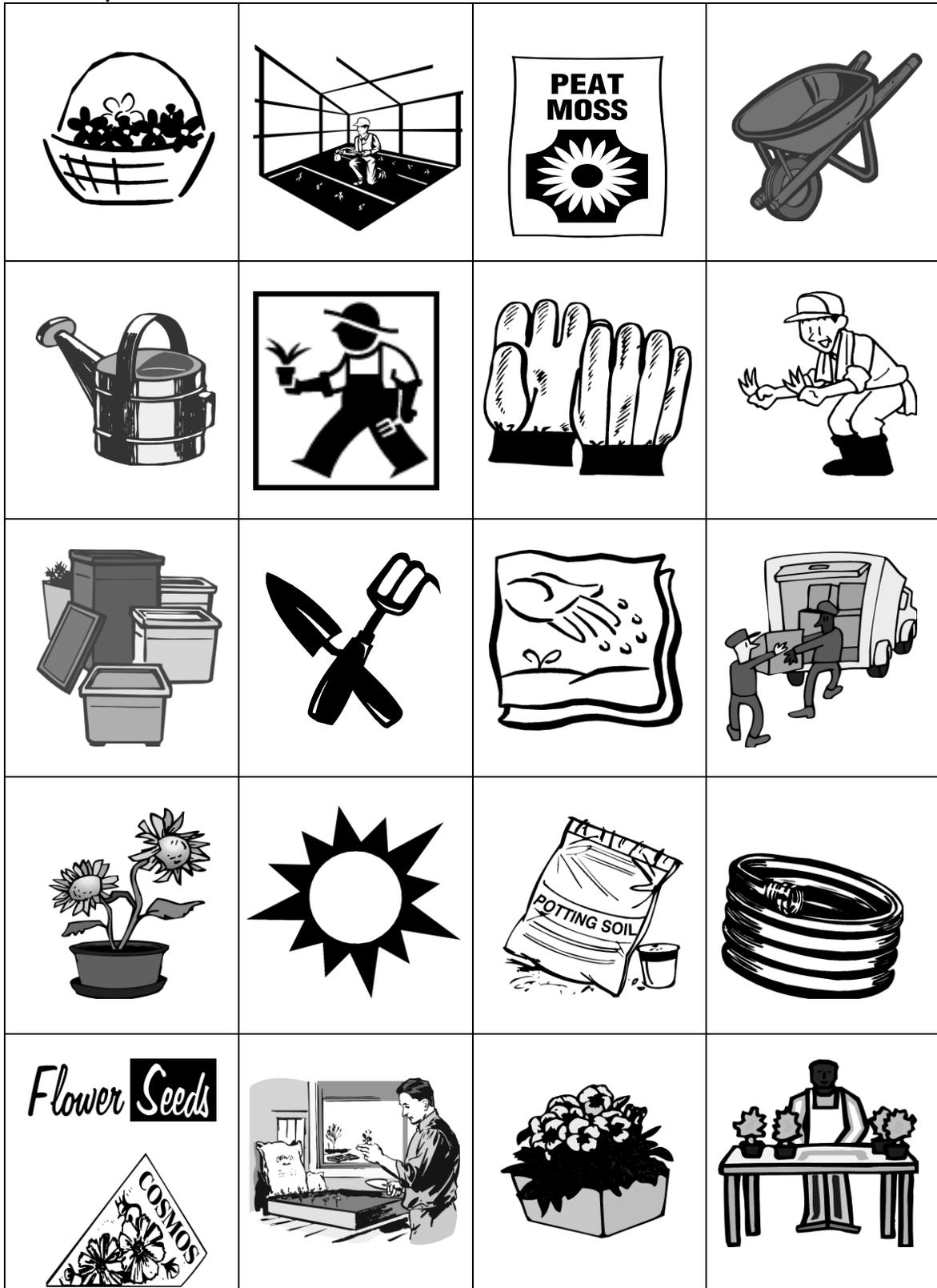
Natural Resources

Capital Resources

Directions: Reread the article, Oh, What a Beautiful World! Using a different colored pencil for each resource, **circle** any words that describe the human, natural, or capital resources that a grower needs to produce plants. Remember that **human resources** are people. **Natural resources** are things in our world that we cannot make. **Capital resources** are the tools or equipment that people use to get a job done. Cut the pictures apart. Decide where they belong and paste them onto the chart. Be able to explain why you placed the picture in that column.



Nursery Pictures



Corn: The A-MAIZE-ing Grain



Inning #4 - Corn

Maryland Ag in the Classroom

Standard(s): Students will:

- identify and compare renewable and nonrenewable natural resources and describe how humans use renewable, natural resources.
- determine/analyze important ideas/messages in informational text.
- describe careers in science and the preparation required for them.

Grade Level: 4 - 8

**Length
of Lesson:** 60 to 90 minutes

Overview: Students will discover numerous connections between a fast food meal and corn, and then read about the benefits of corn used to make plastic and ethanol. Reading for information will expand students' understanding of biodegradable products.

**Background
Information:**



Corn, otherwise known as "maize", has been a part of America for over 7,000 years. The Mayan, Aztec, and Inca Indians of Central and South America learned to use every part of the corn plant. They used the leaves as "chewing gum" because of their high sugar content. The immature corn was eaten as a vegetable and the dry mature kernels were ground into flour or popped. History indicates that corn saved the Pilgrims during the first winter. Flint corn was the kind of corn the Indians taught the colonists to grow. It grew well in cold climates and could be stored longer than other types of corn. Today, corn is a major source of food for humans and animals. It is a renewable natural resource that is being made into fuel for engines, biodegradable plastics, and road de-icers.

**Teaching
the Lesson:**

1. **Engage** student interest by bringing in a typical fast-food meal containing a hamburger, ketchup and mustard packets, fries, soda or juice drink, toy, bag/carton package.
2. Student will read **Do You See Corn in Your Meal?** to see if their predictions were correct. Students add facts to their **Fast Food Meal** organizer.
3. Students will then read, **Corn: The A-MAIZE-ing Grain** to understand the importance of corn in our daily lives; to describe the meaning and importance of by-products and biodegradability; to list ways corn (a natural resource) meets our basic human needs; and to distinguish between the different types of corn.
4. Students will read labels on various products to determine if they contain corn (students or teacher may collect samples).

Materials:

Fast Food Meal worksheet

Do You See Corn in Your Meal? article

Corn: The A-MAIZE-ing Grain article

Collection of products containing corn: cereal, crackers, pudding, snack foods, soda, fruit drinks, toothpaste with sorbitol, baby powder or foot powder with cornstarch, aspirin (cornstarch coating)

Ear of corn for each team to examine as they read the articles

Will It Pop? Extension Activity

1 $\frac{1}{2}$ cups of unpopped corn and three brown lunch bags per team

Trivia:

There are more than 3,500 food uses for corn. A bushel of corn sweetens 413 cans of soda. Seventy-five percent of all grocery items contain corn in some processed form. Sixty-one percent of all U.S. corn is fed to livestock.

**Extension
Activity:**

Will It Pop? (located at the end of this lesson)

Lesson developed for Maryland *Ag in the Classroom* to accompany **Take Me Out to the Cornfield.** Funding provided by Maryland Agricultural Education Foundation, 2004. **Corn: The A-MAIZE-ing Grain** adapted from **Kids, Crops, & Critters,** Illinois Farm Bureau AITC.



Fast Food Meal

Name _____

Date _____



When you order a meal from a fast food chain, do you realize how much corn is in your meal? You don't believe me? Let's find out! List all the items in a fast food meal. Mark any connections you can think of in the second column. Read the article, Do You See Corn in Your Meal? Now fill in the last column.

| Items in a Fast Food Meal | I know they are connected to corn because... | I have discovered that they are connected to corn because... |
|---------------------------|--|--|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |
| 6. | | |
| 7. | | |
| 8. | | |



Do You See Corn in Your Meal?

Start with the HAMBURGER:



The hamburger is made from cows, and cows eat corn to grow. A co-product of corn, DEXTROSE is also used in the pickling process for the pickles that come on your sandwich.

KETCHUP & MUSTARD



The condiments that are added to your sandwich are not MADE from corn, but they are sweetened with corn syrup. Ketchup is made from tomatoes and mustard comes from small mustard seeds, but their taste would be very plain without the help of corn syrup!

FRIES



You would be correct to say that fries are made of potatoes, not corn. Did you know, though, that they may be cooked in corn oil?

SODA & JUICE DRINKS



Just like ketchup and mustard, these drinks use corn syrup as a sweetener. This sweetener is a high-fructose corn syrup that is used in many types of beverages that have a sweet flavor. Next time you have a bottled or canned beverage, look on the label and I'll bet you'll find corn syrup.

(gasp) the TOY



Ahhh yes. Do not be surprised! Even the little plastic toy that comes with your packaged meal has something to do with corn. A corn by-product called DEXTRIN is used to shape the plastics that are found in many toys and other plastic items.

To BAG it all up



Just like the paper that you write on, cornstarch is used to hold together the fibers of the paper bag or carton! You may find corn in the paper cup that the soft drink comes in too! The ink used to print the logos on the paper may even come from corn oil! Wow!

There are lots of things that you use every single day that are made from corn! Not everything you use has corn in it, but keep your eyes and "Ears" open and you'll see corn everywhere you look!

Corn: The A-Maize-ing Grain



Corn (known as MAIZE in Latin America) is one of nature's most amazing energy storing devices. A corn seed weighs about one-hundredth of an ounce. Yet this tiny seed can produce a corn plant that will grow 7 to 10 feet tall and will produce between 600 and 1,000 seeds. The "seeds" are commonly known as kernels. The kernels are arranged in rows along the ear of corn. An ear of corn may have as few as eight or as many as 36 rows, but the number of rows is always even. The kernels may become corn seeds to plant for next year's crop. (Examine your ear of corn to validate these figures).



Corn is the major feed grain for animals raised by farmers. In addition, corn is a major component in many of the foods we eat such as cereals, snack foods, and sodas. Corn can be found in chewing gum, ice cream, marshmallows, pickles, and chocolate products.

Corn By-Products

In addition to many food products found in the grocery store, new products are continuously being developed from corn. A by-product is something other than food that comes from a plant or animal. Many amazing by-products come from corn. By-products from corn include items such as toothpaste, paper, soaps, vitamins, gelatin for drug capsules, body lotion, lipstick, fireworks, cleaners, and detergents.



Biodegradable and Renewable Resources

Corn not only provides both animals and people with food, it also has been used to develop biodegradable products that protect our environment. In fact, researchers have invented a biodegradable plastic made from cornstarch. Plastics made from corn will break down and not take up valuable space in our landfills.

