



Want To Know About  
**FARMING**

**LESSON  
PLANS**



## LESSON PLANS

### **Video Overview:**

“Ten Things Kids Want to Know About Farming” is a 22-minute educational video. It takes students on a series of field trips to farm and ranch locations throughout the United States, offering a firsthand view of what happens to produce the food and clothing we use every day.

Agriculture is a vital part of American life, even if most of us have not spent much time on a farm. “Ten Things Kids Want to Know About Farming” answers such basic questions about food production such as: what can grow on an acre, what is soil, and how much water is needed to grow a crop?

Scenes of farmers using tractors and irrigation systems, harvesting crops and trees, milking cows and herding sheep invite students to experience a world largely unknown to them. By answering questions that kids commonly ask about agriculture, farmers and ranchers share the realities of making a living off the land.

### **Lesson Plan Overview:**

The “Ten Things Kids Want to Know About Farming” lesson plans help teachers expand upon ideas presented in the video. Through classroom and field activities, the 10 lesson plans offer creative ways of teaching fundamental concepts in math, science, history, social science, geography, language arts and visual arts. Each lesson plan features a specific learning objective, ways of connecting the lesson to the core curriculum, vocabulary, a list of materials and procedures for conducting the lesson, additional ideas for expanded learning and suggested web sites for background information.

## **Video and Lesson Plan Orders:**

The “Ten Things Kids Want to Know About Farming” video was co-produced by the American Farm Bureau Federation and the AFB Foundation for Agriculture. Single copies of the VHS tape or DVD version are available for \$17.00 each; 2 to 99 copies are \$14.00 each. Orders of 100 or more are \$12.00 each.

The “Ten Things Kids Want to Know About Farming” lesson plans were developed by David O. Pippin, president of David Pippin, Inc. in Richmond, Virginia, in consultation with teachers and staff of the American Farm Bureau Foundation for Agriculture and the Virginia Foundation for Agriculture in the Classroom. Single copies are \$5.00 each; 2 to 99 copies are \$3.00 each; 100 or more are \$1.50 each. Orders may be placed by phone at 202-406-3701, by fax at 202-314-5121 or on-line at [www.agfoundation.org](http://www.agfoundation.org).

## **About the Foundation for Agriculture:**

The American Farm Bureau Foundation for Agriculture® is a 501 (c)(3) not-for-profit affiliate of the American Farm Bureau Federation®. This teacher’s guide has been developed to fulfill the Foundation’s mission of building agricultural awareness and understanding through education.

For information about how to order this and other educational resources, visit [www.agfoundation.org](http://www.agfoundation.org) or contact:

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## A List of Lessons and Learning Objectives

### **Lesson 1: Design a Farm**

Students will understand the many facets of a farm through their research, design process and by becoming “farmers.”

### **Lesson 2: Discover an Acre**

Students will visualize and understand the actual size of a square foot and ultimately an acre.

### **Lesson 3: Nature’s Fibers**

Students will understand that cotton is a valuable agricultural crop and will gain an understanding of how the fibers are made into many products they use, including cloth.

### **Lesson 4: Corn — It’s Not All Ears!**

Students will discover the many uses of corn and corn by-products.

### **Lesson 5: How Much Water?**

Students will gain an understanding of the irrigation process and the importance of conservation.

### **Lesson 6: Is Your Soil Like My Soil?**

Students will understand that soil has many components and that all soils are not alike.

### **Lesson 7: Fewer Farmers...Greater Production**

Students will understand the importance of machinery on today’s farms and changes brought by the U.S. industrial revolution.

### **Lesson 8: If I Were a Farm Kid**

Students will gain an understanding of life on a farm by putting themselves in the role of a farm kid.

### **Lesson 9: How Many Cows?**

Students will determine how many cows are needed to provide their class, grade level, school and their family with milk.

### **Lesson 10: Nature’s Renewable Resources**

Students will understand the basic functions of trees and recognize the many products that come from trees.





## LESSON 1: Design a Farm

**Objective:** Students will understand the many facets of a farm through their research, design process and by becoming “farmers.”

### Curriculum Connection:

- Art (creativity, design)
- Language Arts (writing, listening, speaking)
- Study Skills (research)
- Computer Skills
- Social Science (map skills)
- History (families and communities)
- U. S. Geography
- Cooperation

**Book List:** **Harvest Year**, Cris Peterson, Boyds Mills Press  
**Farming**, Gail Gibbons, Holiday House  
**Ranching (Let’s Investigate)**, Scott Wrobel, Creative Education

**Vocabulary:** • Farm – a tract of land devoted to agricultural purposes  
• Ranch – a large farm for raising horses, beef cattle or sheep

**Materials:** Library books, magazines and catalogs with farm and agriculture themes  
Computers with Internet access  
Different types of maps with keys  
Blank U. S. map for each student  
Crayons, colored pencils and/or markers  
Drawing paper  
Poster board (one/group)  
Small sticky notepads

### PROCEDURES:

#### Farms in the United States

- Review and discuss the types of farms shown in the video with the class. In what states were the farms located? What types of farms were located in each of the states shown? Why are certain types of farms (e.g. cotton farms) located in some states but not in others? Explain the varying climates in different parts of the United States. Some regions have longer growing seasons than others, allowing them to grow crops requiring a longer growing season. What types of farms are located in your state? Why?
- Give each student a blank U. S. map. Ask them to locate, color and label the states with farms shown in the video. Write the type of farm that was located in each state.
- Locate, color and label your state. Write the name of at least one type of farm located in your state. Can you name more than one?

### Creating a Farm Map

- After watching the video, ask the students to write a list of things that can be seen on a farm.
- Divide the class into several farms (4 – 5 students per group). Ask students to compare their farm lists and make a master list of the group's items. Which items do their lists have in common? Which items differ?
- Encourage each group to be a different type of farm (e.g. a dairy farm, a hog and corn farm, a cotton farm, etc.). Allow the students to decide.
- After groups decide their type of farm, have each group review its farm item list. Are there items that should be removed for their particular type of farm? Should anything be added?
- Once each group's master list has been established, have them begin designing their farm by having each student draw pictures of items from the master list.
- Students may also look for pictures of the items they plan to have on their farm in magazines, seed catalogs and equipment catalogs or on the Internet. These pictures may include crops, animals, equipment, buildings, etc.
- As a group, review the pictures to start planning the layout of the farm.
- Give each group a piece of poster board and one sticky notepad.
- Write items from the master list on the sticky notes. Using the pictures as a reference, start placing the sticky notes on the poster board. Which items require more space? Which items require less space? Arrange and rearrange accordingly.
- Once the group agrees upon final placement of all items, it's time to start drawing the farm map. Some items such as fences can be drawn on the poster board. Other items can be drawn on separate sheets of paper and glued to the poster board. By drawing on separate sheets of paper, everyone can participate at the same time and not have to crowd around the poster board.
- Create a key/legend for the map of their farm. Label all parts.
- Encourage students to be creative with their maps.

