

What's Growin' On?

Cultivating Your Future



Teacher's Supplement



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Introduction

Welcome! Thank you for your interest in California Foundation for Agriculture in the Classroom's (CFAITC) student activity newspaper, *What's Growin' On? Cultivating Your Future*. Developed by educators, *What's Growin' On?* offers fun and engaging ways to teach problem-solving and critical thinking skills in the curricular areas of reading, writing, mathematics, science and social studies while familiarizing students with their local newspaper and demonstrating the importance of our food and fiber system.

This teacher's supplement contains ideas and opportunities for extending the content presented in the student activity newspaper. Depending on the needs of your specific classroom, this supplement includes inquiry-based labs, related readings and methods for incorporating technology into each learning experience. CFAITC encourages teachers to continue sharing life-long lessons outside the pages of the student newspaper, and have provided a list of field trip and guest speaker ideas that may strengthen student learning and comprehension. Finally, recognizing that each student in your classroom has uniquely different learning styles and educational needs, we have provided GATE and ELL adaptations that can help tailor each topic to the diverse abilities of your students. We hope you are able to deepen your classrooms learning through these lesson ideas.

The agriculture-themed examples and activities found in *What's Growin' On?* are designed to motivate and inspire your students, connecting classroom lessons to real-life experiences and circumstances. This is accomplished by weaving **agriculture** into teaching so that students can better relate to food they eat, clothes they wear, homes they live in and open spaces they enjoy. Additionally, using the **newspaper** as an instructional tool allows young people to discover the relevance of their classroom studies by reading news stories, acquiring new knowledge, forming opinions and broadening their understanding of the world they live in.



California Foundation for Agriculture in the Classroom (CFAITC) is dedicated to increasing the awareness and understanding of agriculture among California's educators and students. CFAITC provides educators with resources and programs that enhance agricultural literacy. To request a free teacher resource packet or copies of the current edition of *What's Growin' On?* contact CFAITC via e-mail (cfaite@cfbf.com) or phone (800-700-2482).

Newspapers in Education (NIE) is comprised of hundreds of newspapers throughout the United States that promote and aid in newspaper education. Whether creating or offering special curricula or programs, NIE touches the lives of students in countless ways. Local NIE programs reach out to their educational communities by providing teachers with training and resources that expand the newspaper's use as an effective tool—a real-life textbook, to which students respond enthusiastically. For more information about California Newspapers in Education (CNIE), visit www.cal-nie.org.

Mechanical Movers

Extension Ideas

1. Bring a lawn mower into the classroom for student examination. Lawn mowers are a common household tool containing all six simple machines. Students can use sticky notes to identify each different machine within the lawnmower. Discuss with the class how each part has an important role in making work faster and easier.
2. Practice identifying simple machines with your class. Bring a variety of household items: knife, scissors, pencil sharpener, pliers, nail clippers, shovel, screwdriver, cheese grater, etc. Instruct the class to work in groups to sort the items based on the simple machine used. Remind students that some items will employ more than one simple machine, and should be classified as a complex machine.
3. Use a spring scale to compare the amount of force needed to pull a constant weight given different simple machines. Create a solid Lego brick (or piece of wood) measuring approximately 5 inches x 4 inches x 4 inches. Use the spring scale to measure the force required to drag a brick on a flat surface. Next, add wheels to the structure and compare the amount of force required to move the object with the help of the wheel and axle. How much effort did this simple machine save? Finally, compare the force required to move the object up a ramp as opposed to lifting it directly from the ground using the spring scale. What other experiments can your students use to find the mechanical advantage? Describe the mechanical advantage that each item provides. The actual advantage can be determined by using the equation:



$$\text{Weight of object (N) / Force required by machine (N)}$$

Guest Speaker Idea

- Agriculture mechanics utilize science, math, technology and engineering knowledge and skills every day. Invite an agriculture mechanic to the class to share about the skills they need to be successful in the field and provide a demonstration. Plan to also visit the agriculture mechanic at their shop to see the simple and complex machines they use.