In addition to biodegradability, corn products are also renewable. By saving corn kernels, protecting the soil, and providing ample water and nutrients, corn can be grown again, year after year. Therefore, corn used for plastic is both biodegradable and renewable! However, the current source of most plastic is oil (not corn). This type of plastic does not break down or disintegrate; therefore, taking up landfill space and polluting water bodies. Plastic made from oil is also non-renewable. Once the oil reserves are depleted, they will be gone forever. Such problems could be solved by switching to a renewable, biodegradable option like CORN, the A-MAIZE-ing grain!



Environmentally friendly packing peanuts are made with over 95% cornstarch. They are used to fill packages and have the benefits of being light weight, shock absorbing, and totally biodegradable. Another environmentally friendly by-product from corn is ethanol, a high performance fuel. It is safer for our environment because it burns cleaner and pollutes less than petroleum fuels. Since ethanol is made from a renewable resource, it can be replenished. Ethanol saves nonrenewable petroleum and makes us less dependent on oil from other countries. Researchers continue to find ways to use corn - a natural, biodegradable, renewable resource.



Types of Corn

There's more than one kind of corn grown. The kind you eat on the cob is very different from the majority of corn seen growing in the cornfield.

The majority of corn grown in the United States is **FIELD CORN**. Field corn contains 95% starch and is used to make livestock feed, ethanol fuel, corn starch and corn syrup.



SWEET CORN is the fresh corn on the cob and also the canned or frozen corn that you buy in the store. It is harvested when the plant is still immature with soft kernels. It will not pop.

POPCORN is a special kind of corn that contains moisture that makes it pop when cooked. Popcorn kernels and ears are usually smaller than those of other corn. It is easy to see why corn is such an A-MAIZE-ing grain.



What Do You Remember?



Name _____
Date _____

1. Describe a corn plant and an ear of corn.

2. What is a by-product? List 6 that come from corn.

3. Why are plastics made from oil a problem?

4. Describe the biodegradable plastic made from corn.

5. What are the benefits of ethanol?

6. List and describe the 3 types of corn.



Will It Pop?



Teacher Preparation:

Treatment A: Cook $\frac{1}{2}$ cup of popcorn in an oven set to 200° for 60 minutes.

Treatment B: Soak $\frac{1}{2}$ cup of popcorn in water for 60 minutes and allow to dry overnight.

Treatment C: Do not do anything to the remaining $\frac{1}{2}$ cup of popcorn.

Student Assignment:

Give each group of three students the same number of kernels from treatment A, B, and C and a brown lunch bag for each sample. Students should label their bags A, B, and C. Have them take home the bag and kernels and pop them in a microwave for the same number of minutes (with the assistance of a parent or as an option have a parent volunteer pop the samples in the classroom).

The next day, students examine their popped corn and create a data sheet to describe their findings. Using their data and the information from Corn: The A-MAIZE-ing Grain, students determine:

1. Which treatment had the most popped kernels, which had the fewest, which had the most unpopped kernels, and which were the largest, fluffiest kernels?
2. Analyze the data to decide what was done to the popcorn that had the largest kernels? the smallest kernels?
3. Discuss the variables in this investigation and determine how well they were controlled.
4. What changes could be made in this investigation to make it better?



Seeds We Eat - Corn and Soybeans

Inning #4 - Corn or Inning #6 - Soybeans
Maryland *Ag in the Classroom*



Standard(s): Students will:

- Determine important ideas and messages in informational text.
- Compose informational writing that follows a simple organizational structure (relevant facts about a topic).

Grade Level: 1 - 3

Length

of Lesson: 30 to 45 minutes

Overview: This lesson can be done when teaching about corn or soybeans. Students will read to be informed and then complete a Venn diagram to compare and contrast two different kinds of seeds that they eat - soybeans and corn.

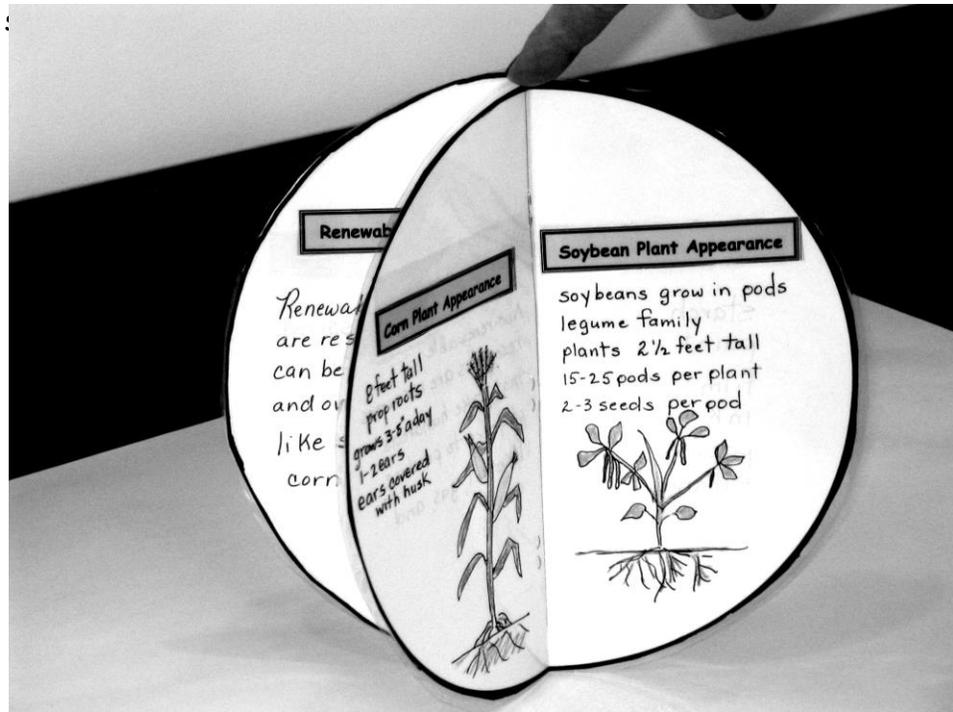
**Teaching
the Lesson:**

Depending on the reading level of students, teachers may choose to use the reading selection as a read-aloud for grade one.

To improve student comprehension, teachers may want to introduce the following vocabulary words to students: **provide, continent, Antarctica, ethanol, environmentally, pod, appearance.**

1. **Engage** student interest by asking if students ever eat plants. Elicit what kinds of plants are eaten by people. List on the board. Have students decide whether they eat the stem, leaves, roots, or flowers of these plants. Next, have students list kinds of seeds that are eaten by people.
2. Students **explore** the topic as they read **Seeds We Eat - Corn and Soybeans**. Students then complete a Venn diagram that compares the appearance of corn and soybean plants, as well as the food and the non-food products, that come from these seeds. Students identify the author's purpose and main ideas in the text.

3. Students **explain** their understandings as they construct a 3-dimensional comparison ball (Venn diagram - see picture below). Each student folds two 8 ½ inch paper circles in half and staples them together along the fold. Students glue the Comparison Ball labels on one half of each page and add information and drawings to compare the plants, their uses as food and non-food items, and definitions and examples of renewable and non-renewable resources. Students compose an informational paragraph communicating relevant facts about either/both corn or



4. **Extensions:** Students can investigate the content of labels from food products at home to determine the number of products they eat that contain corn or soybeans.

Materials:

Seeds We Eat - Corn and Soybeans article

Comparison Ball (Venn diagram - 2 pieces of paper cut into 8 ½ inch circles per student)

Labels for comparison ball (found at end of article - 1 set per student)

Stapler, Glue, Crayons/Colored Pencils



Lesson developed for Maryland *Ag in the Classroom* to accompany Take Me Out to the Cornfield. Funding provided by Maryland Agricultural Education Foundation 2004.



Seeds We Eat - Corn and Soybeans

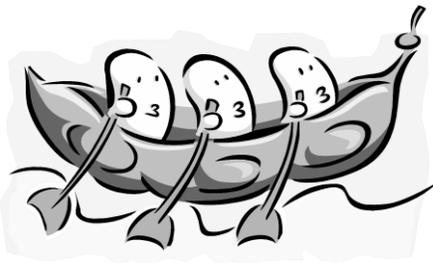
What are some seeds that you eat? Let's look at the plants that produce two different kinds of seeds - **corn** and **soybeans**. The plants are very different but they both provide us with things that we eat and use every day.

Corn plants can grow 8 feet tall. The corn plant has special roots called "prop roots" that help to hold it up when the wind blows. In summer, a corn plant can grow 3 to 5 inches in just one day. A corn plant usually has only one or two ears of corn. Each ear is covered with a husk. An ear of corn may have as many as 600 kernels lined up in rows.



There are three different kinds of corn: field corn, sweet corn, and popcorn. **Field corn** is tough and doesn't taste good. It is used to feed animals and make special products like the corn syrup that sweetens soda. People eat **sweet corn**. It comes fresh on the cob, canned, or frozen. **Popcorn** is another kind of corn that "pops" when it is heated. People eat popcorn at the movies or as a snack.

Corn is grown on every continent except Antarctica. There are over 3,500 different ways to use corn. People eat corn flakes, corn bread, corn oil, and corn tortillas. Corn is used as food for livestock. Corn may be used to make starch, paint, film, ink, paper, and ethanol (an environmentally friendly fuel).



Soybeans, another seed you eat, belong to a special family of plants. The seeds from a soybean are packed in a pod somewhat like peas, peanuts, and lima beans. Beans and peas that grow in a pod belong to the plant family called legumes. The soybean plant grows about 2 $\frac{1}{2}$ feet tall. Each soybean plant produces 15 to 25 pods. Each pod contains 2 or 3 seeds, called beans.

The leaves on the soybean plant grow in groups of three. Soybeans are sometimes called the "miracle crop" because of their hundreds of uses. Each person eats 35 to 40 pounds of soybeans a year. People may eat soybeans in bread, cereal, snacks, or salad dressing. Soybeans keep the chocolate in your candy bar smooth and creamy. Soybeans can also be found in shampoo, soap, crayons, and bio-diesel fuel.

One of the reasons that making new products from corn and soybeans is so important is that corn and soybeans are both **renewable resources**. **Renewable resources** are resources that can be planted over and over again. When they are used up, we are able to grow more. **Non-renewable resources** are things like coal, oil, and gas which take many years to produce. When these resources are gone we cannot get any more for hundreds of years. So, we must always be looking for new ways to use **renewable resources**. That is why being able to make inks, crayons, and fuels from corn and soybeans is so important.

