"PLANT A SEED IN TENNESSEE"

FOURTH GRADE CURRICULUM

Draft

Tennessee Foundation for Agriculture in the Classroom
PO Box 313
Columbia, TN 38402

"Plant a Seed in Tennessee" Fourth Grade Curriculum
Draft -- June 2009

PREFACE:
The Tennessee Foundation for Agriculture in the Classroom was established to promote "agricultural literacy", or a greater awareness, understanding, and appreciation of agriculture's influence on our lives, to students throughout the state of Tennessee. The "Plant a Seed in Tennessee" Fourth Grade Curriculum is just one of the educational resource materials that is available to educators through the Foundation. This material is designed to enhance classroom studies and presentations and to supplement the basic school curriculum. In addition to these materials, training workshops for teachers and other programs are available through the Tennessee Agriculture in the Classroom program.

ABOUT THIS MATERIAL:
This is the first draft of the new Fourth Grade "Plant a Seed in Tennessee" curriculum. Due to the emphasis on math and language arts subject areas, we are trying a new format. Please keep in mind that it is ONLY a draft. There are many additions, corrections, etc... that have to be made.

Each lesson plan has been correlated to meet Tennessee Department of Education Curriculum Standards.

CONTACTS:
If you have any questions regarding this material or any other material or programs sponsored by the Tennessee Foundation for Agriculture in the Classroom, please contact:

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CALCULATING KERNELS

Math: GLE 0406.1.2
GLE 0406.1.5
GLE 0406.4.3
Writing: GLE 0401.3.2
Language Arts: GLE 0401.6.1

BRIEF DESCRIPTION:
Students estimate and measure using standard and non-standard units of measurement.

LEVEL:
Fourth Grade

SUBJECT:
Language Arts, Math

SKILLS:
Estimating, Measuring, Calculating, Writing, Reporting

OBJECTIVES:
The student will:
- measure diameter using standard and non-standard units of measurement.
- measure circumference using standard and non-standard units of measurement.
- measure length using standard and non-standard units of measurement.
- measure height using standard and non-standard units of measurement.
- estimate units.

ESTIMATED TEACHING TIME:
45-60 minutes

Calculating Kernels

Materials:

- Popcorn kernels
- Field corn kernels
- Calculating Kernels worksheet (1 per student)
- Rulers (1 per student)
- 3 identical jar lids
- 4 school milk cartons
- Calculating Kernels Station Direction Cards - Run on cardstock and fold in half to form "tent" stand up directions

Procedure:

1. Teacher should prepare the following estimation stations in the classroom. Copy the Calculating Kernels Station Direction Cards on cardstock and place them at the stations.
   a. Display a jar lid with the diameter marked and a few kernels. How many kernels laid end to end would it take to measure the diameter of the lid?
   b. Display a jar lid with the circumference marked and a few kernels. How many kernels laid end to end would it take to measure the circumference?
   c. Display a jar lid and a few kernels. How many kernels would it take laid next to one another to cover the lid?
   d. Display a regular milk carton (any size) and a few kernels. How many kernels, laid end to end, would it take to measure the length of one side?
   e. Display a regular milk carton with the top section cut off and a few kernels. How many kernels, laid end to end, would it take to measure the height of the carton?
   f. Display a regular milk carton and a few kernels. How many kernels, laid end to end, would it take to measure

the whole way around the outside of the milk carton?

g. Display milk carton with the top section cut off and a few kernels. How many kernels would it take to cover the bottom of the carton with one single layer?

2. Show students a bag of popcorn kernels. Ask students, "What can we use these for?"
3. Explain that the popcorn kernels will be used as a unit of measurement.
4. Ask students, "What does it mean to estimate?"
5. Give students a popcorn kernel, "Calculating Kernels" worksheet, and a ruler. Ask students, "How many popcorn kernels, laid end to end, would equal an inch? Students record estimation on "Calculating Kernels" worksheet.
6. Record the class estimates. Have students use popcorn kernels to determine how many kernels equal one inch. Record results on "Calculating Kernels" worksheet.
7. Divide students into 7 groups. Assign each group to a starting station, and have students record their estimations as they rotate around the stations.
8. When all groups have completed their estimations, have groups complete the stations again. This time students use the popcorn kernels and rulers to complete and record the actual popcorn kernel measurements and measurement in inches.
9. Discuss student estimations and actual measurements.
10. Give students several "field corn" kernels. Have students predict if measurements will be greater or less using this unit of measure.
11. Allow students to complete centers again, using "field corn" kernels to complete the measurements. Record "field corn" kernel measurements on "Calculating Kernels" worksheet.
12. Collect "Calculating Kernels" worksheet to determine student effectiveness at estimation.
13. Have students write to explain:
    How they made their estimations
    Why they got different answers using popcorn and field corn kernels
    Why we use standard units of measurement (like inches) instead of nonstandard units of measurement (like corn kernels).

Extensions:

1. Read Popcorn by Elaine Landau (ISBN # 1-57091-443-5)
2. Math - The volume of popcorn kernels and popped popcorn is drastically different
   a. Display 2 jars, one with popcorn kernels and the other with an equal amount of popped popcorn. Ask students, "Which jar has more pieces of popcorn?" Have students count and discuss the difference in volume of kernels and popped popcorn.
   b. Students weigh the popped and unpopped kernels to determine if there is a difference in weight as well.

Name _____

CALCULATING KERNELS

Estimated number of kernels to equal one inch? _____

Actual number of kernels to equal one inch? _____

	Estimated number of popcorn kernels	Actual number of popcorn kernels	Difference (+ or -)	Inches	Actual number of field corn kernels
Station One					
Station Two					
Station Three					
Station Four					
Station Five					
Station Six					
Station Seven					

Station Eight: Which of your estimates was closest to the actual number? Why do think this happened?