### ADDITIONAL IDEAS:

- Have students make scale models of their farms or models of important buildings on their farm.
- Contact your County Farm Bureau® or Extension Service and invite a local farmer to visit your class. Ask the farmer to share information about his or her farm while students are designing their farms. If farmers from different types of farms are available, invite them to participate in a panel discussion for the class. Ask students to prepare questions for the farmers and mail a copy of the questions to farmers before the visit, to help them prepare for the class discussion.

- Contact your state Agriculture in the Classroom representative about programs available for your school. For a state contacts list visit [www.agclassroom.org](http://www.agclassroom.org).
- Have students write letters to a farmer asking him or her about life on a farm. Share the information with the class. Some of the web sites listed below have addresses of farmers who are willing to be pen pals.

### **Web Site Information for Teachers:**

#### **4-H Virtual Farm Tour**

<http://www.ext.vt.edu/resources/4h/virtualfarm/main.html>

This site introduces you to some of the people who earn their living off the land. You'll see the different types of farms where they live and work. You'll learn how foods get from the farm to your plate.

#### **Family Farms Around the World**

[http://www.disknet.com/indiana\\_biolab/farms.htm](http://www.disknet.com/indiana_biolab/farms.htm)

The 150 farm homepages offer a feel for life on a farm in 40 states and 18 countries. Most include information about animals, crops, wildlife, marketing, soil, climate and other information. Farmers will answer e-mail letters.

#### **Farm Life Live** by Ag Day

<http://www.agday.org/tc/tc-farmlife.html>

Farm families and their children share real life experiences about farm and ranch life in the United States. Families will answer e-mail questions.

#### **What is a Farm?** by American Farm Bureau Foundation for Agriculture

[http://www.ageducate.org/news/what\\_farm.html](http://www.ageducate.org/news/what_farm.html)

Identifies eight farm types based on USDA survey information.





## LESSON 2: Discover an Acre

**Objective:** Students will visualize and understand the actual size of a square foot and ultimately an acre.

### Curriculum Connection:

**Math** (using calculators, problem solving, units of measure, area and perimeter, multiplying, estimating)

**Science** (plants)

**History**

**Cooperation**

**Vocabulary:**

- **Acre** – a piece of land measuring 43,560 square feet
- **Square foot** – one foot x one foot
- **Square foot gardening** – a method that sets plants in a grid pattern rather than in rows, in order to save space.

**Materials:**

- Yard stick
- Measuring tapes
- Calculators
- Pencils and paper
- 12" x 12" construction paper or cardboard (three per student)
- Seeds or seedlings (see list under "Plant a Square Foot Garden")
- Square foot pots and potting soil if container gardening
- Popsicle sticks to label seeds after they've been planted
- Heavy string or yarn
- Staple gun or tacks
- 8' landscape timbers (5)
- Handsaw or chain saw
- Shovel or rototiller

## PROCEDURES:

### Understanding Square Feet

- Give each student a 12" x 12" piece of construction paper or cardboard. Explain this is a square foot. It measures 1 foot x 1 foot. The area of the paper is one square foot.
- To measure the perimeter, have the students use their ruler to measure all four sides. The perimeter is four feet.
- Clear a space in the classroom or go to a room such as the cafeteria or gymnasium where students will be able to lay all of their squares on the floor and view them.
- Pretending that they are laying out a square foot garden, ask the students to place their squares on the floor one at a time. Each square that is placed on the floor must touch at least one side of another square. Each square will represent a crop or plant in the garden. Keep in mind that different plants require different amounts of space in which to grow. For example,

one tomato plant or 16 radish seeds could grow in a square foot. Once the “garden” has been laid out, ask the students to count the number of square feet in their garden. Repeat this exercise several times, allowing students to arrange their squares in different patterns. Each time, ask them how many square feet are in their garden. Students will understand that no matter how the squares are arranged, the garden has the same number of square feet.

- Each time the garden is laid out, have students measure the perimeter. Does it change?

### Field Trip

- This is an opportunity to take students outside to measure the area and perimeter of different spaces. Some possible things that could be measured are squares in the sidewalk, the top of a picnic table, areas marked with chalk on the sidewalk or blacktop, doors, windows, etc. Be creative.
- Before going outside, review the activity “Understanding Square Feet.” Divide the class into groups with 3 students in each group. Two students will measure the area (length x width) and perimeter (add the length of all sides) of the designated spaces, while one student records the measurements. After the measurements have been taken, have students calculate the number of square feet in the space as well as the perimeter of the space.
- Once students have mastered “Understanding Square Feet,” it’s time for them to visualize an acre. Take the students to a large open space, preferably the football/athletic field; this is the perfect site for this exercise, because an acre is approximately the size of a football field. If your school does not have a football/athletic field, look for other open spaces such as a playground for students to measure. Also, explain that an acre is 43,560 square feet, approximately the same size as a football field, which is 300 feet x 150 feet.

### Plant a Square Foot Garden

- This activity provides a great opportunity to involve parent volunteers or your parent-teacher organization.
- Choose a school location for the garden that receives at least six hours of sunlight each day. It should also be a well-drained area.
- Till or turn the soil with shovels in two 8’ x 2’ areas (good adult activity).
- Have an adult saw one of the landscape timbers into 2’ lengths. Line the 8’ x 2’ beds with landscape timbers. This creates 16 one-foot squares in each bed. Fill the beds with topsoil if needed.
- Mark the one-foot squares with string by attaching it to the timbers with tacks or a staple gun.
- Allow each student to have his or her own square foot in the garden. Choose crops that will mature before the end of the school year such as radishes, lettuce, peas, spinach or onions. If you are in a warmer climate, you may be able to grow other crops.