Labels for the Comparison Ball

| | |
|------------------------------|---------------------------------|
| Corn Plant Appearance | Soybean Plant Appearance |
| Corn Food Products | Soybean Food Products |
| Other Corn Products | Other Soybean Products |
| Renewable Resources | Non-Renewable Resources |

Lesson developed for *Maryland Ag in the Classroom* to accompany Take Me Out to the Cornfield.
Funding provided by Maryland Agricultural Education Foundation 2004.



Harvest A Plenty

Inning # 5

Maryland *Ag in the Classroom*



Standard(s): Students will:

- organize, display, analyze, and interpret data to identify/describe human activities in a region that are affected by environmental factors (such as temperature and precipitation).

Grade Level: 4 - 8

Length of Lesson: 60 to 90 minutes

Overview: Students will discuss the conditions necessary for growth, create a graph that depicts the months that Maryland's climate allows the harvesting of fruits and vegetables, and compare these elements with another location as they discover how we are able to enjoy fresh food year round. Additionally, students explore the importance of and ability to eat locally grown food.

Background

Information: Botanically, a fruit is the part of a plant that develops from a flower and produces seeds. Many plant parts we eat and call vegetables are really "fruits". A true vegetable is the food product that comes from any part of the plant other than the flower. So, roots such as carrots and radishes, and leaves such as cabbage and lettuce, are true vegetables. If you cut produce open and it contains seeds inside such as a tomato, squash, or cucumber - then it is a fruit. If there are no seeds - then it is a vegetable.

Sometimes we call produce a fruit or vegetable by the time the item is to be eaten. Vegetables are usually thought to be eaten with the main meal, while fruits, which may be sweeter, may be eaten as a dessert.

A third way of deciding whether produce is a fruit or vegetable is by examining how and where it is grown. Vegetables are usually

annuals (they live one season and need to be replanted each year) and they are planted in rows in a field. Fruits, on the other hand, are grown and produced over many years (they are perennials and grow from one year to the next) and may be found on bushes, vines, or trees.

There are exceptions to this way of classification. The classification of these fruits and vegetables may cause some disagreement; but, there is one thing that is always agreed upon - they contain many healthy vitamins and minerals - so be sure to eat 5 a day.

Whether it is a fruit or a vegetable, both types of produce are grown in Maryland. Consuming such seasonal, local foods has many benefits, such as: enjoying fresh/nutritious/great tasting food, maintaining farm land/open space, reducing packaging and transportation ("food miles" -> on average, produce travels 1,300 miles from farm to consumer), increasing economic stability and food security, supporting farmers with direct marketing, and understanding local growing conditions while increasing the sense of "place". Thus, buying locally, gardening, or joining community farms contributes to a more sustainable food system.

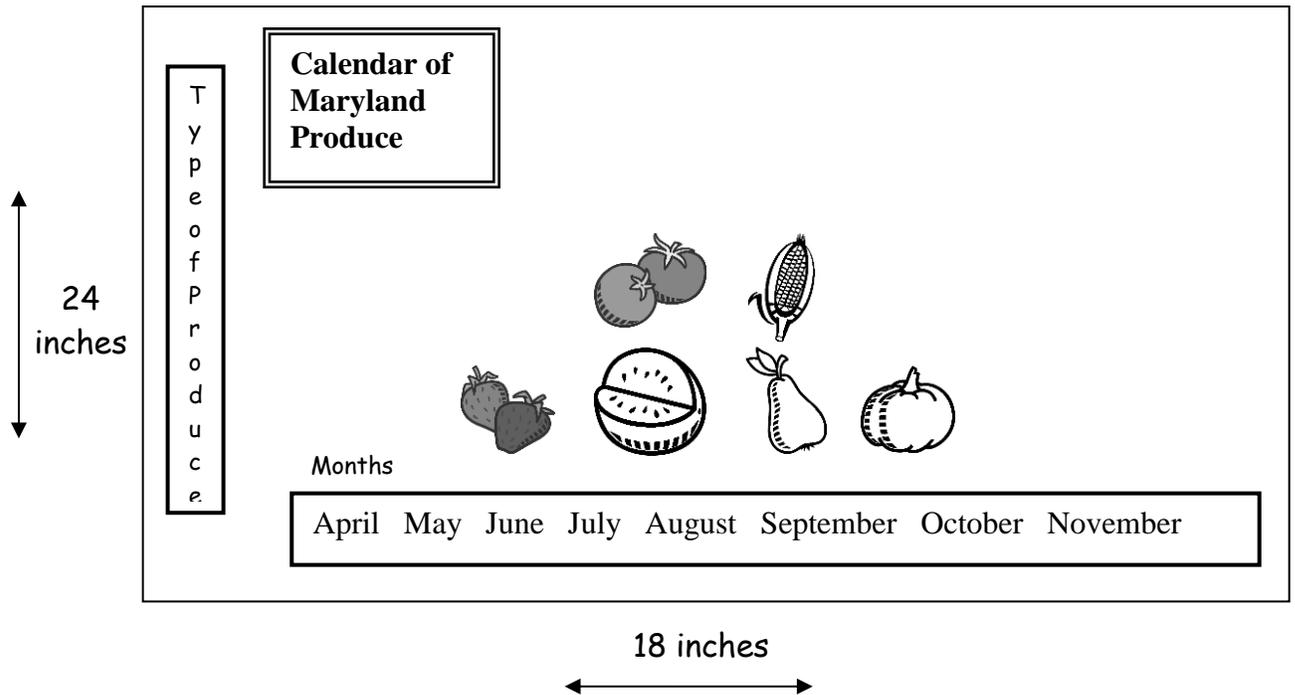
Teaching

the Lesson:

1. Engage student interest by asking them what factors are necessary for plant growth (sunlight, temperature, rainfall, soil).
2. List months of the year in Maryland that provide temperatures warm enough for fruits and vegetables to grow? (April - November). Why do these months allow fruits and vegetables to grow? (longer days and warmer temperatures).
3. Think about being able to get local fruits and vegetables from your home garden or a farm stand. Identify some months and products that are available (strawberries in June, raspberries & blueberries in July, corn and tomatoes in August, apples and peaches in September, pumpkins in October).
4. Fresh Maryland Produce is available at roadside stands, pick-your-own farms, farmers' markets, community-supported

agriculture farms, and many supermarkets. Students will create a graph that displays the months of the year, the products available, and the times at which they can be harvested.

5. Using the **Maryland Produce** worksheets, students will build the graph described using two (2) sheets of 12 by 18 inch construction paper taped together to make an 18 by 24 inch sheet. Students add the **Calendar of Maryland Produce** title and mark **Months** (x axis) and **Type of Produce** (y axis). The bar graph is constructed as students read the Calendar of Harvest Chart, cut out the fruit/vegetable icon, and then glue it above the correct month. Completed project will be formatted like the following illustration:



6. Students summarize their experience by responding to the following:
 - a. Describe your graph.
 - b. What trends do you notice?
 - c. To whom would this information be useful?
 - d. What on the graph surprised you?
 - e. What one thing did you already know?

- f. You eat oranges, pineapple, grapefruit and lemons. None of these things is shown on your graph. Why not? Where do these fruits come from?
- g. In December, January, and February we are able to purchase strawberries, cucumbers, potatoes, and apples at the supermarket. How can that happen when none of these things are harvested in Maryland during those months? *Refer to the Digital Atlas pg. 9 for additional information.*

7. **Middle School Extension Activity:** Select a region of the country that has a different climate than Maryland (such as Hawaii, Florida, Texas, or Alaska). Research what months produce fresh fruits and vegetables. Name the fruits and vegetables produced in your selected region. Compare and contrast the latitude and longitude, climate (include monthly temperature and rainfall statistics), products, and growing season with that of Maryland. What similarities do you notice? What are the differences? What would happen if all of the food we ate had to come from Maryland? Design a chart or poster that explains how Maryland is similar and/or different to the region you selected. Include an explanation of how the Earth's surface and environmental conditions allow different fruits and vegetables to survive in these two locations.

Materials: Harvest A Plenty worksheet
Calendar of Harvest chart
Get Fresh! Buy Local! brochure (included in MD Resource Kit)
Maryland Produce Calendar Icons
Two sheets of 12" x 18" construction paper per student
Glue and scissors

Trivia: Some scientists think that eating blueberries can help slow down or even reverse some of the physical effects of growing old. The heaviest apple weighed 3 pounds 11 ounces. The world's largest pumpkin was grown in Simcoe, Ontario, Canada in 1998. It weighed 1,092 pounds!

Websites: www.urbanext.uicu.edu/pumpkins/
www.bestapples.com
www.marylandsbest.net
www.mda.state.md.us/agdev/berries.htm
www.ams.usda.gov/farmersmarkets/States/Maryland.htm
www.kigsregen.org
www.5aday.com
www.dole5aday.com
www.fandvforme.com
www.freshfromflorida.org/resources.htm

Resource

Connections: **Green Power: Leaf & Flower Vegetables** by Meredith Sayles Hughes, Lerner Publications, Minneapolis, 2001.
Spill the Beans and Pass the Peanuts (Legumes) by Meredith Sayles Hughes, Lerner Publications, Minneapolis, 1999.
Tomatoes, Potatoes, Corn and Beans: How the Foods of the Americas Changed Eating Around the World by Sylvia A. Johnson, Atheneum Books for Young Readers, New York, 1997.
New Junior Garden Book by Felder Rushing, Meredith Books, 1999.
Cool as a Cucumber, Hot as a Pepper: Fruit Vegetables by Meredith Sayles Hughes, Lerner Publications Company, 1999.
Cranberries: Fruit of the Bogs by Diane Burns, Carolrhoda Books, Inc., 1994.
A Pocketful of Goobers: A Story About George Washington Carver by Barbara Mitchell, Carolrhoda Books Inc., 1986.
How to Make an Apple Pie and See the World by Marjorie Priceman, Alfred A. Knopf, New York, 1994.



**Extension
Activities:**

Historical Background on Providing Year Round Food to Eat

Discuss with students what folks have done historically to extend the availability of food into other seasons of the year (canning, freezing, pickling, storing in a root cellar). Students select one of these methods and describe the process and the time period in which it was used. Create a timeline of these events.

Securing Fresh Food Year Round



What are some ways people in Maryland today are able to secure fruit and vegetables food year round? (commercial canneries, controlled storage, importing). Investigate one of these options and list the kinds of food that it provides. What modes of transportation are used to provide us with year round food? (air, boat, rail, trucks). Match your foods with the correct form of transportation.

Apple Investigation

With your students plan and conduct an investigation to determine the best environmental condition for maintaining the freshness and quality of apples.