Field Trip Idea

- Although many California crops are still harvested by hand, agriculture-minded inventors have revolutionized the industry with machines capable of harvesting nuts and produce. Visit a local farm during harvest time to see the machinery involved in the process. Depending on where you live in California, you may be able to witness the efficiency of a tomato harvester or the strength of a nut shaker.

Technology Opportunity

You don't even have to go outside to put a simple machine to work! Visit the Center of Science and Industry Web site to virtually explore the simple machines used to build a tree house.

Students learn about simple machines and use math to determine the mechanical advantage presented in different scenarios. www.cosi.org/files/Flash/simpMach/sm1.swf

Inquiry Opportunity

Create a science lab that encourages students' curiosity about how machines work. Students can investigate how a first-class lever works by building a lever out of common household items, such as a broom, table and chair. After developing a hypothesis, demonstrate how to place the broom handle under the edge of the table and across the back of the chair to create a first-class lever. They should be able to easily lift the table by pushing down on the brush end of the broom if the fulcrum (the chair) is in the right spot. Encourage students to explore the mechanical advantage of placing the fulcrum under the broom handle in different spots or placing the chair at various distances from the table. Students record their observations and determine which scenario requires the most/least amount of effort.

Books About Machines

Adamson, Heather. ***A Day in the Life of a Farmer***. Capstone Press, 2003. Spend a day with Farmer Dave on his Midwest farm as he feeds animals, drives a tractor, and brings in the harvest. ISBN 978-0-7368-2283-1

Cowley, Joy. ***The Rusty, Trusty Tractor***. Boyds Mills, 2000. Tractor salesman Mr. Hill, tries to convince Micah's grandfather that his old rusty tractor has seen better days. ISBN 978-1-56397-565-3

Doeden, Matt. ***Farm Tractors***. Capstone Press, 2007. Learn how tractors pull farm machines to help farmers plant and harvest their crops. ISBN 978-0-7368-6721-4

Dregni, Michael. ***This Old Tractor: A Treasury of Vintage Tractors and Family Farm Memories***. Voyageur Press, 2002. This informational text, written in narrative form, is accompanied by many nostalgic photographs and artwork of vintage tractors. ISBN 978-0-89658-602-4

Gillis, Jennifer Blizen. ***Farm Machines***. Compass Point Books, 2004. View photographs and learn how machines are a part of farm life. ISBN 978-0-7565-0672-8

Leeper, Angela. ***Farm***. Heinemann Library, 2004. Take a field trip to a farm and learn about its different crops, animals, machines and buildings. ISBN 978-1-4034-5167-5

Nelson, Kristin. ***Farm Tractors***. Lerner Publications Company, 2003. With colorful photographs, this emerging reader introduces children to different kinds of tractors and how they are used on farms. ISBN 978-0-8225-0690-4

Saunders-Smith, Gail. ***Fall Harvest***. Capstone Press, 1998. This emerging reader book shows that crops are harvested by hand and by machine. ISBN 978-1-56065-587-9

ELL Adaptation

K'NEX sets can provide a visual example of each simple machine. In this adaptation, supply students with a variety of K'NEX pieces and parts. First, allow students time to independently explore and investigate how to create different simple machines. Next, instruct them to make

specific machines and diagram the design on a separate piece of paper. After completing the diagrams, students can connect their simple machines to develop a more complex example.

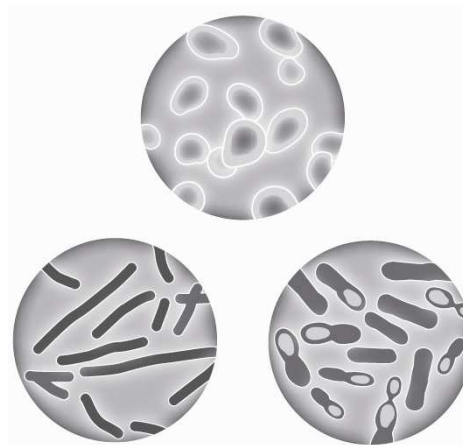
CFAITC Resource

Check out CFAITC's resource, ***Simple and Complex Machines Used in Agriculture***. This unit incorporates many science and math concepts as students learn about farm machinery and the use of machines in agricultural practices. Concepts focus on simple machines such as inclined planes, levers and pulleys and show how these simple machines are combined to form complex agricultural equipment. www.cfaitc.org/LessonPlan.