- Rather than a traditional square foot garden, you may try square foot gardening in containers. If possible, find containers that are one foot x one foot square. Have one container per student or one per group of students. Add potting soil to each container. Fill to within one inch of the rim, allowing room for water. A variety of vegetables can be grown in containers. Try lettuce, spinach, radishes, onions or peas. Peppers, eggplant, tomatoes or potatoes do well in containers, but require a longer growing season and may not mature before the end of the school year.

### **ADDITIONAL IDEAS:**

- Have each student calculate the square footage of a room in his or her home and compare it with their classroom, as well as the square footage of an acre. Total the square footage of all students' rooms. How many of the students' rooms would fit on an acre?
- Have students calculate the square footage of their classroom. Is their classroom larger or smaller than one acre? How many of their classrooms would fit on an acre?

### **Web Site Information for Teachers:**

**Container Gardening** by Garden Guides

<http://www.gardenguides.com/TipsandTechniques/container.htm>

Guidelines for growing container gardens.



## LESSON 3: Nature's Fibers

**Objective:** Students will understand that cotton is a valuable agricultural crop and will gain an understanding of how the fibers are made into many of the products they use, including cloth.

### Curriculum Connection:

Math (estimation, measurement, computation, graphing)  
Science (life science)  
Language Arts

**Book List:** **Cotton Now and Then**, Karen B. Willing, Julie B. Dock, Sarah Morse, Now and Then Publications

**Vocabulary:**

- Boll - the pod or capsule of the cotton plant
- Carding - a process of cleaning fibers by separating and laying them parallel to each other.
- Combing - a process for removing short fibers and impurities from cotton that has been carded to produce a softer, more elegant feel
- Cotton Gin - machine used to separate cotton seeds from the fibers
- Fiber - the slender and greatly elongated filaments inside the cotton boll that are capable of being spun into thread
- Thread - a filament or a group of filaments twisted together, often formed by spinning and twisting short textile fibers such as cotton into a continuous strand

**Materials:** Bolls of cotton or cotton balls (one per student, if possible)  
Magnifying glasses  
Microscopes  
Cotton yarn (don't use wool or synthetic yarn)  
Several old, white cotton T-shirts (1 T-shirt for every 3-4 students)  
One pair of sharp scissors for each group  
Yardstick or tape measure  
Blank U. S. maps

## PROCEDURES:

### *Where Does Cotton Grow?*

- Begin by giving each student a blank U. S. map.
- Ask students, "In what states is cotton grown?" The 14 major cotton producing states are Alabama, Arizona, Arkansas, California, Georgia, Louisiana, Mississippi, Missouri, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee and Texas. Some cotton is also produced in Florida, Kansas and Virginia.
- Why is cotton grown in these states and not in all states?

- Have students find, color and label the cotton producing states on the blank maps.

### **Making Threads**

- Give each student a 1-foot length of cotton yarn. Have them pull it apart slowly, exposing the many small fibers which make up the yarn. Look at the fibers using a magnifying glass and/or a microscope. Tape the fibers to an index card and label "yarn."
- After examining the cotton yarn, give each student a cotton boll, if available, or a ball of cotton (be sure to use real cotton balls and not synthetic "cotton balls"). If using cotton balls, have students unroll them carefully. Examine the fine fibers with a magnifying glass and/or a microscope. Compare the fibers with those from the cotton yarn.
- Instruct students to slowly pull and twist the fibers together to create their own thread or yarn. Have the students estimate how many feet of thread or yarn they can make from one cotton ball. Have a competition to see who can make the longest thread from their cotton ball or boll by measuring with a ruler, yardstick or tape measure.
- Display the hand-made threads on the classroom bulletin board along with machine made threads.

### **Unraveling**

- Begin this activity by dividing students into groups of 3 or 4 and asking each group, "How many feet or yards of thread does it take to make a T-shirt?" Write their estimates on the board.
- Give each group one white, cotton T-shirt and one pair of scissors.
- Cut off the sleeves at the shoulders and save.
- Have students cut the T-shirts into one continuous "thread" (approximately 1/8 to 1/4 inch in width) by starting at the hem and slowly cutting their way around the T-shirt until they reach the collar. As one student cuts, one or two students should hold the T-shirt and one student should roll the "thread" into a ball. Remind students if they cut the strip of fabric too narrowly, it will rip; if this happens, simply tie the two pieces together and continue cutting.
- Repeat this process with the sleeves and tie them to the t-shirt "thread."
- When all groups have completed cutting their T-shirts into threads, have them measure their results. Remind them that their "threads" are not as thin as the actual thread, or yarn, used to make the T-shirts. Through the use of the magnifying glasses, students should be able to count the approximate number of rows of thread it takes to make 1/4 inch width. Multiply the number of rows in 1/4 inch of fabric by the total number of yards to give an approximate number of yards of thread to make a T-shirt.
- By completing these exercises, students will recognize the importance of every thread in the articles of clothing they wear each day. Ask students, "What cotton products do you use other than T-shirts?" Make a list of these products.

**ADDITIONAL IDEAS:**

- Have students create a bulletin board or display case about cotton. Collect photos from magazine and newspaper advertisements or from the Internet, as well as items made from cotton to use in the display.
- Save the “thread” made from the T-shirts, as well as the thread created from the cotton bolls or balls. These can be dyed with natural plant dyes and used in a weaving exercise.
- Invite a guest speaker to class to demonstrate how a spinning wheel is used and its importance in the home during early U.S. history.
- Invite a weaver from a local artist’s guild to demonstrate different weaving techniques for the class.

**Web Site Information for Teachers:****National Cotton Council of America**

<http://www.cotton.org>

The National Cotton Council web site offers answers to frequently asked questions, including what can be produced from a bale of cotton. The Council provides a variety of educational materials that present the story of cotton — from its history, to its wide usage, to its economic impact.

**Welcome to Cotton Incorporated**

<http://www.cottoninc.com>

A potpourri of information about cotton production, fabric and fibers, fashion and answers to frequently asked questions.

**Cotton’s Journey**

<http://www.cottonsjourney.com>

This educational site features cotton as a vehicle to teach math, science, language arts and social science. Information includes the story of cotton, answers to frequently asked questions, visual images of cotton at various growth stages and lesson plans.