1. Determine the characteristics of a good apple - color, taste, juiciness, and firmness.
2. Select several different environmental conditions: sunny window, dark closet, refrigerator, freezer, and control situation at room temperature.
3. Select a method of covering - paper bag, plastic bag, no bag, or cardboard box.
4. Test for two variables - location and covering. Determine which condition maintained the best apple quality. (Allow the frozen apple to thaw before conducting the test.)
5. Read description of **Controlled Atmospheric Storage**. Does this article help you to better understand how we get food year round? What in the article would have helped you design a better investigation on preserving the quality of apples?

6. Design an investigation to discover the best way to store onions, potatoes, or bananas.

Controlled Atmosphere Storage

Apples are harvested in late summer and early fall; however, we can buy fresh apples from the store all year. This is due to Controlled Atmosphere Storage. Controlled Atmosphere Storage regulates the temperature, oxygen, carbon dioxide, and humidity in the storage room. Each variety of apple requires different conditions so computers help keep the specified conditions constant. As an apple ripens, the starches change to sugar, and the apple takes in oxygen and gives off carbon dioxide. This is the respiration process of an apple. In Controlled Atmosphere storage, the respiration process is slowed down so the apples do not ripen quickly. Most varieties of apples can be stored for 12 months or longer. Because of Controlled Atmosphere Storage, we are able to enjoy apples year round.

Lesson developed for Maryland *Ag in the Classroom* to accompany Take Me Out to the Cornfield. Funding provided by Maryland Agricultural Education Foundation, 2004. Maryland Produce Calendar lesson created by Sari Bennett & Pat Robeson UMBC, Geography Department, 2003, used with permission. Get Fresh! Buy Local! Brochure provided by Future Harvest CASA.



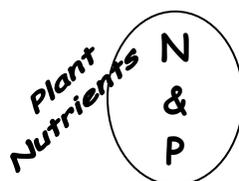
Harvest A Plenty



Name _____
Date _____



Maryland "harvests a plenty" - plenty of fresh fruits and vegetables! This produce however is not "produced" year round in Maryland. Maryland's growing season is controlled by the climate (environmental factors such as temperature and precipitation). During this activity, you will organize, display, analyze, and interpret seasonal information pertaining to our region's harvest of fresh fruits and vegetables.



1. What factors are necessary for plant growth?

2. Using climatic factors from above, what months of the year are warm enough in Maryland to grow fruits and vegetables? *Circle all that apply.*

| | | | | | |
|---------|----------|-----------|---------|----------|----------|
| January | February | March | April | May | June |
| July | August | September | October | November | December |

3. Why do these months allow farmers and gardeners to grow produce?

*When can you eat Maryland strawberries or green peppers?
How about local tomatoes or sweet corn?*

You will now create a graph to answer these questions.

Graph Instructions

- ✓ Tape together 2 sheets of 12 inches x 18 inches construction paper to make 1 piece of large paper that is 24 inches long by 18 inches high.
- ✓ Cut out all icons, including the title, months, type of produce label, fruits, and vegetables.
- ✓ Place the **Calendar of Maryland Produce** title at the top, **Months** along the bottom (x axis), and **Type of Produce** at the left margin (y axis). Ask your teacher to check the graph title and axis labels. Once checked, glue the title and labels.
- ✓ Carefully, read the Calendar of Harvest Chart.
- ✓ Glue the individual fruit and vegetable icons over the correct month.
- ✓ Using the completed graph, answer the questions below.

4. How would you describe your graph?

5. What trends do you notice?

6. To whom would this information be useful?

7. What on the graph surprised you?

8. What was one thing that you already knew before making the graph?

9. Do you see citrus, bananas, or pineapples on the graph? YES NO

Why or why not? _____

Where are these fruits grown? _____

10. How can we purchase fresh produce in Maryland grocery stores during winter months (out of the growing season)?

Get to know where your food originates! When you eat food directly from Maryland farmers, you (1) enjoy fresh, nutritious, great tasting food, (2) support local agriculture, and (3) help to maintain farm land/open space. There are many ways that you can obtain Maryland fruits and vegetables:

- ✓ Shop at a Farmer's Market, which are located in every county and Baltimore City.
- ✓ Join a CSA - members of a Community Supported Agricultural farm and partner with a farmer to receive a weekly "share" of the harvest.
- ✓ Stop by a road-side farm stand or "pick-your-own" farm.
- ✓ Encourage your neighborhood grocery stores and restaurants to buy from local farmers so you can eat locally-grown foods!

11. Can you think of another way to eat local Maryland produce?

Lesson developed for Maryland *Ag in the Classroom* to accompany Take Me Out to the Cornfield. Funding provided by Maryland Agricultural Education Foundation, 2004. Maryland Produce Calendar lesson created by Sari Bennett & Pat Robeson UMBC, Geography Department, 2003, used with permission. . Get Fresh! Buy Local! brochure provided by Future Harvest CASA.

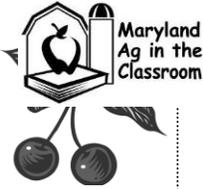




CALENDAR OF HARVEST



| <u>Dates</u> | <u>Type of Produce</u> | <u>Dates</u> | <u>Type of Produce</u> |
|--------------------|------------------------|--------------------|------------------------|
| Feb. 7 - 21 | Maple Sap | Jul. 10 - Sept. 15 | Carrots |
| Apr. 25 - Jun. 15 | Asparagus | Jul. 10 - Nov. 1 | Broccoli |
| May | Spinach | Jul. 15 - Aug. 30 | Okra |
| May 15 - Jun. 20 | Strawberries | Jul. 15 - Sept. 15 | Cantaloupes |
| Jun. 1 - Jul. 1 | Green Peas | Jul. 15 - Sept. 15 | Plums |
| Jun. 1 - Sept. 15 | Cabbage | Jul. 20 - Aug. 30 | Black-eyed Peas |
| Jun. 10 - Jul. 10 | Sweet Cherries | Jul. 20 - Sept. 1 | Lima Beans |
| Jun. 10 - Sept. 15 | Snap Beans | Jul. 21 - Sept. 20 | Cider |
| Jun. 15 - Jul. 10 | Raspberries | Jul. 25 - Aug. 25 | Nectarines |
| Jun. 15 - Jul. 15 | Sour Cherries | Jul. 25 - Sept. 10 | Eggplant |
| Jun. 20 - Aug. 1 | Blueberries | Jul. 25 - Sept. 15 | Peppers |
| Jun. 25 - Aug. 30 | Pole Beans | Jul. 25 - Oct. 1 | Watermelons |
| Jun. 25 - Sept. 1 | Summer Squash | Aug. 1 - Sept. 30 | Winter Squash |
| Jun. 25 - Sept. 15 | Sweet Corn | Aug. 15 - Sept. 20 | Grapes |
| Jul. 1 - Sept. 1 | Cucumbers | Aug. 15 - Oct. 15 | Pears |
| Jul. 1 - Sept. 30 | Potatoes | Aug. 15 - Nov. 1 | Turnips |
| Jul. 1 - Oct. 30 | Honey | Aug. 15 - Nov. 5 | Apples |
| Jul. 4 - Sept. 1 | Beets | Sept. - Oct. | Gourds |
| Jul. 4 - Sept. 15 | Tomatoes | Sept. 5 - Dec. 15 | Sweet Potatoes |
| Jul. 5 - Aug. 1 | Blackberries | Sept. 10 - Nov. 30 | Pumpkins |
| Jul. 5 - Sept. 20 | Peaches | December | Christmas Trees |

| | | | | | |
|--|--|--|--|--|--|
| Watermelon  | Watermelon  | Watermelon  | Watermelon  | Cherries  |  |
| Strawberries  | Strawberries  | Broccoli  | Broccoli  | Broccoli  | Broccoli  |
| Broccoli  | Apples  | Apples  | Apples  | Apples  | Pears  |
| Pears  | Pears  | Grapes  | Grapes  | Raspberries  | Raspberries  |
| Peaches  | Peaches  | Peaches  | Asparagus  | Asparagus  | Asparagus  |
| Tomatoes  | Tomatoes  | Tomatoes  | Pumpkins  | Pumpkins  | Pumpkins  |
| Blueberries  | Blueberries  | Blueberries  | Cantaloupes  | Cantaloupes  | Cantaloupes  |

MONTHS

TYPE OF PRODUCE

| | | | | | |
|---|---|---|--|--|---|
| Potatoes  | Potatoes  | Potatoes  | Peas  | Peas  | Eggplant  |
| Eggplant  | Eggplant  | Cucumbers  | Cucumbers  | Cucumbers  | Sweet Corn  |
| Sweet Corn  | Sweet Corn  | Sweet Corn  | Carrots  | Carrots  | Carrots  |
| Green Peppers  | Green Peppers  | Green Peppers  | Beets  | Beets  | Beets  |



Calendar of Maryland Produce

April

May

June

July

August

September

October

November

The Great Pumpkin Story

Inning #5 - Fruits and Vegetables
Maryland *Ag in the Classroom*



Standard(s): Students will:

- explain how a model can be used to learn about what it represents.
- describe and compare how stems, leaves, roots, and flowers allow a plant to live in its environment.

Grade Level: 1 - 3

Length of Lesson: 60 minutes

Overview: Students determine the difference between a fruit and vegetable. After reading informational text, students build a model of the life cycle of a pumpkin and explain the functions of its various parts.

Background

Information: Refer to the intermediate section preceding this lesson for Background Information, Trivia, Atlas Connections, Websites, and Resource Connections that will be helpful in teaching The Great Pumpkin Story.

Teaching the Lesson:

Depending on the reading level of students, teachers may choose to use the reading selection as a read-aloud for grade one.

To improve student comprehension, teachers may want to introduce the following vocabulary words to students: **variety, colonial, ingredient, fertile soil, produce, mature, sprouting, eventually, blossoms, nutrients, tendrils, harvested.**

1. **Engagement:** Teacher brings in a variety of fruits and vegetables (or pictures of them) to share with students. Pose the question, "What makes a **fruit** a **fruit** and a **vegetable** a **vegetable**?" Botanically speaking, fruits develop

- from flowers and contain seeds (see background information in intermediate lesson Harvest a Plenty for more details).
2. Using this definition, classify the fruits and vegetables.
 3. Students gather important ideas by reading informational text in article, The Great Pumpkin Story.
 4. Students discuss the function of each plant part and then build a model of the pumpkin life cycle using the Pumpkin, Pumpkin directions that follow.
 5. Students explain each part of their model and its function.