Playing it Safe

Extension Ideas

1. Bring a bag of groceries to class containing foods with various expiration dates. Show the food items to the class and ask students how they determine if the food is okay to eat. Explain that the use-by, sell by, and expires-on dates help us determine when the food will spoil. These terms apply to all *unopened* items stored in their optimal environment.
 - a. *Use-by date*: This term means the product should retain maximum freshness, flavor and texture if used by this date. Beyond this date, the product begins to deteriorate, although it may still be edible.
 - b. *Sell-by or pull-by date*: This date is used by manufacturers to tell grocers when to remove their product from the shelves, but there is generally still some leeway for home usage. For example, milk often has a sell-by date, but the milk will usually still be good for at least a week beyond that date if properly refrigerated.
 - c. *Expiration date*: If you haven't used the product by this date, toss it out. Other dating terms are used as a basic guideline, but this one means what it says.
2. Glo Germ™ lotion (www.glogerm.com) is an effective tool to demonstrate hand washing, surface cleaning, hygiene and containment techniques. Demonstrate to students how microbes can easily be spread during food preparation by placing the Glo Germ™ lotion on the outside of a cantaloupe or other melon. Use a cutting board to slice the melon into wedges. A blacklight will reveal the melon has been contaminated throughout, as well as the cutting surface and knife. Discuss with students the importance of washing the surface of all fruits and vegetables to reduce the risk of cross-contamination.
3. Proper food storage relies on correct placement, ideal temperature and appropriate containers. Use the newspaper or Internet to research new products on the market for storing food. Create an infomercial (presented live or via video) to promote this particular method. Each infomercial should also contain at least five tips for safe food storage.
4. Instruct students to draw a picture of a kitchen. Within their drawing they must visually represent 10-15 common food safety risks. Provide an example of possible perspectives and ways to visually represent different hazards. After completing the drawing, students will trade papers with a partner. On a separate piece of paper, students create an observation chart listing the food safety risks visible on the drawing and how to correct the hazard.



Risk	How to Correct
1. Fridge is too warm	Set fridge temperature to 41 degrees Fahrenheit
2. Sponge is moldy	Replace sponge with a new one or run the sponge in dishwasher

Guest Speaker Idea

- Restaurant manager duties consist of overseeing day-to-day operations, food safety practices and general restaurant cleanliness. Invite a local restaurant manager to your classroom to share their perspective about food safety in a restaurant environment. Lead the discussion by asking about employee training to handle food, sanitation practices, where the food comes from, food rotation and working with health inspectors. Ask the guest speaker to share the skills they need to be successful in their career.

Field Trip Idea

- Grocery stores have a key responsibility in keeping the food they sell to consumers fresh and safe. Visit a local grocery store and ask the department managers to show students the methods they use to ensure the food we buy is safe. Ask the store manager to demonstrate food rotation, food date monitoring, cleaning and sanitization practices, temperature control and other safety-related store procedures.

Technology Opportunity

Food safety inspection reports are public records. Guide your class to your county's health services Web site to view and print local reports. Have students keep track of commonly made mistakes. Using these mistakes as a guide, students will create food safety brochures for a restaurant, school or grocery store. Depending on students' ability, use a word processor or more complex design software to create the brochure. For an example, view the Kings County inspection reports by visiting www.countyofkings.com/Health/ehs/reports.html.

Inquiry Opportunity

Create a research opportunity that encourages students' curiosity about food safety practices. After learning about food safety guidelines, students can develop a research opportunity to answer questions they may have about the food safety. Many students pack a lunch in the morning and eat their meal several hours later. Depending on the storage environment, this practice could be unsafe. Have students make identical deli sandwiches and place them inside different types of lunch bags (paper, insulated, neoprene, etc.) with or without ice packs. Students record the internal temperature of the bags throughout the day and develop their own conclusions. Challenge students to interpret their findings using charts and graphs.