## LESSON 4: Corn – It's Not All Ears!

**Objective:** Students will discover the many uses of corn and corn by-products.

### **Curriculum Connection:**

Science (life science)  
Language Arts (reading, writing, multiple word meanings, homophones)  
Art (drawing, crafts)  
Math (graphing)  
History (United States)

**Book List:** **Corn (True Books-Food & Nutrition)**, Elaine Landau, Children's Press  
**Corn Belt Harvest**, Raymond Bial, Houghton Mifflin Co.  
**Corn Is Maize: The Gift of the Indians**, Aliko, Ty Crowell Co.

**Vocabulary:**

- Ear – the entire fruiting structure of corn that holds the kernels and the husk
- Husk – the leafy outer covering which protects the kernels
- Cob – the structure which holds the kernels
- Kernel – corn seed which can be eaten or dried to grow new corn plants
- Silk – the cluster of female flowers attached to the ear which catches pollen
- Tassel – the cluster of male flowers at the top of the corn stalk which produces pollen
- Leaves – the usually flat green part of the plant that is attached to the stem and produces food through photosynthesis
- Roots – the parts of a plant normally underground. They anchor the plant in the soil, absorb water and dissolved minerals, which they carry to the stalk.
- Stalk – the main stem of the corn plant that supports all other parts such as leaves and fruit. It also carries water, minerals and food to other parts of the plant.

**Materials:** Ears of corn or corn stalks (if available)  
Magnifying glasses  
Paper  
Colored pencils

## PROCEDURES:

### *Examining the Corn Plant*

- If corn stalks are available from a local farmer or farmers' market (usually in the fall) bring some to class for the students. If the entire stalk is not available, find a picture of a corn stalk and have students label the parts.
- If ears of corn are available (with husks and silks), use them as part of your classroom discussion and exploration. Check your local farmers' market or grocery store for availability of corn on the cob.
- Divide the class into small groups. Encourage students to touch and describe the stalk, leaves, tassels, ears, roots, etc. Use a magnifying glass to examine all parts closely. Discuss the function of each plant part.
- Have the students draw the corn plant or ear of corn. Label the parts and give the function of each plant part.

### *Corn Product Investigators*

- Many items contain corn or corn by-products. Have students make a list. Some items are obvious, such as corn chips and canned corn. Others require some detective work. To help students get started, bring products to class and have them look for the following items on product ingredient lists: monosodium glutamate, xanthan gum, cornstarch, corn syrup, corn meal, maltodextrin, corn oil, dextrose and sorbitol.
- Have students become corn product investigators by examining labels of foods and household products they find at home. Ask students to bring empty, cleaned containers or labels to class (no glass containers).
- Have students create a Corn Product display. Group the product labels and containers according to their corn ingredients and label the groups.
- Have students make a graph showing the number of products made with corn and corn by-products.

## ADDITIONAL IDEAS:

- Bring popcorn and a popper to class. Have students estimate how much popcorn can be made from varied amounts of kernels. Make a chart to compare unpopped amounts to popped amounts. After measuring, popping and measuring again, enjoy a popcorn snack!
- After researching the many food products made from corn, have a Corn Feast. Eat only foods made from corn. This is a great way to involve parents in your study of corn.
- Have students make cornhusk dolls like Native American and Colonial Period children did.



## **Web Site Information for Teachers:**

**Corn in the Classroom**, by National Corn Growers Association  
<http://www.ncga.com>

Corn in the Classroom is a web-based curriculum that uses examples from the corn industry to teach kids mathematics, science, language arts, social studies and even music and art. The curriculum is divided into nine different units and based on the real-life experiences of a Minnesota farm family.

**Popcorn Board Teaching Guide**  
<http://www.popcorn.org/index.cfm>

The Popcorn Program is an interdisciplinary educational guide designed to introduce elementary school students (K-8) to popcorn and its many applications. Includes lesson ideas for Social Studies, Mathematics, Language Arts, Science, Health and Consumer Science.

**The Many Uses of Corn** by the Ohio Corn Marketing Program  
<http://www.ohiocorn.org/usage/uses.htm>

Chart features an ear of corn and describes the various categories of corn by-products.

**How to Make Corn Husk Dolls**  
<http://www.teachersfirst.com/summer/cornhusk.htm>

Lists materials needed and step-by-step directions with diagrams.



## LESSON 5: How Much Water?

**Objective:** Students will gain an understanding of the irrigation process and the importance of conservation.

### Curriculum Connection:

Science  
Math (measuring, multiplying)  
Social Science (map skills)

**Book List:** **Water (Topic Books)**, Fiona Macdonald, Franklin Watts Publisher  
**The Drop in My Drink**, Meredith Hooper and Chris Coady, Viking- The Penguin Group  
**A Drop of Water**, Walter Wick, Scholastic Press

**Vocabulary:**

- Evaporation – the process through which water is converted to vapor
- Conservation – planned management of a natural resource such as water to prevent exploitation, destruction, or neglect
- Irrigation – to supply land with water by artificial means
- Water Cycle – the continuous movement of water from ocean to air and land then back to the ocean in a cyclic pattern

**Materials:** 4 – 5 rain gauges  
Rulers, yardsticks or tape measures  
Graph paper  
Pencils  
Water hose  
Lawn sprinkler  
Access to an exterior water spigot

### PROCEDURES:

- A school garden is an excellent place to conduct this experiment. If you do not have a garden, choose a grassy area on the school grounds.
- Connect a water hose to spigot and lawn sprinkler to serve as an irrigator.
- Place in the school garden or lawn.
- Divide the class into several groups and assign each group a number. Give each group a rain gauge and label it with their group number. Have groups place the rain gauges throughout the area to be irrigated, at varying distances from the sprinkler.
- Plot each rain gauge location on a map of the area that is being irrigated. Use rulers, yardsticks or tape measures to measure the distances from the sprinkler and help plot their locations on graph paper.
- Turn on the water. Make sure water from the sprinkler reaches all rain gauges.

- Let the sprinkler run for one hour.
- Turn off the water.
- Have students check the amount of water in their rain gauges. Is it the same amount in each rain gauge? Discuss the results.
- Make a bar graph showing the amount of water in each group's rain gauge.
- How much water would the area have received if the sprinkler had been left on for two hours? Three hours? Four hours? Five hours? Graph these results as well.