Extension

Activities:

1. An excellent read-a-loud book is Pumpkin Circle - The Story of a Garden by George Levinson. Students can bring to school old pumpkins and begin a compost pile with them. As the pumpkins rot through the winter, they enrich the soil and the life cycle can begin again if students save seeds to plant in the spring.
2. Have students line a plastic cup with paper towel strips. Fill cup with moistened cotton balls. Students plant 4 - 6 pumpkin seeds between the cup and towel. Seeds should be planted in different directions - up, down, sideways. Students predict direction stems and leaves will grow and journal their observations.

Materials:

Fruits and Vegetables (or pictures of them)

The Great Pumpkin Story! article

Pumpkin, Pumpkin (directions for pumpkin life cycle model)

Lesson developed for Maryland *Ag in the Classroom* to accompany Take Me Out to the Cornfield. Funding provided by Maryland Agricultural Education Foundation 2004. Pumpkin, Pumpkin from Louisiana *Ag in the Classroom* & National *Ag in the Classroom* Conference 2001.



The Great Pumpkin Story!

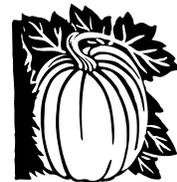


Pumpkins were one of the first crops grown in America. Pumpkins have had a variety of uses over the years. Native Americans used pumpkins seeds for medicine and food. In early colonial times, pumpkins were used as an ingredient for the crust of pies and not for the filling. Pumpkins were once recommended for removing freckles and curing snake bites.



Pumpkins are planted in fertile soil after the last frost. The seeds must be planted four feet apart because pumpkins vines need lots of room to spread. It takes about 110 days for a pumpkin vine to produce mature pumpkins.

After sprouting, true leaves and the vine begin to grow. Pumpkin vines may be 15 to 20 feet in length. Pumpkin vines develop orange flowers about one month after planting. Pumpkin flowers will eventually become pumpkins. Cutting off some of these flowers will force the other blossoms to grow into larger pumpkins.



The roots of the plant gather up water and nutrients that help the plant grow. The large leaves gather sunshine and help the plant produce the food it needs. Tiny curling tendrils also form on the stems. These tendrils reach out and cling to the vines around them. Female flowers begin to grow a small bulb at the base of the flower. This is the beginning of the pumpkin. As the pumpkin grows larger, it turns from dark green to bright orange.



Harvested pumpkins are used to feed animals, to make pumpkin pies, and to be carved into Jack-o-Lanterns. Pumpkin seeds can be roasted



as a snack. Some people even like to eat the pumpkin flowers. If you save some of the seeds from this year's pumpkin, then you can plant them next year and have another crop of pumpkins.

PUMPKIN, PUMPKIN



Materials

- Paper plates (orange or white); two per student
- Construction paper in brown, dark green, yellow, light green, orange
- Brown or green yarn; five pieces per student, 6-8" long
- Scotch tape
- Scissors
- Stapler

DIRECTIONS

You can use cardboard patterns to trace each shape onto construction paper, or copy directly onto appropriate paper.

Seed: brown

Leaf: dark green

Blossom: yellow

Small pumpkin: light green

Large pumpkin: orange

1. Tape a piece of yarn to inside of one paper plate (eating side) and hang over edge toward the plate back. Place this plate face-to-face with another plate, and staple them together at their edges, leaving about 1/3 diameter of the plate edge unstapled (see Figure 1).

Decorate this piece to resemble a jack-o-lantern.

2. Staple and tape each shape in order with yarn between each piece (see Figure 2).

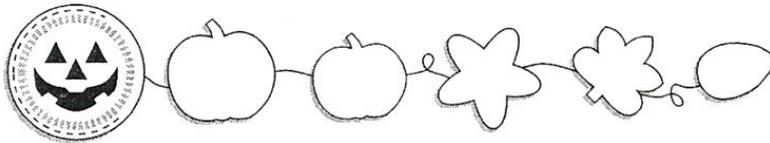
3. When assembled, stack shapes neatly and place in opening of paper plate jack-o-lantern.

Starting with the seed shape, slowly pull shapes out of pumpkin as you tell the story of how pumpkins grow.

Figure 1:

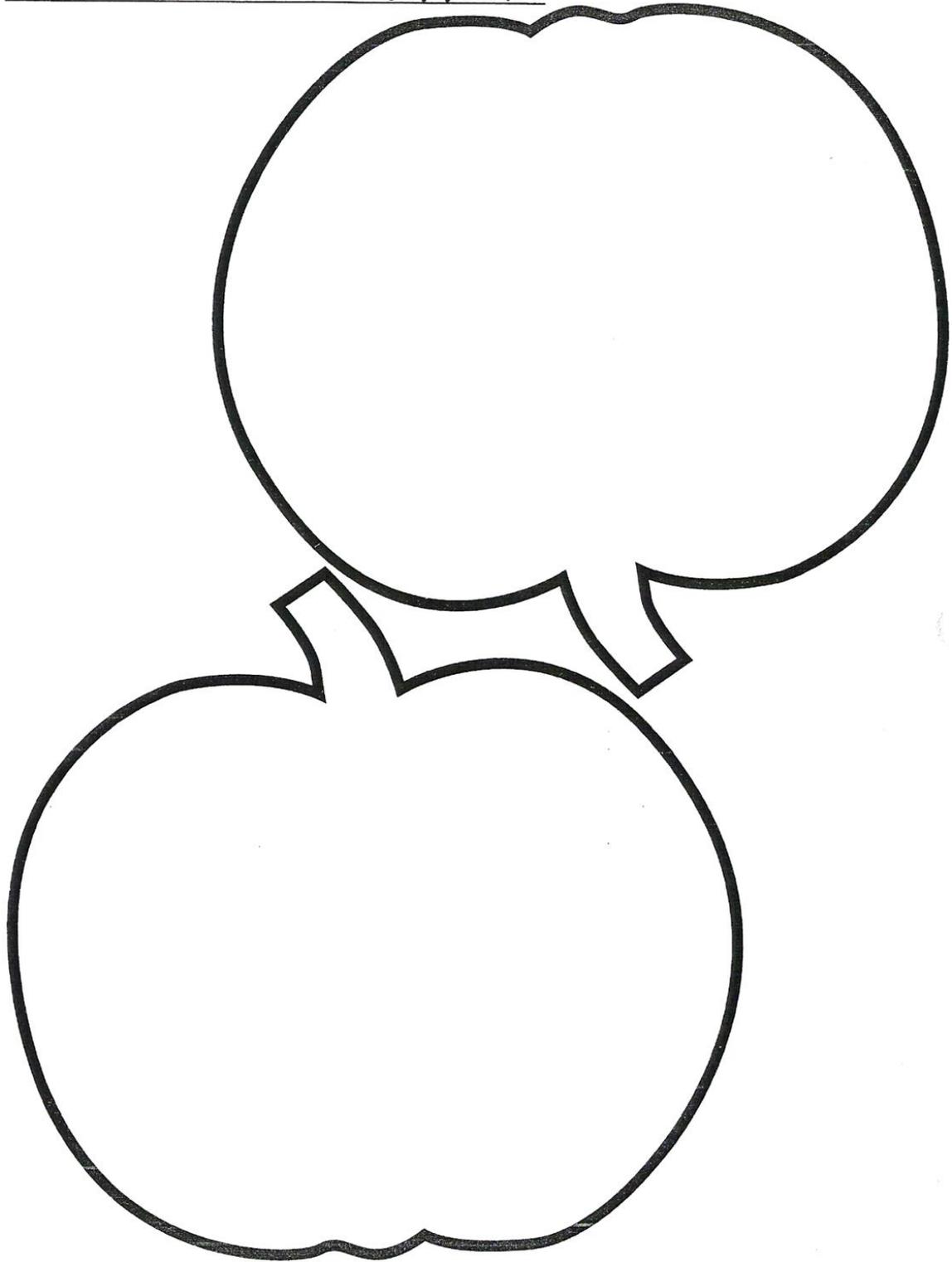


Figure 2:

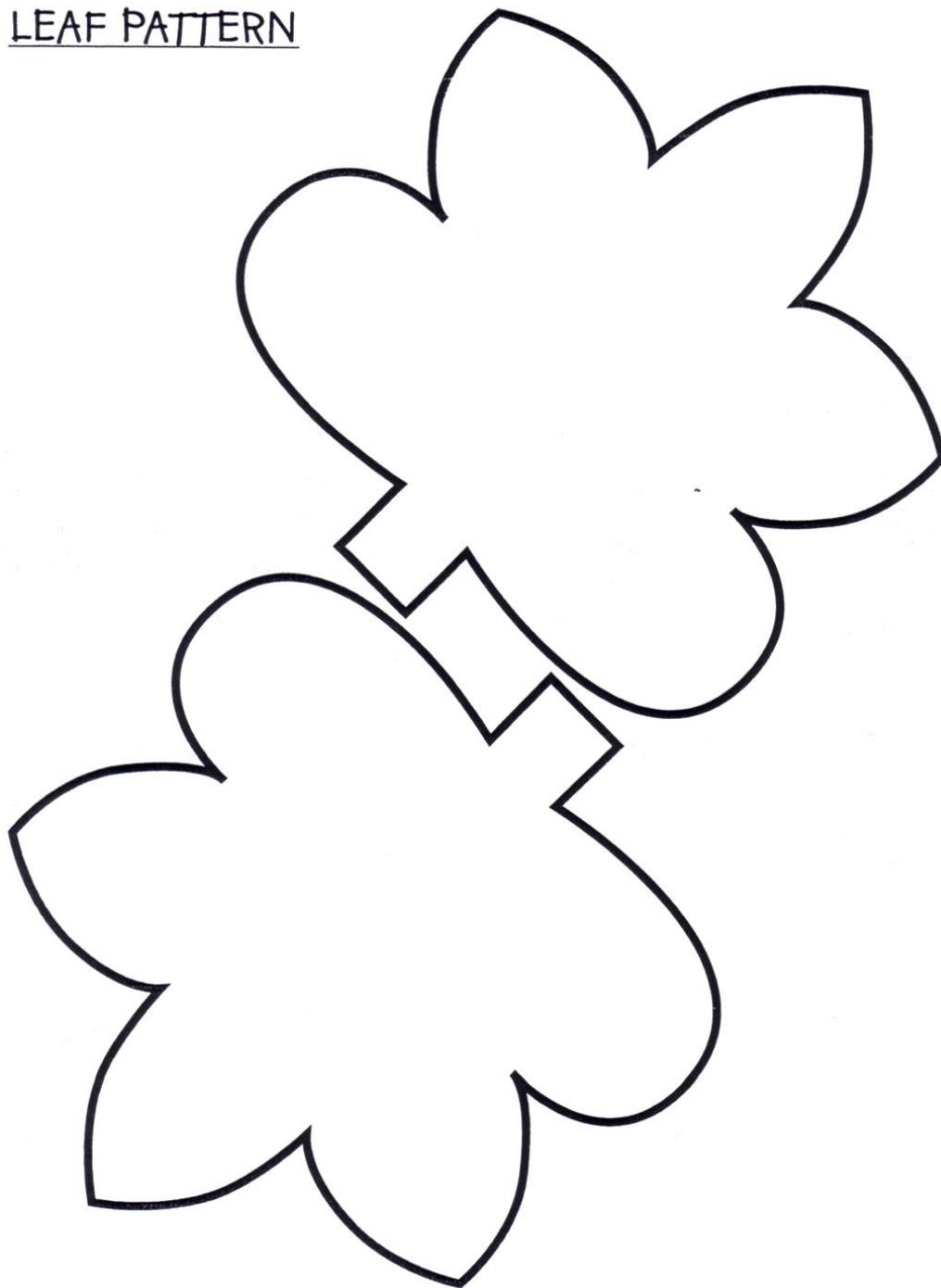


Credit: 2001 National Ag in the Classroom Conference

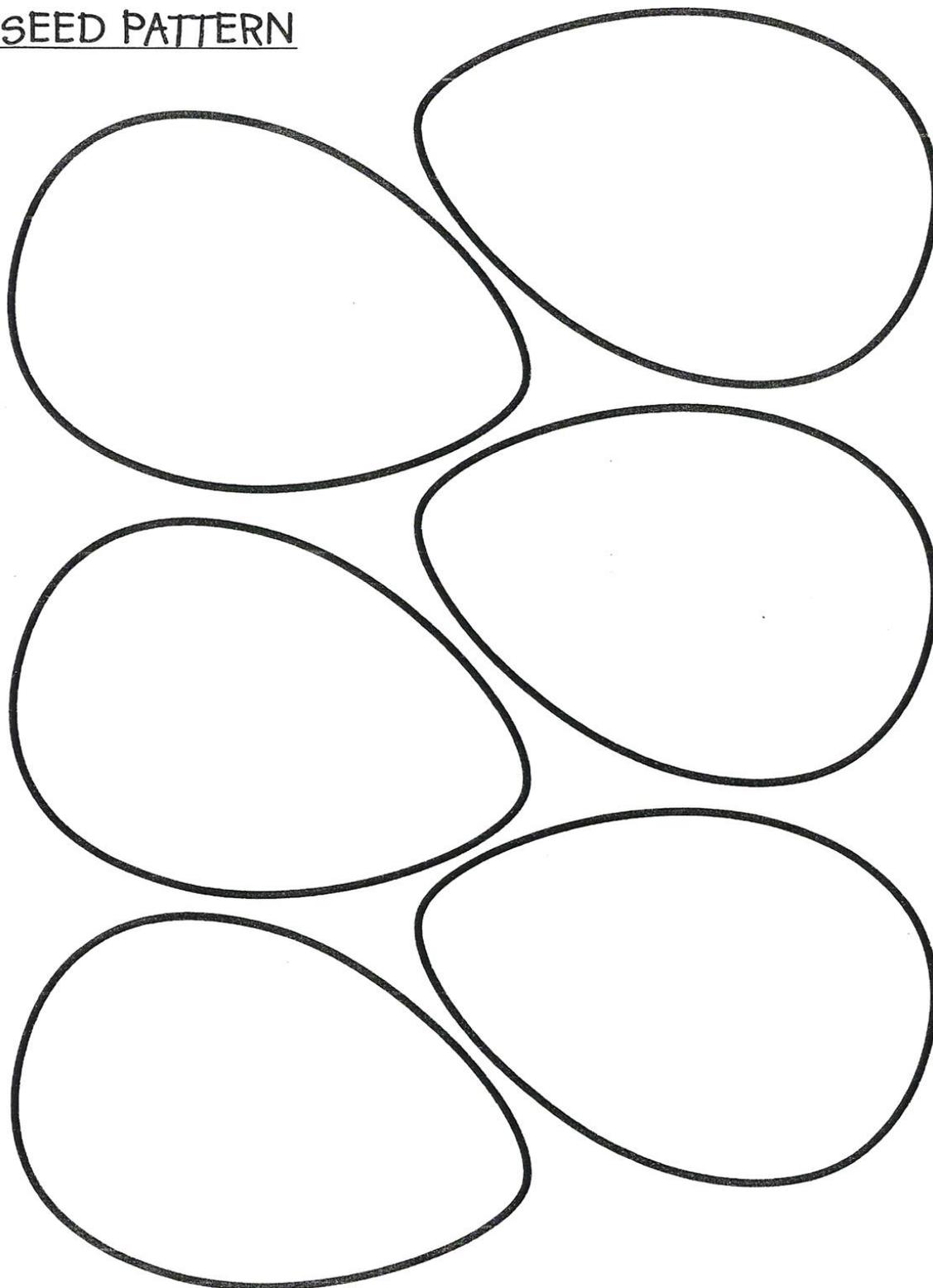
LARGE PUMPKIN PATTERN



LEAF PATTERN



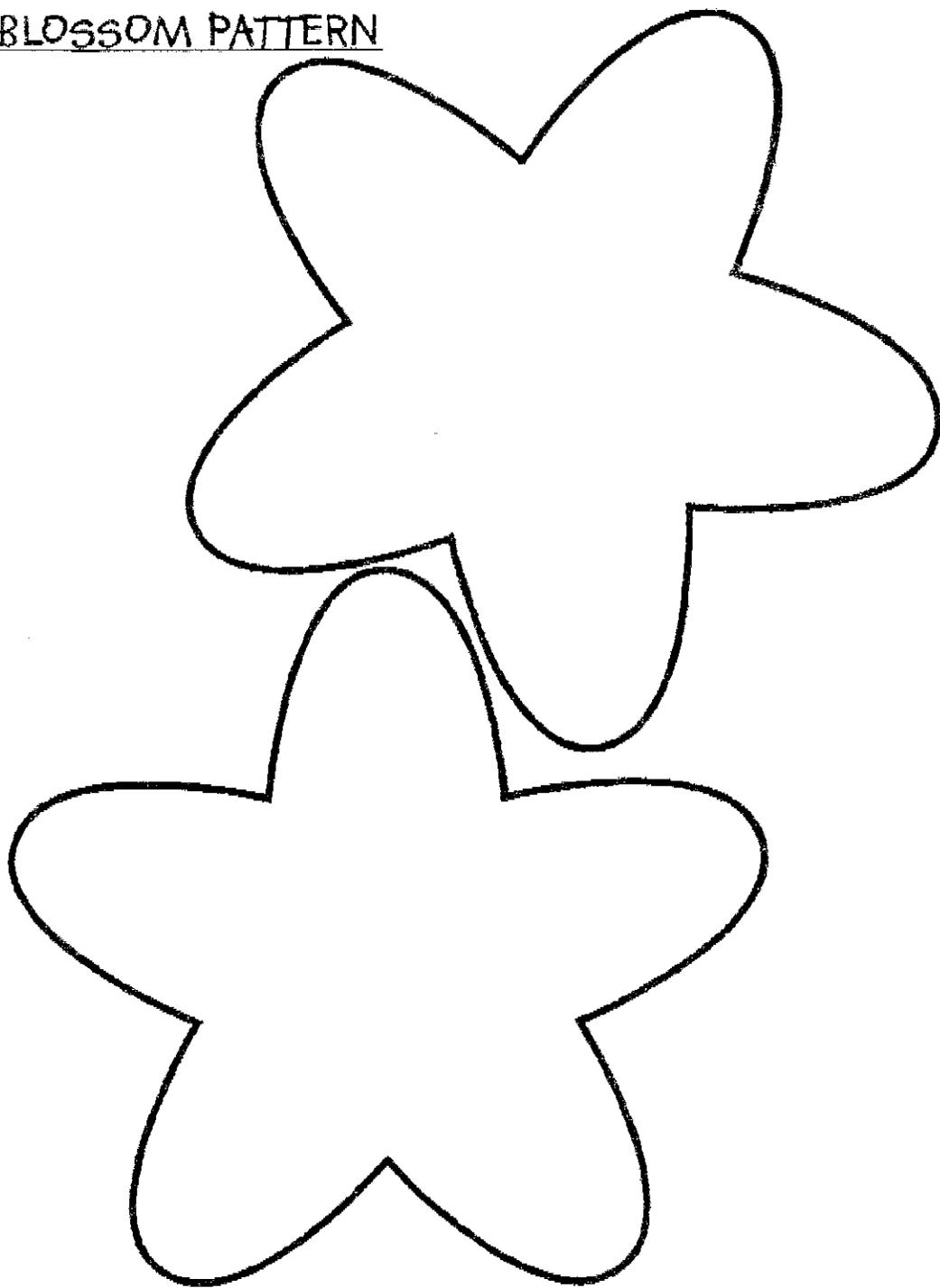
SEED PATTERN



SMALL PUMPKIN PATTERN



BLOSSOM PATTERN



Soybeans: The Most Bene-ficial Bean

Inning #6

Maryland *Ag in the Classroom*



Standard(s): Students will:

- identify and analyze the organizational patterns of texts (sequential and chronological order).
- describe how humans use renewable, natural resources.
- describe careers in science and the preparation required for them.

Grade Level: 4 - 8

Length of Lesson: 60 to 90 minutes

Overview: We all use soybeans every day even though many of us could not even describe a soybean. After an examination of products containing soybeans, students will read about the uses and history of soybeans and then construct both a timeline depicting major events in its development and a pyramid organizer to highlight several environmentally friendly uses of soybeans.

Background

Information: Soybeans have an interesting history as described in the student article, [The History of the Soybean](#), as well as being used in numerous food and household products. The soybean industry is constantly working to develop new environmentally friendly products from this renewable resource. A check of food product labels indicates the presence of soybean in numerous foods. Students should check candy wrapper ingredients since soybean lecithin is usually found in chocolate candy. Soybeans many and varied uses make it a most "Bene-ficial Bean".