A. How did you decide what estimates to make for the popcorn kernels?

B. Why did you get different answers using popcorn kernels and field corn kernels?

C. Is it possible to get different answers using just popcorn kernels? Why?

D. Why do we usually use standard units of measurement instead of nonstandard units of measurements?

Station One:
How many kernels, laid end to end, would it take to measure the diameter of this lid?

Station Two:
How many kernels, laid end to end, would it take to measure the circumference of this lid?

Station Three:
How many kernels would it take, laid next to one another, to cover this lid?

Station Four:
How many kernels, laid end to end, would it take to measure the length of one side?

Station Five:
How many kernels, laid end to end, would it take to measure the height of the milk carton?

Station Six:
How many kernels, laid end to end, would it take to measure the whole way around the outside of the milk carton?

Station Seven:
How many kernels would it take to cover the bottom of the carton in a single layer?

Station Eight:
Which of your estimates is closest to the actual number? Why do you think this happened?

GERMINATION OBSERVATIONS

Science: GLE 0407.Inq.1
GLE 0407.2.1

BRIEF DESCRIPTION:
Students will learn the importance of soil, water, air, and solar energy to the agriculture industry and the interrelationship of agriculture with the environment. Students will germinate seeds under a variety of conditions.

LEVEL:
Fourth Grade

SUBJECT:
Science

SKILLS:
Analyzing, Investigating, Reasoning, Thinking Creatively, Identifying, Describing, Observing, Predicting

OBJECTIVES:
The student will:
- arrange the steps of a scientific problem in the proper sequential order
- experiment with various growing medium, light conditions, and plants
- determine the proper procedure to use in an experiment

ESTIMATED TEACHING TIME:
60 minutes

GERMINATION OBSERVATION

Archaeologists believe that in many prehistoric cultures, gardening was a woman's specialty. Most men had to spend their time away from home-hunting or working in fields far away. Women, however, stayed close to home to care for the children. Because they spent so much time in one place, women got to know the plants growing in the areas surrounding their homes. Often they would spend part of each day collecting plants. They would experiment with the plants until they discovered what plants were best to use for what purpose. Strong grasses could be woven into baskets. Large gourds could be dried and used for carrying water and other things. Some plants were good for taking the sting out of insect bites; others helped ease an upset stomach or a headache.

Eventually some people began cultivating small gardens. They would prepare small plots near their encampments by clearing out unwanted plants and cultivating the soil with digging sticks. Then they would go out and dig up the plants they found most useful and transplant them to their plots. Some of the plants were easier to transplant than others. Some would survive better if they were transplanted in the spring. Others would do better in the fall. Some grew best from seeds. Others were best transplanted as seedlings.

Today, we can go to the store to buy all the things the first gardeners had to grow themselves. Despite that fact, gardening has continued over the centuries to be a favorite pastime among women and men, young and old. Home gardening today is America's number one hobby. In 1987 Americans spent $896.2 million on bedding plants, mostly of the flowering type.

Home gardening is very popular in Tennessee. A large number of people tend flowers and grow vegetables. Some have large gardens on rural acreages where they grow enough corn,

squash, beans and other vegetables to feed their families for several months. Many Tennessee gardeners live in cities and have only small yards with flower beds and small garden plots.

Materials Needed:

- Potting soil
- Vermiculite
- Peat moss
- Sand
- Other potting medium
- Assortment of vegetable and flower seeds
- Empty egg carton (one per student)
- Empty, clean milk carton (one per student)
- Germinating Seeds Observations worksheet
- Sprouting Seeds Observations worksheet

Procedure:

1. Ask parents to donate the materials needed. Have each student bring an empty egg carton from home. Ask the school cafeteria for empty, clean milk cartons.
2. Share background material. Review germination and the basic steps of scientific method. Discuss the difference between a control group and a test group and the role of variables in an experiment.
3. Have students list the conditions necessary for plants to grow. Explain that prehistoric people had to experiment over thousands of years to discover the best techniques for growing the plants they needed to fill their needs. Ask the class to develop three or four hypotheses having to do with germination, and write them on the chalkboard. Some possible hypotheses are:
    a. Plants need light to germinate.
    b. Plants need moisture to germinate.
    c. Plants germinate best in peat moss, compost, potting soil (depending on what materials you have available).
    d. Large seeds sprout more quickly than small seeds.
4. Divide the class into groups of four or five, and assign one hypothesis to each group.
5. Show the class the available materials. Have each group determine what materials it will need to carry out its experiment and what procedure to follow. Hand out student worksheets and have students use them to record what materials they used, what procedures they followed, what they predict will happen and what they observed.
6. After five days, have students report on their results and come up with classroom procedures for germinating seeds, based on their results. Then have them repeat the experiment, using the classroom procedures.
7. After seedlings have developed two true sets of leaves, have students transplant them to milk cartons saved from the cafeteria. Keep the plants in the classroom and allow students to chart growth, or send them home for transplanting there.
8. Were students successful in formulating and testing hypotheses?

Resources:

Books to accompany the lesson

Bates, Jeffrey, Seeds to Plants: Projects With Biology, Watts, 1991.
Bjork, Christina, Linnea in Monet's Garden, Farrar, Straus and Giroux, 1991.
Burnie, David, Plant, Eyewitness Books, Knopf, 1989.
Cole, Henry, Jack's Garden: ISBN 0-688-13501-3.
Stewart, Sarah, The Gardener: ISBN 0-374-32517-0
Walker, Lois, Get Growing, John Wiley & Sons, 1990.

Additional resources to accompany lesson

"Digging for Data," National Cattlemen's Beef Association, Education Dept., 444 N. Michigan Ave., Chicago, IL 60611, l-800-368-3138 (22-minute live-action video designed to help students understand the scientific method and the skills scientists use when they investigate questions, includes teacher's guide with background information, reference sheets and blackline masters for student activities, Code #17-806, $9.95).
Grow Lab: A Complete Guide to Gardening in the Classroom, National Gardening Association, 180 Flynn Ave., Burlington, VT 05401,802-863-5962.