Books About Food Safety

Capeci, Anne, Bruce Degen, John Spears and Joanna Cole. ***The Giant Germ***. Scholastic, 2001. When Keesha discovers mold on her sandwich, the class takes off on a tour of the mini microbe world, and they learn first hand that these little creatures can have HUGE effects. ISBN 978-0439204200

Cobb, Vicki. ***Dirt & Grime, Like You've Never Seen***. Scholastic, 1998. Get closer than you've ever wanted to be with dirt, grime, cobwebs and mold. Electron microscopes reveal the amazing truth about the unseen world around us. ISBN 978-0590926669

Latta, Sara M. ***The Good, the Bad, the Slimy: The Secret Life of Microbes***. Enslow Publishers, 2006. Bacteria, viruses, and fungi... microbes are everywhere! You may think they are all harmful, but most microbes are beneficial. Learn how these tiny organisms impact our lives every day. ISBN 978-0-7660-1294-3

Leavitt, Judith Walzer. ***Typhoid Mary***. Beacon Press, 1997. The story of Mary Mallon, the Irish immigrant cook who later became known as "Typhoid Mary," dramatically illustrates the conflict between the needs of an individual and the needs of society. ISBN 978-0-8070-2103-3

Satin, Morton. ***Food Alert: The Ultimate Sourcebook for Food Safety***. Checkmark Books, 1999. Learn about the 20 most common causes of food contamination in your kitchen, steps you can take to lower the risk of foodborne illness, how to avoid eating contaminated food, and how to tell if you may be suffering from a foodborne illness. ISBN 978-0-8160-3935-7

Woods, Michael and Mary B. Woods. ***Ancient Agriculture***. Runestone Press, 2000. Explains in simple terms how the story of agriculture is also the story of civilization. Also describes how ancient cultures left a rich legacy of agricultural knowledge and technology. ISBN 978-0-8225-2995-8

GATE Adaptation

The agriculture industry is continually seeking to improve the quality, safety and marketability of fresh produce. In this activity, your classroom will become a laboratory and your students will become post harvest scientists. Their job is to create a new form of packaging for produce that is affordable and extends the shelf life of a specific fruit or vegetable. Students choose a produce item, design a package using household items, determine the cost per unit for the packaging and test the packaging for effectiveness. At the end of the project, students reports their findings and the class votes for the most innovative, effective, affordable and best all-around packaging design.

CFAITC Resource

Check out CFAITC's resource, ***Food Safety: From Farm to Fork***. This unit provides fifth through seventh graders a better understanding of food safety through real-life examples and enjoyable activities. They learn that everyone has a responsibility in minimizing foodborne illnesses—farmers, transporters, restaurants, grocery stores...and the consumer! Through reading, games, puzzles, math problems and science investigations, participants identify the roles each one of us plays to ensure the food we enjoy is safe to eat.
www.cfaitc.org/LessonPlans

Technically Terrific

Extension Ideas

1. One of the earliest examples of biotechnology is fermentation. We still use fermentation today to enjoy foods like cheese, bread and root beer. As a class, discuss the importance of yeast in the bread-making process. Explain that biotechnologists are currently developing more active, better flavored strains of yeast that can make bread rise in less time, at a lower temperature. Divide the class into small groups to make bread. Throughout the process, explain how yeast interacts with maltose and sucrose to produce alcohol and carbon dioxide. Have students draw diagrams of the chemical reactions that occur during fermentation.
2. Not all people around the world enjoy the same safe, bountiful food supply that we do in the United States. Biotechnology is being used today to improve plant hardiness and develop more nutritious strains of staple crops. By increasing the nutritional value of available food crops, the people of developing countries will have access to more healthful food. Using encyclopedias, research papers or online resources, research some of the benefits of introducing biotech crops to developing nations. What are the drawbacks? Ask students to thoughtfully consider and discuss the pros and cons of using biotechnology for the purpose of reducing world hunger and related maladies. Students can develop a chart to represent their findings and summarize how they formed their opinion.
3. As a class, brainstorm some of the major events that have led to the development of how biotechnology is used today. These events may include early domestication of species, use of yeast, the discovery of the cell, discovery of bacteria, the discovery of DNA or the development of the first commercial biotech firm. Review historical figures such as Gregor Mendel, Louis Pasteur, Alexander Fleming, James Watson, Francis Crick, Norman Borlaug, Stanley Cohen and Louis Brown, and their contributions to biotech advances. After creating a list, divide the class into groups to organize the list chronologically and create a timeline that includes visual representation of each significant event. Create the timelines on butcher paper and display around the room.