### **ADDITIONAL IDEAS:**

- Keep the rain gauges in the schoolyard over a period of a month (or longer). Keep records of rainfall. Make a bar graph showing the amount of rainfall received.
- Research the average annual rainfall for your area. Compare the average annual rainfall in your area with other parts of the United States. Discuss your findings. Which states are similar? Which states receive the most rainfall? Which states receive the least rainfall?

### **Web Site Information for Teachers:**

**Backyard Conservation** by USDA Natural Resources Conservation Service

<http://www.nhq.nrcs.usda.gov/CCS/Backyard.html>

Shows how conservation practices used on agricultural land across the country can be adapted for use on land around your home.

**PRISM Precipitation Maps: 1961-90** by Oregon Climate Service

<http://www.wrcc.dri.edu/precip.html>

Individual state maps with data on average precipitation in various regions of the state.



## LESSON 6: Is Your Soil Like My Soil?

**Objective:** Students will understand that soil has many components and that all soils are not alike.

### Curriculum Connection:

Science (earth and life sciences)  
Math (measuring, graphing)  
Language Arts (writing)  
Computer Skills (database, spread sheet)

**Book List:** **Children of the Dust Bowl**, Jerry Stanley, Crown Publisher  
**A Handful of Dirt**, Raymond Bial, Walker & Co.  
**Sand**, Ellen J. Prager and Nancy Woodman, National Geographic Society

**Vocabulary:**

- Clay – the smallest of soil particles. Clay is smooth when dry and sticky when wet. Clay can hold a lot of nutrients, but doesn't let air and water through it well.
- Humus – decayed plant or animal matter that makes up the organic portion of soil.
- Sand – the largest of soil particles. When you rub it, it feels rough because it has sharp edges. Sand doesn't hold many nutrients.
- Silt – soil particle sized between sand and clay. Silt is smooth and powdery when dry and smooth, but not sticky when wet.
- Soil – living and nonliving material spread as a very thin layer over the entire surface of the earth. Soil is a combination of rock particles (sand, silt and clay) as well as organic matter, water and air.

**Materials:** Zipper-top bags (one per student)  
Permanent markers  
Magnifying glasses  
3 - 4" flowerpots, Styrofoam cups or half-pint milk cartons (one per student)  
Assorted seeds (beans, peas, pumpkins and squash all work well)  
Journal or paper  
Rulers

### PROCEDURES:

#### Examining Soil Types

- Give each student a zipper-top bag. Have them write their name on the bag in permanent marker.

- Each student should take the bag home and fill it 3/4 full with soil from their yard or neighborhood and bring it back to class. Remind students to ask an adult at home to show them where they may obtain their soil sample.
- Place all bags of soil on a table. Without opening the bags, compare the colors and textures of the different soil samples. Ask students to group them according to color. Open each bag and compare by picking up small amounts of soil and rubbing it between thumbs and forefingers. Do the soils that have the same color also have the same texture? Ask students to record their observations in journals or on paper.
- Repeat this process with each soil sample by adding a small amount of water to each bag. If the soil sticks together and a coil or ribbon can be rolled, the soil contains more clay. If it does not stick together, the soil probably contains more sand and organic matter. Ask students to record their observations in journals or on paper.

### Supporting Plant Growth

- Give each student a flowerpot, Styrofoam cup or half-pint milk carton. Have them write their names on the containers in permanent marker.
- If using Styrofoam cups or milk cartons, punch a small drainage hole in the bottom with a pen or pencil.
- Fill the pots 3/4 full with the soil from their bags.
- Allow students to choose and plant one type of seed in their container. Plant 4 - 5 seeds at a depth of 1 1/2 - 2 times the seed's diameter in each container. Place the containers on a sunny windowsill and water well. Check them daily. Keep the soil evenly moist, but not too wet. Some soils will dry out more quickly than others. Ask students why this happens.
- Students should keep daily records with information such as type of soil, type of seeds, amount of water added each day, date seeds germinate, etc.
- Once seeds germinate, watch them closely. Measure the amount the seedlings grow each day. Graph daily growth.
- Are the seedlings in different types of soil growing differently?
- After two or three weeks, terminate the experiment. Have students make final observations and conclusions about their soil and seedlings. Allow each student the opportunity to share his or her findings with the class. Have the students conclude which soils were better for growing seedlings.

### ADDITIONAL IDEAS:

- Contact your local Soil and Water Conservation Service and ask them to come to class with soil samples and soil type maps from your area.
- Combine the students' soil and make an earthworm bin for your classroom. You can purchase worm bins that provide all materials, including the worms, or you can construct your own. Using a large, shallow, plastic storage container with a top or a small aquarium add layers of the students' damp garden soil, sand/straw and finish with a thick layer of

leaves or vegetable scraps. Add 10 – 20 earthworms on top. Earthworms can be brought in from the garden or purchased from a local bait shop. If purchasing, Red Wigglers are the best earthworms to use in earthworm bins. Cover the container with a lid. Be sure the lid has some small holes to allow air to circulate (but not big enough to allow worms to escape). If your bin is clear, store it in a dark cupboard or cover with thick dark paper and store in a cool place. The bin should be kept damp but not wet. Add uncooked vegetable scraps (finely chopped) and shredded newspaper to the soil weekly. Students should observe the earthworm bins daily to understand how earthworms help decompose organic material. The worms eat the organic material and produce ‘worm castings’ or droppings. While moving through the soil they aerate it and help mix it up. This mixing and aerating can be seen more easily when worm bins are set up in aquariums or other clear containers.

- Make “Dirt Pudding” by layering the following ingredients in clear plastic cups so students can observe edible soil profiles.

- 1/4” crumbled vanilla cookies
- 1/2” vanilla pudding
- 1/4” graham crackers
- 1/2” butterscotch pudding
- 1/4” chocolate cookies
- 1 gummy worm
- 1/2” chocolate pudding

Sprinkle with shredded coconut (either toasted or dyed green to represent grass). This will help students understand layers of “soil and rocks” in their own dessert. Before eating the “dirt,” students should draw a soil profile of their dessert, showing the different layers.

## **Web Site Information for Teachers:**

### **Soil and Water Conservation Society**

<http://www.swcs.org>

This web site has links to individual Soil and Water Conservation regions and chapters, as well as links to resources of interest to students and teachers.

### **The Worm Digest**

<http://www.wormdigest.org>

A quarterly newspaper reporting on worms and worm composting.