Extension:

1. Arrange for a tour of a local greenhouse, or invite a greenhouse worker to visit your classroom to explain greenhouse operations there and answer students' questions.
2. In the spring instruct students to visit a greenhouse or other source of bedding plants and list all the varieties of flowers and vegetables they can find.
3. Have students interview a greenhouse operator about what flowers and vegetables sell best in your area.
4. Have students research the difference between annual, biennial, and perennial plants.
5. Have students interview local gardeners to find out why they like to garden and what plants are their favorites? Do they garden mostly with annuals or perennials? Why? Do they grow plants from seed or purchase bedding plants? Why?
6. Invite a landscape architect to your class to discuss plants that are native to Tennessee.

Name _____

GERMINATING SEEDS OBSERVATIONS

Use the space below to record your experiments in germinating seeds.

QUESTION (problem statement) _____

_____

Materials used:

Kinds of seed(s) _____

Planting medium _____

Other materials _____

Hypothesis (prediction) _____

Procedures (Write down your group's plans for conducting this experiment.)

Seed group 1 _____

_____

Seed group 2 _____

_____

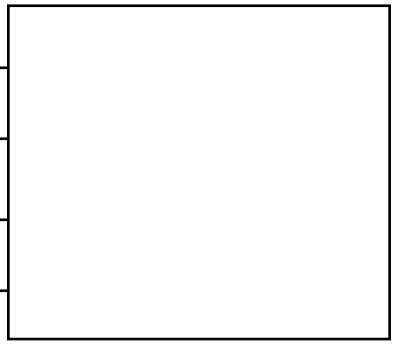
Observations (Write and draw what you see.)

Seed group 1 _____

_____

Seed group 2 _____

_____



Conclusion (Write what you learned.) _____

_____

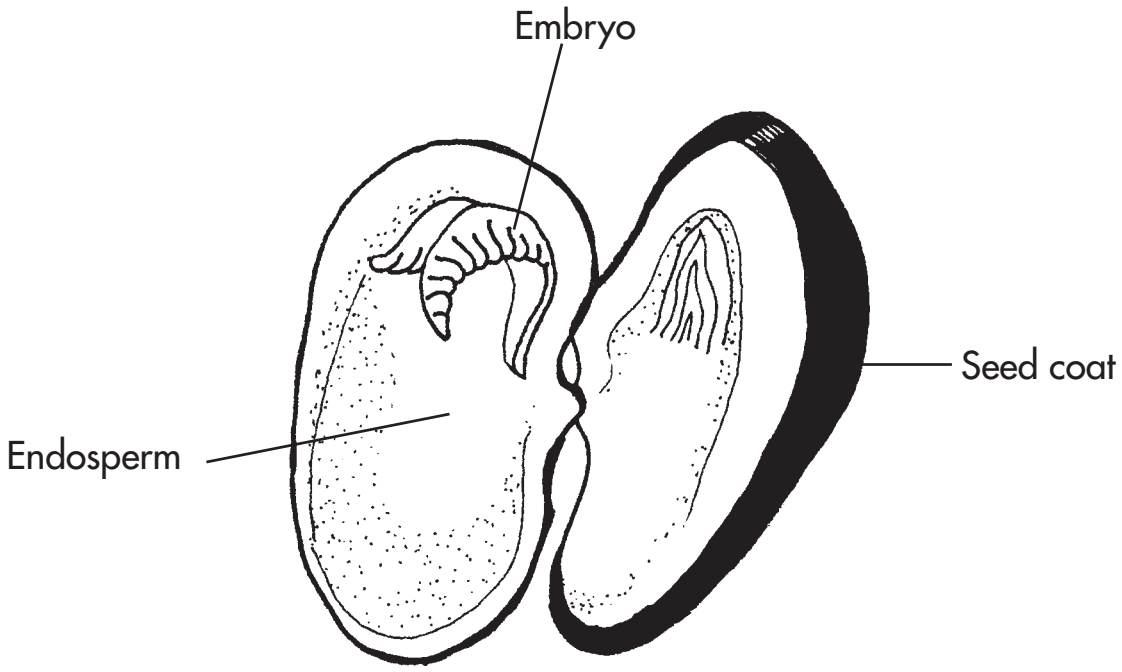
Name _____

SPROUTING SEEDS OBSERVATIONS

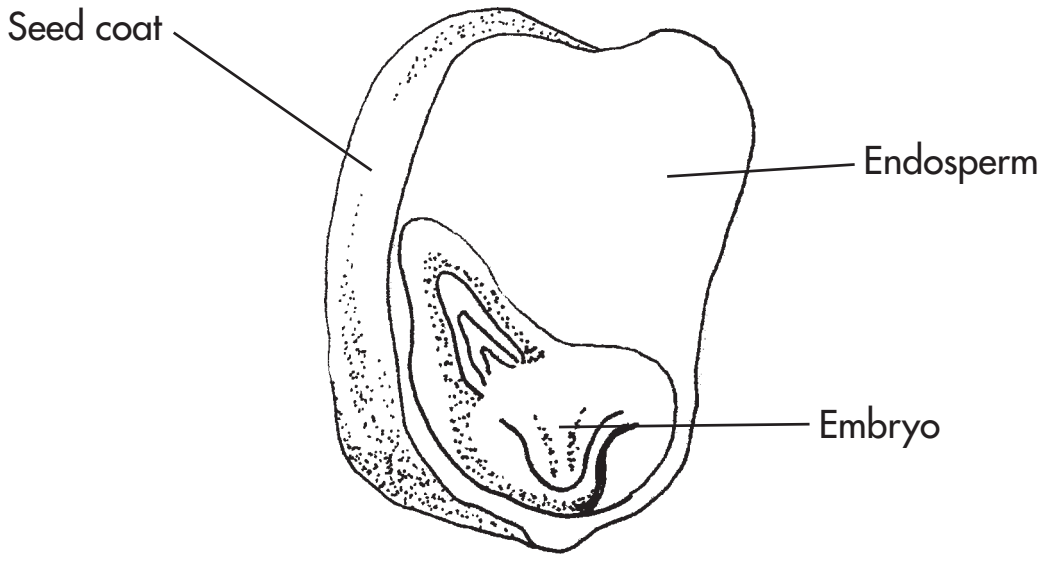
Use the space below to record your experiments in germinating seeds.