Guest Speaker Idea

- Ask an individual from the agriculture industry to visit the class to share how they depend on biotechnology for food production. Guest speakers may be from the dairy, nut, tree fruit, grape, rice, berry, melon industry or many others. Ask the representative to share important advances in biosciences and how the production, appearance, abundance and taste of their commodity have changed over time. Also ask the guest speaker to share about their job responsibilities and skills they use on daily basis.

Field Trip Idea

- Visit a dairy processing facility to see how cheese, yogurt or lactose-free milk is produced. Look for examples of biotechnology in the stages of production. At the end of the field trip, sample some of the different varieties or flavors.

Technology Opportunity

So what's all the buzz about biotech? Brett Buzz, insect reporter for the W.I.N.G. News Center, introduces students to the world of biotechnology through a special investigative report. While

watching this online video, students can respond by answering question on a provided worksheet. Following the video, students participate in an interactive Web quest. A Web quest is an inquiry-oriented lesson in which most or all of the information that students explore and evaluate comes from the Web. To see what the buzz is about, visit www.childrensmuseum.org/themuseum/biotech/webquest.

Inquiry Opportunity

Create a research opportunity that encourages students' curiosity about biotechnology. DNA extraction is one way to give students an actual visual of what DNA looks like. Visit learn.genetics.utah.edu/content/labs/extraction/howto for a complete how-to guide. After modeling the process for the class, allow student groups to develop their own experiments. Students may want to experiment with other DNA sources, test a variety of soaps and detergents or determine which fruit or vegetable provides the most DNA. Instruct students to create a relevant hypothesis, design and execute their experiment and determine the best method for evaluating the results. Challenge students to interpret their findings using charts and graphs.

Books About Biotechnology

DeGregori, Thomas. ***Bountiful Harvest. Technology, Food Safety, and the Environment.*** CATO Institute, 2002. The author expresses his opinion that technology, like an art, expresses the creativity of human beings and provides a world that is better fed. ISBN 978-1-930865-31-0

Fine, Edith Hope. ***Barbara McClintock: Nobel Geneticist.*** Enslow Publishers, Inc, 1998. Presents the life and career of the geneticist who spent many years studying the cells of maize and was awarded the Nobel Prize in physiology and medicine. ISBN 978-0-89490-983-2

Kahn, Jetty. ***Women in Agricultural Science Careers.*** Capstone Books, 1999. Learn about six women who have very unique careers in agricultural science. ISBN 978-0-7368-0314-4

University of California, Davis. ***Shaping Agriculture in the 21st Century.*** Agricultural Issues Center, 1995. The report covers the impact of science, environmental perspectives, and economic factors that will affect agriculture in the next century.

Woods, Michael and Mary B. Woods. ***Ancient Agriculture.*** Runestone Press, 2000. Explains in simple terms how the story of agriculture is also the story of civilization. Also describes how ancient cultures left a rich legacy of agricultural knowledge and technology. ISBN 978-0-8225-2995-8

GATE Adaptations

Students can demonstrate the process of biotechnology by using candy as an oversized model. Students work in groups to determine which candy will represent the gene, plasmid vector, bacterium, nucleus, plant cell and DNA. Once each piece of the process is identified, students can act as scientists and complete the process of inserting a "desirable trait" into a living organism. Scientists can report back to the class and explain the purpose of their experiment, describe the process of biotechnology and share their conclusions with the class. Lead a discussion with the class exploring the challenge of the actual process and working with microscopic "parts."