### **The Autobiography of Squirmin’ Herman the Worm**

<http://www.urbanext.uiuc.edu/worms>

An interactive resource to help kids learn about worms and the role they play in our lives.



## LESSON 7: Fewer Farmers... Greater Production

**Objective:** Students will understand the importance of machinery on today's farms and changes brought about by the U.S. industrial revolution.

### Curriculum Connection:

Language Arts (reading, writing, speaking)  
History (time lines)

### Books:

**Mighty Machines TRACTOR**, Claire Llewellyn, DK Publishing  
**Eye Witness Books, FARM**, Ned Halley, DK Publishing  
**On the Farm (Machines at Work)**, Henry Arthur Pluckrose, Franklin Watts, Inc.

**Farming: Copyright-Free Illustrations for Lovers of History (Historical Etchings, Bobbie Kalman)**, Crabtree Publishing

### Materials:

Paper  
Pencils

## PROCEDURES:

- Review with students the images of farm practices and equipment from the USDA Economic Research Service's History of American Agriculture 1776-1990, with updates for 1990-1997. The information is available at <http://www.usda.gov/history2/back.htm>. The same information is available in poster format from the USDA for \$30 plus \$5 for handling. (Call 1-800-999-6779. Ask for ERS-POST-12).
- Discuss changes in machinery from the 18th Century through the 20th Century and how farming is different today compared to 200 to 300 years ago. Compare horses or oxen pulling farm equipment with tractors and other farm machinery. How do machines make a difference in farmers' lives today? Invite a farmer to visit the class and discuss his or her perspective of changing agricultural equipment and technology.
- The time line information and images can be copied and put on individual cards or pieces of construction paper. Each student or group of students may have a set. Have them arrange the cards in chronological order. To make it more challenging, put images and information on the front of the cards and dates on the back, or make the cards without dates.

## ADDITIONAL IDEAS:

- Bring a farm tool to class that isn't readily known by your students. Have them write words to describe the tool and how they think it was used. Have students volunteer to read their ideas aloud.

- Using a different tool, have students create an oral story. The teacher should start the story, “Once upon a time...” and stop midway through a sentence. Hand the tool (if it’s small enough) to a student, who will finish the teacher’s sentence and add approximately another sentence and one half. Acting as a monitor, the teacher will stop students in the middle of a sentence. Select students randomly to continue the story, handing each one the tool as he or she speaks. By choosing students at random, everyone will listen more closely because they won’t know when it will be their turn to continue the story.

### **Web Site Information for Teachers:**

#### **A History of American Agriculture 1776-1990 by USDA**

<http://www.usda.gov/history2/back.htm>

Highlights of key events in agricultural history in the categories of: economic cycles; farm economy; farmers and the land; farm machinery and technology; crops and livestock; transportation; agricultural trade and development; life on the farm; farm organizations and movements; agricultural education and extension and government programs and policy.

#### **Equipment** by Kids Farm

<http://www.kidsfarm.com/equipment.htm>

This section features photos and information on the farm uses of hay balers, front-end loaders, tractors, swathers, trucks and rakes.

#### **History of Tractors** by SSB Tractor

<http://www.ssbtractor.com/features/index.html>

Offers a photo history of the progressive development of tractors manufactured by Ford and Massey Ferguson. Also a good resource for photos, specifications and prices of more recently manufactured farm implements.

#### **Agriculture — A Look Back** by Norbest, Inc.

<http://www.norbest.com>

Highlights of U.S. agriculture from the 1600s to the 1990s, including information on developments in farm equipment, declining U.S. farm population and increasing annual value of U.S. agricultural exports.





## LESSON 8: If I Were a Farm Kid

*Objective:* Students will gain an understanding of life on a farm by putting themselves in the role of a farm kid.

### Curriculum Connection:

Language Arts (writing and reading)  
Study Skills (research)

### Book List:

**Farmer Boy**, Laura Ingalls Wilder  
**A Pioneer Sampler, The Daily Life of a Pioneer Family in 1840**, Barbara Greenwood, Houghton Mifflin Co.  
**The Farm, Life in Colonial Pennsylvania**, James E. Knight, Troll Association  
**Century Farm**, Cris Peterson, Boyds Mills Press  
**Growing Seasons**, Elsie Lee Splear, G.P. Putnam's Sons  
**Pioneer Farm: Living on a Farm in the 1880s**, Megan O'Hara, Blue Earth Books

**Materials:** Library books about farming  
Paper and pencils or pens

### PROCEDURES:

- Have students read a book from the book list or research U.S. family farms in early eras, focusing on the children who lived on farms and things they did.
- Once they have finished reading and/or researching, have students imagine they are farm kids during those particular times. Students should write a week's worth of daily journal entries or schedules of their farm activities.
- Using their journal entries or schedules as a guideline, have the students write a short story about life on their particular farms.
- How has life changed for farm kids from earlier times to the 21st Century? What changes have taken place in the past 200 years that have affected farm kids' lives?
- To find out about life on a 400-acre Minnesota farm with corn, soybeans, hogs and Rambouillet sheep, have students send questions via e-mail or letter to Brent and Derek Meshke, the boys in the "Ten Things Kids Want to Know About Farming" video. Derek and Brent can tell about daily routines, chores, favorite things about living on a farm, etc. The Meshke's mailing address is 51497 169th Street, Lake Crystal, MN 56055 or they may be reached by e-mail at [twofarmkids@yahoo.com](mailto:twofarmkids@yahoo.com)

## ADDITIONAL IDEAS:

- Divide the class into several groups and have the students portray farm kids from different centuries for an audience of parents or a class of younger students. Have the audience ask questions about life on a farm. Note: Teachers may want to write questions on index cards and give to guests to ask the farm kids. Questions may be presented to the farm kids beforehand, so they can prepare answers. For added effect, have farm kids dress appropriately for the historical period they represent.

## Web Site Information for Teachers:

### The Farm School

<http://www.farmschool.org>

Each year 1,400 school children join farmers and naturalists on this family farm for three-day programs. Here they find value in real work, create community that persists when they return to their classrooms and experience first hand what it means to be a steward of the earth.

### Picture This by Michigan Department of Agriculture

<http://www.mda.state.mi.us/kids/pictures>

Kids tell about their experiences on a part-time farm, a dairy farm, a maple syrup operation and with backyard gardens.