Days after seeds were sown	Number of seeds sprouted in **Seed Group 1**	Number of seeds sprouted in **Seed Group 2**
Day 1		
Day 2		
Day 3		
Day 4		
Day 5		
Day 6		
Day 7		
Day 8		
Day 9		
Day 10		

PARTS OF A SEED



Dicot (plant with 2 cotyledons)



Monocot (plant with 1 cotyledon)

Credit: Project Food, Land & People - "Parts of a Seed"

COME INTO MY PARLOR

Language Arts:
GLE 0401.6.1
Math:
SPI 0406.5.1

One of the dairy operator's most important jobs is keeping everything very clean. That is the only way to make sure bacteria doesn't get into the milk and cause it to spoil. The invention of the milking machine made it possible for the dairy operator to milk quickly and to keep everything cleaner than ever before. Not only was this more sanitary, it also cut down on the dairy operator's work.

Before the invention of the milking machine, cows were milked by hand in the same stalls where they ate and slept. By the early 1930s dairymen began to set up special rooms just for milking. Experts explained that with the milking machines, dairy operators were moving the cows "from the bedroom to the parlor." Back then, the parlor was the name for a fancy room in the house that served as a showplace of a family's wealth. Furnishings, pictures and decorations in the parlor were quite fancy.

As news of the automated milking machines spread, people from the surrounding communities began to ask if they could come watch. More and more people became interested, and spectators even started coming in from large cities. Non-farm families found the process very interesting. Some would take a day and make an outing of watching the cows being milked.

Dairy operators began selling the fresh milk to the spectators. Soon they realized this was a great way to sell more milk. Some dairy operators built nice rooms with large glass windows, so visitors could watch in comfort. The room could be as elaborate as the dairyman could afford. It might have chairs in which the visitors could sit and a dairy bar from which the visitors could purchase cream, butter and fresh milk. Since the rooms were as nice as most people's parlors, they came to be called "milking parlors."

Adapted from Oklahoma Ag in the Classroom - "Come into My Parlor"

BRIEF DESCRIPTION:
Students will learn about the social system that surrounds an agricultural community, including history and cultural significance. Students will interpret various pictorial sources of information such as maps, graphs, charts, globes, pictures, and cartoons.

LEVEL:
Fourth Grade

SUBJECT:
Math, Language Arts

SKILLS:
Analyzing, Reasoning, Interpreting, Reading

OBJECTIVES:
The student will:
- interpret a map scale
- measure space in a diagram
- calculate distances

ESTIMATED TEACHING TIME:
60 minutes

COME INTO MY PARLOR

Materials Needed:

- Come Into My Parlor story page
- Milking Parlor Plan Diagram
- Come Into My Parlor worksheet

Procedure:

1. On a traditional map, review the process of using a map scale to calculate distances.
2. Share background information.
3. Hand out the student worksheets. Read the information in the box with students. Go over directions, and have student complete the questions on an individual basis or as a group.

Extensions:

1. Have students draw an aerial view of their classroom. Decide what scale measurement you will use to reflect the size of the classroom. Make a legend key to represent certain items in the room.
2. Have groups of students choose a room to measure in the school or a route from the classroom to a designated place. Have students use tape measures or yardsticks to measure the exact distance. Then have them create aerial maps of the room or path, using a scale measurement.
3. Invite an architect to the classroom to show blueprints and explain their purpose.
4. Have students research the history of milk delivery.
5. Treat students to "Yummy Yogurt Pops" (recipe follows) after they have worked hard on their map skills.

   Mix two 8-ounce cartons of strawberry yogurt and a 10-ounce package of frozen strawberries, thawed, in a small bowl. Fill ten 3-ounce cold drink cups 1/2 to 2/3 full. Place the cups in the freezer for about one hour. Insert wooden popsicle sticks. Freeze completely. To serve, peel off the paper cups. Makes 10 pops. Use different kinds of yogurt and fruit for a variety of flavors.

Resources:

Books to accompany lesson

Cole, Ann, I Saw a Purple Cow and 100 Other Recipes for Learning, Little, 1972.
Macaulay , David, Black and White, Houghton Mifflin, 1990.
Ross, Catherine, The Amazing Milk Book, Addison-Wesley , 1991.

Additional resources to accompany lesson

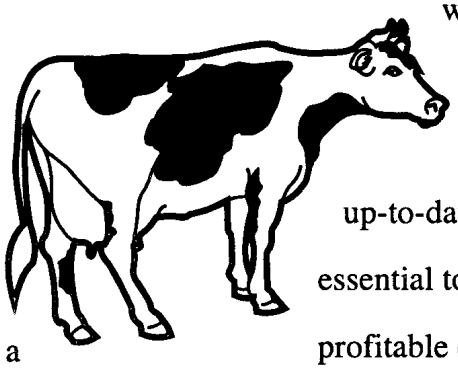
"A Calf Grows Up," Perceptions, Inc., RR 1, Box 1590, Charlotte, VT 05445 (35-minute video and teacher's guide with reproducible pages about the story of dairy farms for grades 4-6, includes recipes, activities and lessons in science, history, and careers, video, $29.95, teacher's guide, $7).
Associated Milk Producers, 1700 N. Sooner Road. Oklahoma City, OK 73112,405-427-6581.
National Dairy Council, 6300 N. River Rd., Rosemon, IL 60018.
"Nutrition Unit: Big Ideas, Secret of Success," Associated Milk Producers, 6240 E. 15, Tulsa, OK 74112,918-835-6933 (free for grades 4-5).