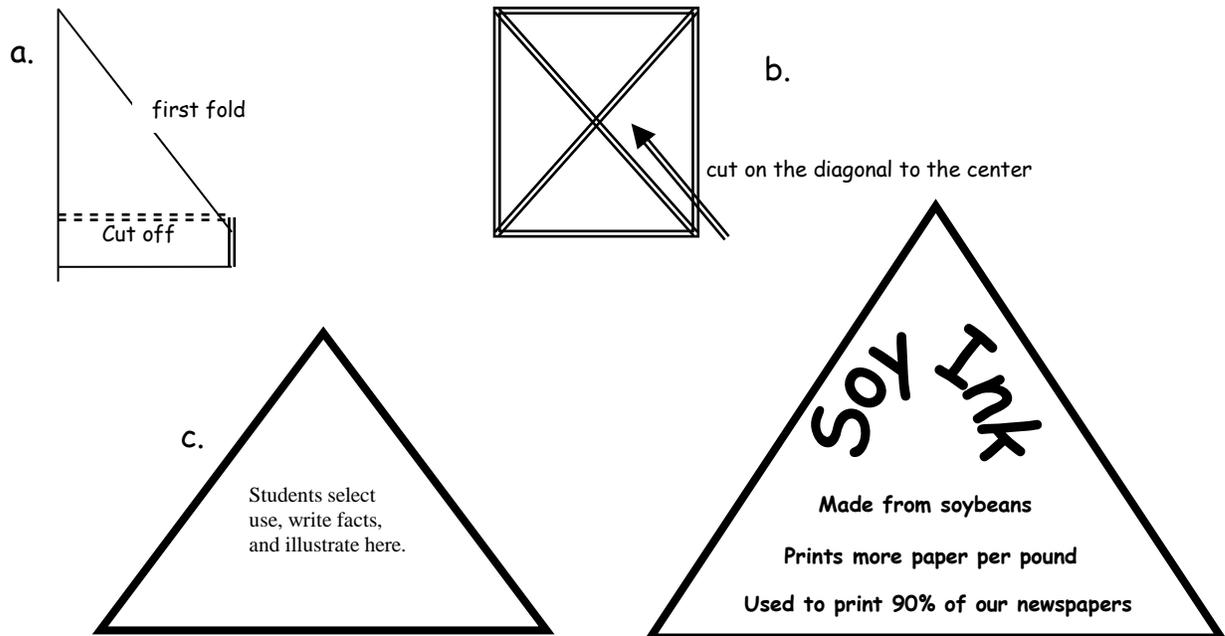
Teaching

the Lesson:

1. Humans eat many kinds of beans. Students record a list of beans that people eat. Ask students to indicate which kinds of beans they eat (record the number of students who eat each kind of beans next to the bean name).
2. Show students a picture of a soybean. Pose the question, "Do you eat soybeans?" Distribute several common food package containers to each group of students. Point out that labels indicate the ingredients in the package listed in order from the greatest to least amount. Students read the ingredients from the label and make a list of foods that contain soybeans. Groups report to the class which products contain soybeans. Ask the question again, "Do you eat soybeans?"
3. Are soybeans a new food? Are soybeans useful for other purposes? In addition to food, do you use any other soybean products? To find out the answers to these questions, students read: **The Most Bene-ficial Bean** and **The History of the Soybean**. After reading the articles, students discuss the answers to the questions within their group.
4. **Elementary students:** Select five turning points in the historical use of soybeans. Organize these events and list them in chronological order.
Middle School students: Construct a time line of ten key events in the historical use of soybeans. Then in a paragraph, explain how these events are related to each other.
5. To summarize the lesson, students build a **pyramid organizer** to share information about any three of the four uses of the soybean (biodiesel fuel, crayons, ink or building materials) described in the article. Students will describe the use, illustrate it, and share how this particular product is good for the environment.

Directions for the Pyramid Organizer:

- Fold an $8\frac{1}{2}$ inch by 11 inch sheet of paper on the diagonal. Cut off the excess single layer formed by the fold.
- Open the paper and fold it again, making a second diagonal fold. Cut one of the folds to the center of the paper.
- Students fill in each section of the pyramid as directed and then glue $\frac{1}{4}$ of the pyramid under another $\frac{1}{4}$ of the pyramid. Students should now have a three-sided, three dimensional pyramid.



Materials: The Most Bene-ficial Bean article
The History of the Soybean article
Commercial/household product packages containing soybeans
Paper for timeline, glue, scissors
Paper for pyramid organizer ($8\frac{1}{2}$ X 11 inches, one per student)

Trivia: In 1850, Civil War soldiers roasted soybeans in place of coffee beans when coffee beans became scarce during the war. In 1997, Prang® starts marketing crayons made from soybeans. Soybeans are found in sunscreen, lip balm, hand lotion, and other cosmetics. In candy bars, lecithin from soybeans is used to keep the chocolate smooth and creamy.

Websites: www.talksoy.com
www.soybean.org
www.prang.com
www.dixonusa.com

Resource

Connections: **Spill the Beans and Pass the Peanuts (Legumes)** by Meredith Syles Hughes, Minneapolis, Lerner Publications Company 1999.
Why the Brown Bean was Blue by Nebraska Ag in the Classroom (Call for more information 1-800-546-2496)

Extension

Activity: Investigate the scientist George Washington Carver to discover the many uses he found for soybeans and peanuts.

The Most "Bene"-ficial Bean

Soybeans are produced for human food, consumer and industrial products, and livestock feed. Soybeans are one of the nation's most fascinating and versatile edible plants. From foods to ink, paints to plastics, soybeans have hundreds of everyday uses. Some of those products are probably in your kitchen or garage right now.

Even though soybeans have been a major food crop in China for over 1,500 years, soybeans were not grown in our country until the 1800's. At first soybeans were small, and their uses few, until a scientist named George Washington Carver began to find more and more uses for them. By 1904, he developed over 300 useful by-products from soybeans.



Soybeans touch our lives hundreds of times a day: when we eat, read a newspaper, get into our cars, and even when we open our front doors. Some of the products made from soybeans include: cereal, cooking oil, chocolate, hot dogs, candy, baby food, flour, soup, ice cream, vitamins, cookies, printing inks, soap, shampoo, fabric softener, paints, plastics, cosmetics, and pet food.



Some other uses for soybeans that scientists have discovered are: biodiesel fuel, soybean crayons, soy ink, and building materials.

Biodiesel Fuel ~ Biodiesel fuel, which can be used in any diesel engine, is made from soybean oil. The fuel is a clean-burning and biodegradable fuel that can help cities meet federal clean air standards. Unlike petroleum diesel, biodiesel fuel emits a much lower amount of pollutants, is sulfur free, and does not produce explosive vapors. Biodiesel fuel also provides similar horsepower, torque, and miles per gallon as petroleum diesel.



Soybean Crayons ~ Soybean crayons are made with soybean oil instead of petroleum based paraffin wax. Soybean crayons provide brighter and smoother colors that do not flake. These crayons can be found under the Prang Fun Pro™ Crayons name at many stores.



Soy Ink ~ Soy ink is also made with soybean oil. Newspapers, commercial printers, and government agencies use soy ink instead of petroleum-based ink, because it prints more paper per pound, offers better color reproduction, and is non-toxic - so it provides a safer environment for their employees. In fact, over 90 percent of all U.S. daily newspapers are printed using soy ink.



Building Materials ~ A biocomposite building material is made with soy flour and recycled newspaper. A fourth grade student from Minnesota contributed to inventing this new building material. Scientists continued research and development until they produced a board similar to wood, harder than oak, and lighter than granite. Biocomposite building material can be used in countertops, furniture, plaques, and much more.



Lesson developed for Maryland *Ag in the Classroom* to accompany Take Me Out to the Cornfield. Funding provided by Maryland Agricultural Education Foundation 2004. Timeline information from Minnesota Soybean Growers Association. Additional information adapted from Kids, Crops, & Critters, by the Illinois Farm Bureau.

The History of the Soybean

(Grades 4-5)



An ancient Chinese legend tells that the wild soybean's nutritious properties were first discovered by a band of traveling merchants.

In 1952, efforts began to expand export markets by promoting American soybeans and soybean products with Japan and around the world.

Soybeans were first brought to America in the early 19th century by trading ships returning from the east.

A significant breakthrough for the soybean in America occurred in 1896, when noted botanist and chemist George Washington Carver became head of the Department of Agriculture at Tuskegee Institute in Alabama. Carver's research into new crops for the depleted soils of the South led to extensive experimentation with soybeans and other nitrogen-producing legumes. To find new uses for these crops, he developed more than 300 by-products, including oils and food substitutes. Carver's work led to the development of what would become soybeans' two main uses on the American continent - edible oil and meal.

The soybean is mentioned in medical records from China, Egypt, and Mesopotamia that date from 1500 B.C. or earlier. In ancient times, moldy and fermented substances from soybeans were commonly used as primitive antibiotics to treat wounds and reduce swelling.

By 1992, the United States accounted for 51% of the world's soybean production, and soybeans were America's second-largest crop in cash sales.

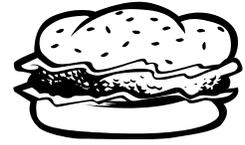
The 1940's were a major turning point for soybeans in the United States. American farmers and soybean processors were ready to fill the gap when a revolution in China and World War II disrupted soybean production and put traditional sources of protein and oils in short supply.

In the early 1950's, soybean meal became available as a low cost, high protein feed ingredient, triggering an explosion in U.S. livestock and poultry production and assuring a vast and continuing market for soybean farmers' output.

Bring on the Beef

Inning #7 - Beef

Maryland *Ag in the Classroom*



Standard(s): Students will:

- determine/analyze important ideas/messages in information text as the text is connected to prior knowledge or experience.
- describe careers in science and the preparation required for them.

Grade Level: 4 - 8

Length

of Lesson: 60 to 90 minutes

This lesson works best if done PRIOR to viewing the video/DVD Take Me Out to the Cornfield since it draws on students' prior knowledge.

Overview:

Students will brainstorm ways that people use beef (other than as meat), record their ideas, and then read the article, Cattle Give Us Beef and a Whole Lot More! There should be a vast difference in the prior knowledge and new learning that occur.

Background

Information:

Almost an entire beef animal can be used to benefit people in some way. From a typical 1,000 pound steer, 400 pounds are used as meat and the remaining 600 pounds are used in by-products. One of the most important by-products from cattle is insulin used by people with diabetes. From the *bones, horns, hooves, and gelatin* we might get combs, gummy bears, marshmallows, and fine bone china. From the *hide and hair* come saddles, paint brushes, glue for bookmaking and bandages, and insulation. From the *fatty acids and fats* we get soaps, shaving creams, brake fluid and insecticides. It is said that 99% of the beef animal is used.

Teaching

the Lesson:

1. In your team, brainstorm and list on your **Bring on the Beef** worksheet ways that people use beef cattle. Be sure to include cattle uses at home, in school, and other places.
2. What counties in Maryland do you think produce the most cattle? List them. Why did you pick these counties?
3. Read the article, **Cattle Give Us Beef and a Whole Lot More!** As you read each paragraph, record on the organizer additional uses of beef that are identified in the article.
4. In a paragraph, compare and contrast your prior knowledge with new information from the text. Highlight one or two of your most interesting new learnings.