### Farm Life Live by Ag Day

<http://www.agday.org/tc/tc-farmlife.html>

Farm families and their children share real life experiences about farm and ranch life in the United States. Families will answer e-mail questions.

### Living History Farms in Urbandale, Iowa

<http://www.ioweb.com/lhf>

Photos and highlights of historical working farms, including the 1700 Ioway Indian village, 1850 pioneer farm and 1900 horse-powered farm.

### George Washington, Pioneer Farmer

<http://www.mountvernon.org/pioneer>

At this site, you will learn more about George Washington's life as a farmer at Mt. Vernon.



## LESSON 9: How Many Cows?

**Objective:** Students will determine how many cows are needed to provide milk for their class, grade level, school and their family.

### Curriculum Connection:

Math (charts, graphs, calculation, conversion)

**Book List:** **Cow**, Jules Older, Charlesbridge Publishing  
**Cows (A True Book)**, Sara Swan Miller, Children's Press -  
A Division of Grolier Publishing  
**Milk Makers**, Gail Gibbons, Atheneum  
**Milk: From Cow to Carton (Let's Read-And-Find-Out Book)**,  
Aliki, Harpercollins Juvenile Books  
**Extra Cheese, Please**, Cris Peterson, Boyds Mills Press  
**Morning Milking**, Linda Lowe Morris, Picture Book Studio  
**Hooray for Dairy Farming!**, Bobbie Kalman, Crabtree  
Publishing

**Vocabulary:**

- Dairy - a farm devoted to the production of milk
- Cattle - there are two types of cattle: a) dairy cattle, which are kept for milk production; b) beef cattle, which are kept for meat production
- Homogenize - to break up the butterfat particles found in milk to make it creamy. If milk was not homogenized, the cream would rise to the top and you would have to stir or shake milk before drinking.
- Pasteurize - in 1856, the French scientist Louis Pasteur discovered that heating liquids to high temperatures kills bacteria. Pasteurization protects the purity and flavor of milk.

**Materials:** Measuring cup  
Half pint milk carton  
Pint milk carton  
Quart milk carton  
Half gallon milk carton  
Gallon milk carton  
Graph paper  
Pencils

**PROCEDURES:**

- Discuss and compare cups, pints, quarts and gallons. How many cups are in one half pint? Pint? Quart? Half gallon? Gallon? How many half pints (the common size for milk cartons in school cafeterias) are in one pint? Quart? Half gallon? Gallon? How many pints are in a quart? Half gallon? Gallon? How many quarts are in one half gallon? Gallon? Divide the class into groups and let them answer these questions using milk cartons and water. This may be a fun activity to do outside on a sunny day.
- Show the gallon container to the class. The average dairy cow gives eight to ten gallons of milk in one day. If possible, show eight to ten one gallon containers at one time, allowing students to see exactly how much milk the average dairy cow gives in one day.
- As a homework assignment, give each student a chart (see sample below) to keep a record of how many cups of milk he or she drinks each day (including all meals and snacks) for one week.
- Once students have kept their records, write these numbers on the chalkboard. Have students make a bar graph showing the amount of milk each student consumes in one week.
- Have students add the number of cups consumed for the entire class. How many cups of milk does your class drink on an average day? Convert total number of cups to ounces. Divide the total number of ounces by 132 to see how many gallons of milk the class drank in a day/week.
- How many gallons of milk does your class drink on an average day? Average week?
- Remember, the average dairy cow gives 8 – 10 gallons of milk each day. How many dairy cows are needed to provide milk for your class daily/ weekly?
- Students can expand this activity to include their grade level, their school and their family by challenging other classes to keep records and share their information; interviewing the cafeteria manager to find out how much milk is consumed in one day and one week, as well as keeping records at home.

**Amount of Milk Consumed**

1 cup = 1/2 pint or 8 oz.; 2 cups = 1 pint or 16 oz.; 2 pints = 1 quart or 32 oz;  
 2 quarts = 1/2 gallon or 64 oz.; 4 quarts = 1 gallon or 132 oz.

<b>Student Name</b>	<b>Mon.</b>	<b>Tues.</b>	<b>Wed.</b>	<b>Thurs.</b>	<b>Fri.</b>	<b>Sat.</b>	<b>Sun.</b>	<b>TOTAL</b>
Example: Jane	2 cups	1 cup	1 cup	2 cups	0 cups	1 cup	1 cup	8 cups/64 oz
<b>Total</b>								

## **ADDITIONAL IDEAS:**

- June is Dairy Month. Celebrate! Have Dairy Day for your class, grade level or the entire school. This could include inviting a guest speaker(s); hosting information tables about dairy products and nutrition or providing samples of a variety of dairy products. Provide dairy games and activities for the students. Involve your Parent Teacher Organization. If there is a local FFA Chapter or 4-H Club, involve them in your Dairy Day celebration.
- What other products are made from milk? Create a bulletin board or display case with photos or labels from clean dairy product containers.
- Visit a dairy farm in your area or ask a local dairy farmer to bring a cow or calf to your school for children to see.
- Make homemade ice cream dairy products. See recipes below.

### **Easy Outdoor Ice Cream Activity**

- 1 C. whipping cream
- 1 C. milk
- 1/2 C. sugar
- 1/2 t. vanilla

Put four ingredients into a 1 lb. coffee can. Put the lid on tightly with duct tape. Insert into a 3lb. coffee can. Pack ice entirely around the inside can and pour 3/4 C. rock salt on top of ice and tape can closed securely (duct tape would do nicely). Roll (kick) the can around the yard for 15-20 minutes and you'll have ice cream.

#### **Ice Cream in a Bag — Materials/Supplies:**

- 1 measuring cup
- 1 tablespoon
- 1 teaspoon
- rock salt
- milk
- vanilla
- ice
- sugar
- small cups and spoons for eating
- gallon ziplock freezer bags
- pint ziplock freezer bags

#### **In pint bag mix the following:**

- 1 cup milk
- 3 tablespoons sugar
- 1 teaspoon vanilla

#### **In gallon bag mix the following:**

- 2 cups ice
- 3 tablespoons rock salt

Place the sealed pint bag in the gallon bag and seal the gallon bag. Mix for about 15 minutes by gently turning and shifting and shaking so the smaller bag moves around in the ice. Open and enjoy!