Name _____

Come Into My Parlor

Most dairies are automated. Gates open and close without the aid of humans and even assist in moving animals along. The map on Student Worksheet B is the floor plan for a style of milking parlor called a "Double Three Milking Parlor." In milking parlors designed in this style, the cow herd is trained to enter the holding area on the east side of the building. Each cow ambles into one of the two alleys and enters a prep stall one at a time. In the prep stall, sprays of warm water clean and stimulate the cow's ***udder.*** This pre-milking routine is a vital step in the milking process. It helps increase milk-flow and maintains a healthy udder. After the pre-milking routine is complete, automated gates open, and the cow enters an unoccupied stall in the milking parlor. She munches on grains and ***silage*** while the dairy worker dries her udder and connects it to the milking machine. The milking machine can milk one cow in about five minutes. When milking is complete, the dairyman removes the milker, and the cow is allowed to leave through one of the two exit lanes in the parlor.

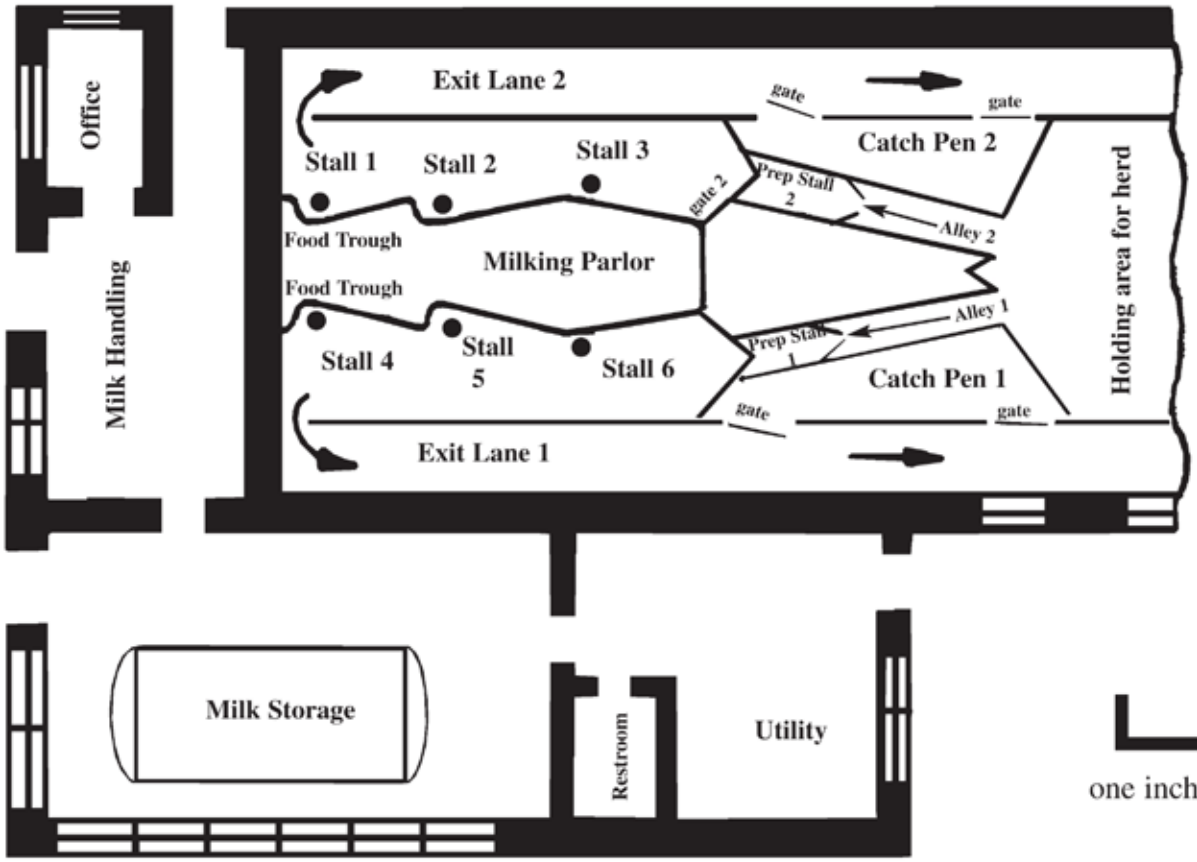
During the milking process, if the cow needs special attention (runny nose, lame foot) she is herded into one of the ***catch pens*** where the dairy worker can examine her and decide what type of medical treatment is needed.



An office with up-to-date information is essential to running a profitable dairy. The dairy operator must keep exact records on matters like milk production, feed and labor costs. Other rooms in the floor plan are used for milk handling and storage. Milk pumps housed in the handling room move the milk through a maze of pumps from the parlor to the storage tanks. All rooms in the parlor are kept extremely clean and cool to maintain a high standard of quality.

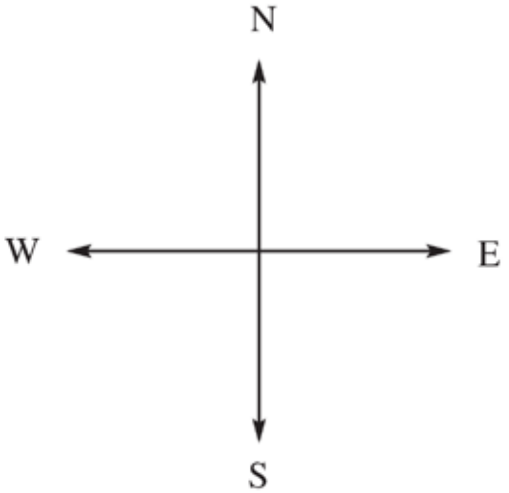
Name _____

Milking Parlor Map



Double 3 Milking Parlor Plan

Automated diagonal stall parlor with side milk-room and utility for one-man operation.



one inch = five feet

Name _____

Come Into My Parlor

Answer the following questions, using the map of the milking parlor and the scale printed on the map. One inch equals five feet on the map.