Materials:

Cattle Give Us Beef and a Whole Lot More! article
Bring On the Beef worksheet

Trivia:

The hide from one beef animal can be used to make 144 baseballs. Leather is also used to make baseball gloves, clothing, shoes, boots, purses, belts, and wallets.

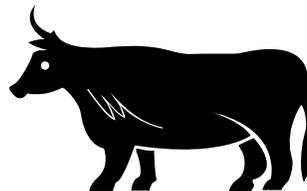
Websites:

www.fb.com/netb/ag-ed/beef.html
www.allcows.com/world/index3.htm

Resource

Connections:

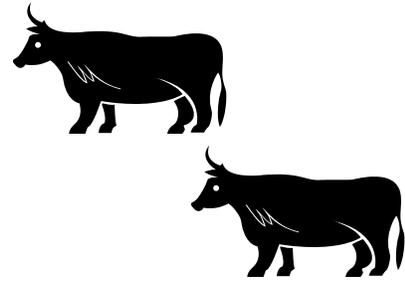
Life on a Cattle Farm by Judy Wolfman, Carolrhoda Books, Inc., Minneapolis, 2002.
Beef by Jason Cooper, Rourke Publications, Vero Beach, Florida, 1997.
Cattle by Dorothy Hishaw Patent, Carolrhoda Books Inc., Minneapolis, 1993.



Lesson developed for Maryland *Ag in the Classroom* to accompany **Take Me Out to the Cornfield**. Funding provided by Maryland Agricultural Education Foundation, 2004. Beef cattle information provided by Anita Thomas with the Maryland Beef Council.



Cattle Give Us Beef and a Whole Lot More!



Beef cattle are important in our lives for many reasons. Beef (such as beef burgers, beef hot dogs, roast beef, and steak) contains nutrients that are important for us as we grow because they keep us healthy. We get our "ZIP" when we eat beef. "Z" stands for zinc, which is a mineral our body needs to help heal wounds and keep our immune system strong. The "I" stands for iron, which is needed for healthy red blood cells. "P" stands for protein, which helps build and repair body tissues.



In addition to delicious eating, cattle also provide us with by-products. Raw materials such as the hide, hair, bones, horns, fat, glands and internal organs are used to make many things that we use every day.

Let's look at a typical school day and see what items containing beef by-products are used at your house. What are some of the things that you or your family members do before leaving for school or work?



Take a shower or bathe and wash your hair?

Many soaps and shampoos contain ingredients obtained from the fat of cattle.



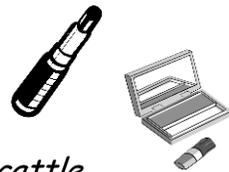
Comb and brush your hair?

Many combs are made from cattle bones or horns and even the bristles in your hair brush may be from cattle.



Shave?

Shaving creams contain fat from cattle.



Put on cosmetics or perfume?

Many cosmetics and perfumes also contain fat from cattle.



Get dressed?

Leather, made from cattle hides, is used to make shoes, boots, belts, coats, gloves, wallets, and purses.





Do you ride to school on a bus or in a car? If so, beef by-products help get you wherever you are going!

- *Antifreeze contains an ingredient from beef fat to keep your bus or car running cool.*
- *Steel ball bearings contain bone charcoal.*
- *Tires contain a type of fat, which makes the rubber hold its shape.*
- *Even the asphalt on our roadways has a binding agent from fat.*



Once you get to school you may also use beef by-products!

- *Some crayons are made from beef fat!*
- *Paint brushes may have bristles made from cattle hair.*
- *Some paints may contain beef fat.*
- *Many sporting goods are made from leather (cattle hides). Twelve basketballs or twenty footballs or 144 baseballs can be made from the hide of one beef animal. Baseball gloves are also made from leather.*
- *Do you have ice cream or yogurt at lunchtime? How about mayonnaise on your sandwich, gummy bears or a marshmallow cookie? These all contain gelatin that comes from cattle.*



There are some things that thankfully we do not use every day, but are important by-products of cattle:

- *The foam in fire extinguishers comes from animal proteins.*
- *Some of the most important things we get from by-products of cattle are medicines that save people's lives.*



Beef by-products enable us to use 99% of every beef animal!

How many things did you use today that contained a beef by-product?

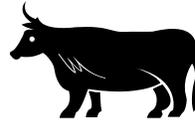


Maryland
Ag in the
Classroom

Bring on the Beef!

Name _____

Date _____



Brainstorm a list of beef uses:

| Home | School | Other Places | Other Ways |
|------|--------|--------------|------------|
| | | | |
| | | | |
| | | | |
| | | | |

Counties in Maryland where you think beef is raised:

| | | | |
|--|--|--|--|
| | | | |
|--|--|--|--|

Why do you think cattle are raised in these counties?

Read **Cattle Give Us Beef and a Whole Lot More!** and complete this organizer by listing below the uses of beef identified in the article.

| | |
|----------------------------------|--|
| Food | |
| Getting Ready for the School Day | |
| Riding in a Car/Bus | |
| At School | |
| Uses other than Everyday | |

In a paragraph, compare and contrast your prior knowledge with the new information from the text. Highlight one or two of the most interesting new things you learned.

Beef Cow or Dairy Cow?

Inning #7 - Beef Cattle

Maryland *Ag in the Classroom*



Standard(s): Students will:

- seek and process information from readings.
- identify and describe similarities and differences between one object and another.

Grade Level: 1 - 3

Length of

Lesson: 45 minutes

Overview:

Some breeds of cattle are raised specifically for meat and other cattle are raised specifically for milk. A beef cow produces only enough milk to feed its young. Most of its energy goes into the muscles that will become the meat you eat. A good dairy cow is thin and the bones on her back are visible. Most of the energy a dairy cow gets from her feed goes into making the milk that you drink. Students recall what they think might be the difference between beef cattle and dairy cows. Then, they read **Beef Cow or Dairy Cow?**, complete a Venn diagram, and explain their findings in an accordion book and writing to inform activity.

Background

Information: Refer to the intermediate section preceding this lesson for Background Information, Trivia, Websites, and Resource Connections that will be helpful in teaching **Beef Cow or Dairy Cow?**

Teaching

the Lesson:

Depending on the reading level of students, teachers may choose to use the reading selection as a read-aloud for grade one.

To improve student comprehension, teachers may want to introduce the following vocabulary words to students: **gelatin, processing plant, homogenized, pasteurized, graze.**

1. **Engagement:** Elicit from students the difference between a pig and a chicken (appearance, habits, and use). Pose question, "What is the difference between a dairy cow and a beef cow?" Accept ideas.
2. If possible, show pictures of beef cattle and dairy cows. Have students add to their list of differences. Students read, **Beef Cow or Dairy Cow?** and then make an accordion book to compare these two animals.

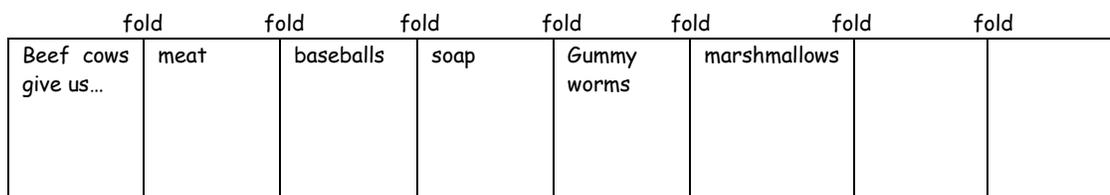
Accordion book directions:

- Using 18" X 24" paper cut strips 6" X 24"
- Fold the strip in half, end to end (Repeat the fold two more times)
- Unfold to reveal 8 sections as pictured below:



- On side one, students draw a picture of a cow in section one and write, "Beef cows give us..." In following sections, students write and draw or cut from magazines, pictures of things we get from beef cattle.

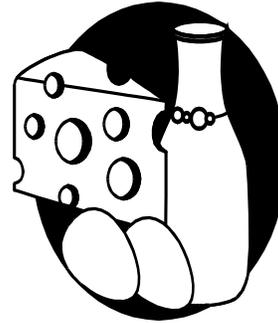
EXAMPLE OF SIDE ONE



- On side two, students draw a dairy cow in the first section and title it "Dairy cows give us..." Then follow the same procedure as side one. Students can compose a paragraph that compares beef and dairy cows.

3. Have students list all the things that can come with a beef burger - roll, meat, cheese, lettuce, tomato, relish, mustard, ketchup, mayonnaise. Trace each of these things back to the farm. Roll→ flour→ wheat→ farm; beef→ cattle→ eat grains from farm.

Materials: Pictures of beef cattle and dairy cows
Beef Cow or Dairy Cow? article
18" x 24" construction paper



Lesson developed for Maryland *Ag in the Classroom* to accompany Take Me Out to the Cornfield. Funding provided by Maryland Agricultural Education Foundation 2004. Lesson ideas from Karen Daush, Harford County teacher and Shelley McCollister, Dorchester County teacher.



Beef Cow or Dairy Cow?



Cows are large, heavy farm animals. They are raised for two different purposes. Did you ever wonder how they are different? Let's see what we can discover!

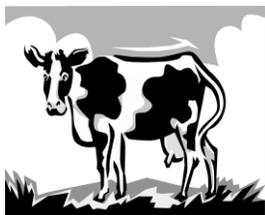


Beef cattle are raised by farmers for their meat. Their bodies are thicker and they have shorter legs than dairy cows. From beef cattle, we get wonderful things to eat. Beef cattle provide steak, beef burgers, and roast beef.

The parts of beef cattle that we don't eat are turned into other useful things. From beef cattle we get leather  baseballs and gloves. Gelatin from beef cattle is used in



making marshmallows and gummy worms. Fat from beef cattle may be found in soap. Beef cattle give us food and a whole lot more!



Dairy cattle are raised by farmers for their milk. Dairy cows have large udders, which contain milk. At least twice a day, the farmer milks the dairy cows. Milk from the cow's udder is piped into a holding tank on the farm. A trucker comes

to the farm to pick up the milk. At the processing plant, milk is homogenized and pasteurized. Then, the milk is made into many things you like to eat. From the dairy cow's milk, we get cream, butter, cheese, yogurt, and ice cream too!



Even though beef cattle and dairy cows are different in some ways, they are alike in other ways. They both eat grass, hay, corn, and soybeans. Sometimes they graze in pastures and at other times they are fed by farmers. They both provide foods we all enjoy!

Lesson developed for Maryland *Ag in the Classroom* to accompany Take Me Out to the Cornfield. Funding provided by Maryland Agricultural Education Foundation 2004. Lesson ideas from Karen Dausch, Harford County teacher and Shelley McCollister, Dorchester County teacher.