## Homemade Butter

Heavy whipping cream

Glass jar with a lid

The more cream you use, the larger the jar should be. Use a small jar if you are just using 1/4 cup cream. Place the cream in the jar. Cover with the lid. Now, shake, shake, shake and shake! Keep shaking — approximately 15 minutes — until the cream turns into butter. Keep shaking until most of the buttermilk disappears. Pour off any excess buttermilk. Dump the butter into a bowl. Mix in a pinch of salt. Get a nice fresh slice of bread or crackers and spread the homemade butter onto it! Does it taste different than the butter you buy from the store?

## Web Site Information for Teachers:

### Moo Milk — A Dynamic Adventure into the Dairy Industry

<http://www.moomilk.com/index.html>

Everything you want to know about cows and milk, including a virtual dairy tour and answers to frequently asked questions.

**Breeds of Livestock** by Dept. of Animal Science, Oklahoma State University

<http://www.ansi.okstate.edu/breeds/cattle>

Photos and information about the development of dairy cattle breeds of North America.

### Animal Industry Foundation Teacher Resource Guide

[www.aif.org](http://www.aif.org)

The guide is a diverse list of educational materials and supplements, some specifically designed for educators. Topics range from basic animal agriculture concepts to in-depth analysis of environmental concerns and animal well-being, to a wide-range of materials derived from animals.



## LESSON 10: Nature's Renewable Resources

**Objective:** Students will understand the basic functions of trees and recognize the many products that come from trees.

### Curriculum Connection:

Science (life science)  
Language Arts (writing)  
Study Skills (research)

**Book List:** **Trees**, Jonathan Pine, Harper Collins Publishers  
**Giants in the Land**, Diana Appelbaum, Houghton Mifflin  
**The Tree in the Wood**, Christopher Manson, North South Books

**Vocabulary:**

- Bark – the tough exterior covering of a woody root or stem
- Deciduous – plant that drops its leaves in the fall
- Evergreen – plant that stays green year round
- Foliage – the leaves or needles of a plant
- Fruit – the usually edible part of a plant that contains the seeds
- Limb – a large primary branch of a tree
- Log – a length of a tree trunk at least 6 feet long that is ready for sawing
- Nut – a hard-shelled dry fruit or seed
- Pulpwood – wood (aspen, hemlock, pine, or spruce) used in making pulp for paper
- Roots – the part of a plant, normally underground, that anchors the plant, absorbs water and dissolved minerals and carries these to the stem
- Sap – the fluid part of a plant; also known as resin or gum
- Sawdust – fine particles of wood made by a saw in cutting
- Stump – the part of a tree remaining attached to the root after the trunk is cut
- Trunk – the main stem of a tree apart from limbs and roots

**Materials:** Paper and pencils  
Tree identification books  
Magazines and newspapers with images of tree products

## PROCEDURES:

### Tree Inventory

- Take students for a walk around your school property or school neighborhood. Choose a tree to examine. Discuss its parts and their functions. Note: Teachers should identify trees beforehand. You may want to use a tree identification book from the library. Collect leaves, nuts, fruit,

etc. from these trees to help with identification. For additional assistance contact a local nurseryman, arborist, tree farmer or horticulturist.

- Have students draw a picture of the tree and label its parts.
- During the walk, make an inventory of the types of trees on the school property. How many of each? How many are deciduous and how many are evergreen?
- Research these trees. Under what conditions do they grow best?
- Allow students to collect and press leaves and needles. A thick telephone book or layers of paper towels and newspapers with books on top of them will work well as a plant press. Once the leaves and needles are dry, mount them on heavy paper with either craft glue or tiny pieces of clear tape. Label each specimen. The specimens can be made into a booklet or displayed on a bulletin board. Pressed leaves and needles as well as the fruits, cones and nuts make great mobiles for the classroom.

### **Tree Product Inventory**

- Conduct a survey inside of the school with the students. What products did they find that are made from trees? Keep in mind that trees provide us with food and wood products we see every day, including school books and notepaper, chemicals, arts and music equipment, sports and recreation equipment.
- Have students do the same thing at home.
- Collect images from magazines, newspapers or the Internet of products made from trees. For additional interest, have students bring items to share that come from trees.
- Have students compile these lists and images for a bulletin board or display case. Divide the lists into the categories that are listed earlier in the procedures.

### **ADDITIONAL IDEAS:**

- If your school doesn't already have your state tree planted on the property, make it a class project to plant one (or more). Raise money to purchase the tree or ask for assistance from your parent-teacher organization. Inquire with local nurseries about your state tree. Some nurseries may be willing to donate a tree if you mention their name on a plaque or in the school newsletter. Submit an article to the local newspaper (with photos) and mention the nursery and anyone else who assisted with the project.
- Have students research different state trees. Some of the following questions may help students get started. Do any other states share your state tree? What products do we receive from these trees? What do the trees look like?
- Have students find a tree on the school property or in the neighborhood that interests them. On a piece of paper, have them draw an outline of the tree (no details, just an outline.) On the opposite side of the paper, write



words that describe their tree. Now, use the descriptive words to write a short poem about their tree. Write the poem inside the outline of the tree that was drawn earlier.

- Have students make recycled paper from newspaper or tissue paper.
- Compare trees to the corn plants discussed in Lesson 4. How are they alike? How are they different?

### **Web Site Information for Teachers:**

**Kids and Educators** by American Forest & Paper Association  
<http://www.afandpa.org>

New technology allows nearly all of a tree to be used with little waste. In fact, today more than 5,000 things are made from trees. More information for kids and educators is available at this site.

**Arbor Day** by National Arbor Day Foundation  
<http://www.arborday.org>

The people's choice for America's National Tree was revealed on National Arbor Day Friday, April 27, 2001 in a tree-planting ceremony on the capitol grounds in Washington, D.C. Find out what it is and see the National and State winning posters in the "Trees are Terrific... and Forests are Too" national poster contest at this site.

**Paper Making**  
<http://www.infostuff.com/kids/paper.htm>

**Project Learning Tree** by American Forest Foundation  
<http://www.affoundation.org>

This award-winning environmental education program is designed for educators working with students in pre-kindergarten through twelfth grade. PLT emphasizes teaching students how to think, not what to think, about environmental issues.

*Ten Things Kids Want to Know About Farming Teacher's Guide*  
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