1. Exit Lane 2 is _____ feet long.

2. Move a cow from Prep Stall 1, on the south side of the parlor, to the food trough in Stall 4. Measure the distance in inches. What is the distance in inches?_____ Convert the inches to feet. What is the distance in feet?_____

3. The cow in Stall 2, on the north side, looks droopy and sick. You need to go to the office to check health records. How far is it? _____

4. The cow in Stall 4 and the cow in Stall 5, on the south side, are butting each other. Move the cow in Stall 5 to Stall 6 on the south side. Measure the distance from trough 5 to trough 6. How many feet? _____

5. A cow moves from the entrance to Alley 2 and to Stall 3. How far is that in feet?_____

6. Follow the wall of the milking parlor from the southeast corner to the southwest corner and measure the distance. _____feet

7. You need a wrench to repair a milk pipe. Measure from the doorway of the milk handling room to the doorway of the utility room. _____ feet

8. The milk storage room is in the _____ corner of the dairy building. (Use the compass rose.)

Come Into My Parlor (Answers)

Answer the following questions, using the map of the milking parlor and the scale printed on the map. One inch equals five feet on the map.

1. Exit Lane 2 is 25 feet long.

2. Move a cow from Prep Stall 1, on the south side of the parlor, to the food trough in Stall 4. Measure the distance in inches. What is the distance in inches? three inches Convert the inches to feet. What is the distance in feet? 15 feet

3. The cow in Stall 2, on the north side, looks droopy and sick. You need to go to the office to check health records. How far is it? 10 feet

4. The cow in Stall 4 and the cow in Stall 5, on the south side, are butting each other. Move the cow in Stall 5 to Stall 6 on the south side. Measure the distance from trough 5 to trough 6. How many feet? 5 feet

5. A cow moves from the entrance to Alley 2 and to Stall 3. How far is that in feet? 10 feet

6. Follow the wall of the milking parlor from the southeast corner to the southwest corner and measure the distance. 25 feet

7. You need a wrench to repair a milk pipe. Measure from the doorway of the milk handling room to the doorway of the utility room. 10 feet

8. The milk storage room is in the southwest corner of the dairy building. (Use the compass rose.)

MAKING PAPER

Science:
GLE 0407.2.1
GLE 0407.7.2

Writing:
GLE 0401.3.2

Health:
Standard 14; 14.2

BRIEF DESCRIPTION:
Students will learn the importance of soil, water, air, and solar energy to the agriculture industry and the interrelationship of agriculture with the environment. Students will develop skills and techniques in using a wide variety of art media, tools, and processes.

LEVEL:
Fourth Grade

SUBJECT:
Science, Language Arts, Health

SKILLS:
Analyzing, Reasoning, Illustrating, Sequencing

OBJECTIVES:
The student will:
- make paper from recycled paper
- observe the sequence of events in recycling paper
- use his or her student-made paper for classroom use

ESTIMATED TEACHING TIME:
45-60 minutes

Paper was first produced in China around 105 AD. Ts'ai Lun, a court official, figured out a way to make paper by shredding the bark of a mulberry tree and mixing it with scraps of linen and hemp. He added water and beat the mixture into pulp. He made a frame of bamboo, covered the bottom with cloth, and dipped the frame into the pulp. Then he let it dry until he could pull it off the frame in a sheet.

The cell walls in most plants are cellulose, the part of the plant from which paper is made. Most paper today is made from the cellulose of fast-growing trees like the loblolly pine grown in southern and middle Tennessee. First, the bark is striped from the trunk of the tree, then the trunk is chopped into small chips. The chips are cooked at a high temperature with chemicals and placed on a conveyor belt that travels through several machines. The machines wash the pieces several times to create clean pulp. More machines flatten and break apart the lumpy fibers. The paper is then pressed and dried into smooth, uniform sheets and sold in large rolls or reams.

Today, people in the United States use about 24 times as much paper as people in China, the country where paper was first produced. The United States is the largest producer and consumer of paper and paper products in the entire world. In 1990 each American used about 663 pounds of paper. By contrast, residents of China only used about 28 pounds each.

Paper is a renewable resource, but getting rid of all the paper we throw away has become a serious problem. Developing landfills that do not pollute the underground water supply is very expensive. Most of the garbage that goes into the landfill is paper. Recycling paper and using products made from recycled paper will help keep our landfills from filling up too fast. That way we can continue using our land for growing food and other purposes.

Adapted from Oklahoma Ag in the Classroom - "Making Paper"

MAKING PAPER

Materials Needed:

- India ink
- Making Paper directions sheet
- Feather handout to decorate
- Toothpicks (one per student)
- Markers or other materials to decorate the paper feather

Procedure:

1. Share background material.
2. Divide students into groups of four or five, and have each group follow the directions for making paper.
3. Hand out feather worksheet for students to decorate and make an imitation quill pen. Have students dip their imitation quill pens in India ink and use them to write on their class-made paper.
4. Were students able to connect their own paper-making to the real life process? Was there a change in the class' viewpoint on recycling paper and other products?

Extensions:

1. Have students use the paper they made for invitations or special occasion cards. Have them dress the paper up by adding perfumes or mixing different colors of tissue paper when creating the pulp, by adding confetti or colored thread to the pulp after it comes out of the blender or by laying leaves, flowers or other flat objects on the pulp before pressing.
2. Lead a discussion in which you ask students why we should be concerned that our landfills are filling up (loss of land for agricultural and other uses and the high cost to cities and counties of building and maintaining environmentally-safe landfills).
3. Invite the city or county official responsible for waste management in your area to your class to discuss problems with maintaining landfills and some of the costs involved.
4. The volume of paper in landfills prevents it from ever having contact with soil. Soils hold the microorganisms necessary to help break it down. Demonstrate this for students by filling one gallon jar with shredded newspaper and another gallon jar with half soil and half newspaper. Keep the contents of each jar moist, and have students observe which jar of paper decomposes faster.

Resources:

Books to accompany lesson

Delton, Judy, Pee Wee Scouts # 16, Trash Bash, Dell, 1992.
Dickinson, Jane, All About Trees, Troll, 1983.
Gackenbach, Dick, Mighty Trees, Harcourt, Brace, Jovanovich, 1992.
George, Jean Craighead, Who Really Killed Cock Robin? An Ecological Mystery, Harper Collins, 1991.

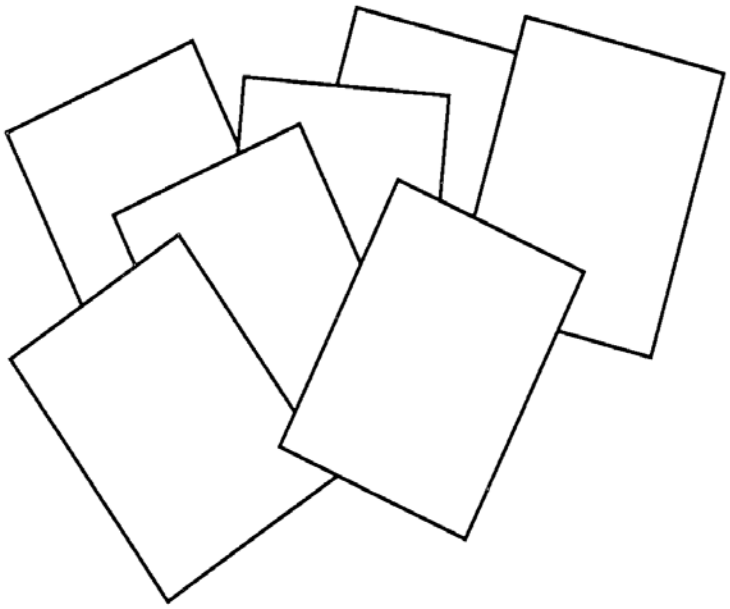
Additional resources to accompany lesson

"The Andirondacks: An Olympic First," New York Ag in the Classroom, 400 Kennedy Hall. Cornell University, Ithaca, NY 14853 (16-minute videotape for grades 4-6 shows trees as a renewable resource and discusses tree growth and replanting issues, $10 plus postage and handling).
"Grow Your Own Tree," The National Arbor Day Foundation, 100 Arbor Ave., Nebraska City. NE 68410 (educational kit).
"Trees are Terrific ," The National Arbor Day Foundation, 100 Arbor Ave., Nebraska City, NE 68410 (educational kit).

Making Paper Directions

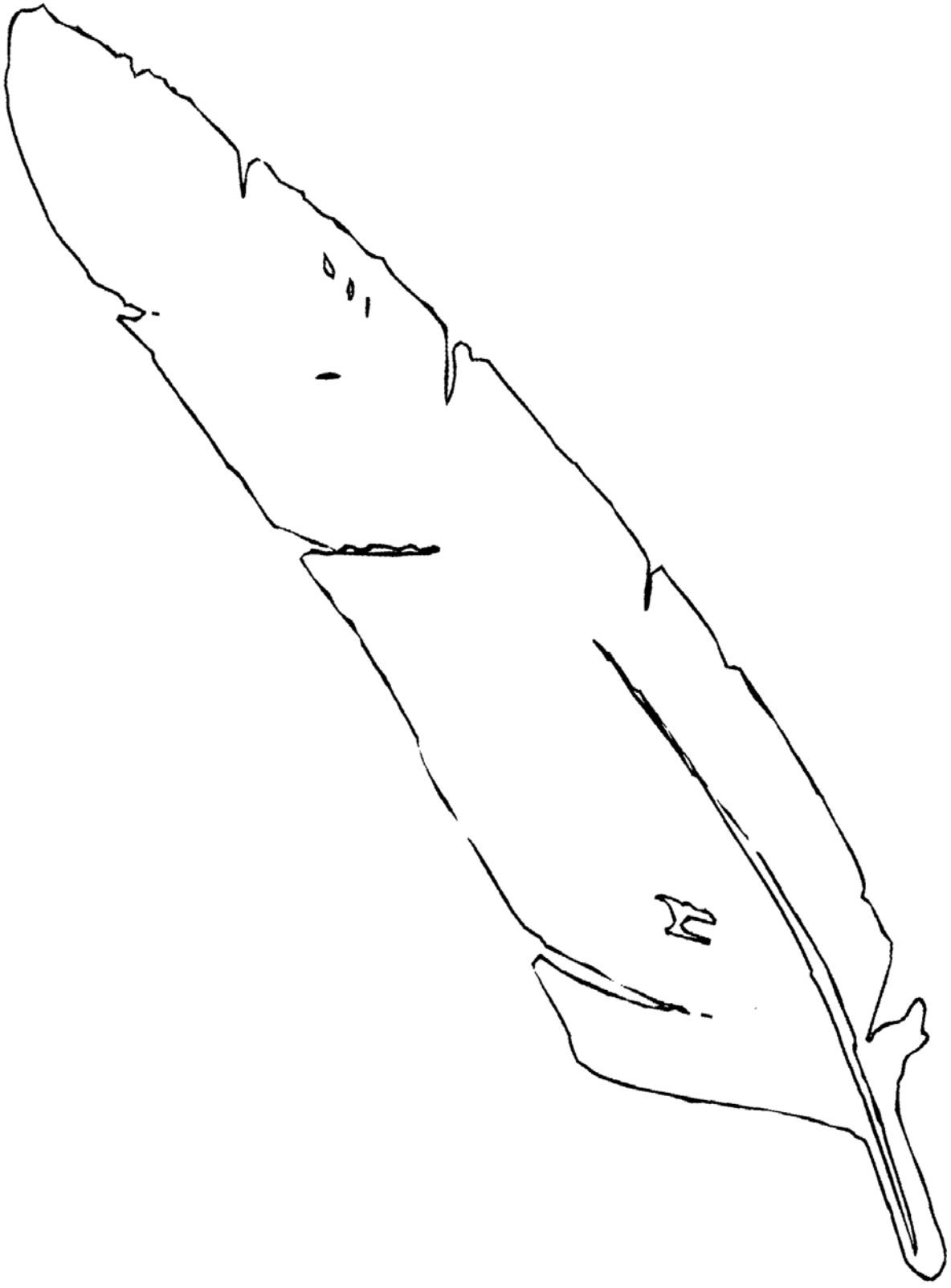
Materials needed:

- Jelly roll pan
- Non-rusting screen
- Large bowl
- Blender or egg beater
- Rolling pin or dry iron
- Newspaper
- Blotting paper
- Used tissue or newsprint
- Instant starch



1. Tear the used tissue or newsprint into very small pieces.
2. Measure 1/2 cup of the torn paper and two cups of hot water into a bowl or blender.
3. Beat the mixture with a blender or egg beater.
4. Mix in two teaspoons of instant starch to strengthen the paper. The pulp mixture should now be thick.
5. Pour the mixture into the flat pan.
6. Slide the screen into the bottom of the pan, and gently move it around until most of the pulp is on top.
7. Lift the screen out carefully, hold it level and let the excess water drain.
8. Place the screen, pulp side up, on blotter paper which has been placed on top of the newspaper.
9. Place another sheet of blotter paper on top of the pulp, and place more newspaper on top of that. This will form a sandwich to help press and dry the new paper.
10. Use a dry iron or rolling pin to help press and dry the new paper.
11. Carefully peel the newspaper from the top and the bottom of the sandwich.
12. Carefully peel the blotter paper from under the screen.
13. Flip the top blotter paper and the newly formed paper off the screen, and let it dry for 24 hours.
14. After 24 hours, carefully peel the new paper from the blotter paper, and use an iron to straighten and dry it.

Decorate the feather below, and cut it out. Tape a toothpick to the end of the quill, leaving a bit of the toothpick sticking out at the end. Dip this quill pen into ink and experiment with writing. Write your address or the alphabet. How difficult would it be if you were living in the 1700s and had to use pens like this one for writing letters and other things?



Tape toothpick here.

PLUMP IT UP

Math:
GLE 0407.9.1
Science:
GLE 0407.Inq.1

BRIEF DESCRIPTION:
Students use knowledge of how raisins are made by dehydrating grapes to conduct an experiment that investigates if raisins can be rehydrated.

LEVEL:
Fourth Grade

SUBJECT:
Math, Science

SKILLS:
Calculating, Illustrating, Measuring, Investigating, Weighing, Predicting, Observing

OBJECTIVES:
The student will:
- determine weight
- follow the proper scientific experiment procedures
- develop an hypothesis

ESTIMATED TEACHING TIME:
60 minutes

Materials Needed:

- Scale
- 10 grapes
- Box of raisins
- Water
- Scientific Investigation worksheet

Procedure:

1. Engage students by showing them grapes and raisins. Ask students, "which do you think weighs more?" Record student predictions on Scientific Investigation worksheet.
2. Weigh 10 grapes. Record weight on Scientific Investigation worksheet.
3. Weigh 10 raisins. Record weight on Scientific Investigation worksheet.
4. Ask students, "why is there a difference in the weights of the grapes and raisins?" Have students write their explanation on their Scientific Investigation worksheet.
5. Ask students, "if raisins are made by dehydrating grapes (letting them dry), can we soak them in water and rehydrate them?" Students write problem, "can we rehydrate raisins?" on Scientific Investigation worksheet, then record their hypothesis.
6. Follow these procedures to conduct the experiment:
    a. Place 10 raisins in a glass.
    b. Cover the raisins with water.
    c. Let the raisins soak for 30 minutes.
    d. Remove the raisins and pat them dry.
    e. Weigh the raisins.
    f. Calculate how much water they absorbed.

Extension:

1. Show students craisins and cranberries. Have students explain which would weigh more, craisins or cranberries, and why.
2. Have students write up the experiment using all the steps in conducting a scientific experiment.
3. Have students brainstorm reasons raisins are used in space travel (lightweight, don't spoil easily, satisfy the craving for something sweet, and provide nutrition and energy).

Name _____

SCIENTIFIC INVESTIGATION

Which weighs more, grapes or raisins? _____

Weight of 10 grapes = _____

Weight of 10 raisins = _____

Why is there a difference in the weights of the grapes and raisins?

_____

_____

_____

Problem (What question do you want to answer?) _____

_____

Materials (What do you need to do your experiment?)_____

_____

Hypothesis (What do you think will happen and why?)_____

_____

Procedure (What steps must you follow to do the experiment?)

_____

_____

_____

Observations (What did you see happen during the experiment?)

Weight of 10 raisins (before soaking for 30 minutes) = _____

Weight of 10 raisins (after soaking for 30 minutes) = _____

_____	-	_____	=	_____
Weight of raisins after soaking		Weight of raisins before soaking		Amount of water absorbed

Conclusions (What did you learn/discover from the experiment?) _____

_____

_____