CFAITC Resource

Check out CFAITC's resource, ***From Genes to Jeans***. Students are introduced to the genetic research and technologies associated with agriculture. Students are provided with the scientific principles and tools associated with genetics and are encouraged to use their knowledge to think critically, creatively and freely about the viability and ethics associated with genetic engineering and agriculture. Careers related to science and agriculture are also introduced.
www.cfaitc.org/LessonPlans

This Land is Your Landscaping

Extension Ideas

1. One major consideration when installing a landscape is whether to use annual or perennial plants. Have students research the similarities and differences between the two types of plants. Students can create Venn diagrams to visually organize their findings.
2. The plants grown in a vegetable garden have a variety of edible parts. Depending on the plant, you may be eating the root, stem, leaf, flower, seed or fruit. Use a broccoli crown to illustrate this concept. An individual broccoli crown has stems, flowers and leaves. Distribute paper bags with produce samples to each of the groups. Instruct students to take turns reaching inside the bag and without looking, identify the food. After the first student guesses, they may remove the food item and decide as a group which plant part it is. The next person in the group repeats the process, first guessing by touch, then removing the food from the bag and categorizing it. As a class, create a chart listing examples of each plant part and discuss some of the nutritional benefits of a diet rich in plant parts.
3. History has shown that different ethnic groups often have different practices for growing things. For example, native peoples from different parts of California have used a wide range of agricultural techniques. Perhaps the best known technique is interplanting corn, beans, and squash together—a trio often referred to as the "three sisters." In a three sisters planting, the three partners benefit one another:
 - a. Corn provides support for beans.
 - b. Beans, like other legumes, have bacteria living on their roots that help them absorb nitrogen from the air and convert it to a form that plants can use. (Corn, which requires a lot of nitrogen to grow, benefits most.)
 - c. The large, prickly squash leaves shade the soil, preventing weed growth, and deter animal pests. The three sisters also complement each other nutritionally.Research the Native American legend of the three sisters and have students act out the legend as a class. To test the validity of the legend, plant corn, beans and squash in your school garden and observe how they grow.
4. Visit a landscaped area on your school grounds. Provide students with a piece of graph paper, with instructions to draw the area (to scale) with accurate dimensions. Within in the area, work in small groups to identify each component of the landscape, including plant species. Students can use tape measures to create an accurate diagram of the landscape.



Guest Speaker Idea

- *U.S. News & World Report* listed "landscape architect" as one of the 30 best careers in 2009. Invite a landscape architect into the classroom to share about their job and how

they work with plants on a daily basis. Ask this professional to share the requirements of their job including educational background, responsibilities and starting pay to introduce students to one of the many careers available in the field of agriculture.

Field Trip Idea

- Before plants are installed in a garden, home or commercial landscape, many plants are raised in a nursery operation. Nurseries provide controlled environments, such as greenhouses or shade houses, where plants can grow in an ideal climate. Visit a local nursery operation to see how plants begin as propagated, cared for and distributed on a commercial level.

Technology Opportunity

Students can visit www.thelandlovers.org to discover career possibilities in the horticulture industry. Students can explore job responsibilities, the required education for specific careers and how much money can be made in the industry. Once students scope it out, they can view actual job postings, listed by state, to see what opportunities currently exist. Instruct students to choose a career, complete an application and develop a resume for the position.

Inquiry Opportunity

Irrigation is an important component of the garden landscape. It controls the distribution of water and helps reduce water loss. Create a research opportunity that encourages students' curiosity about how water moves through soil. Students create a water permeability test using two-liter bottles with the bottoms cut off, colored water and natural earth materials such as sand, gravel, ash, silt and clay. Each group of students is given a bottle and instructions to fill a third of the bottle with their choice of layered earth material. Each group will determine the appropriate method for testing water permeability (time, color of soil, etc.). Challenge students to answer the following questions: 1) How does water filter into the ground? 2) What are some of the things that control water infiltration?

Books About Plants and Landscaping

Fleischman, Paul. **Seedfolks**. HarperTrophy, 1999. One by one, a number of people of varying ages and backgrounds transform a trash-filled inner-city lot into a productive and beautiful garden. In doing so, the gardeners are themselves transformed. ISBN 978-0-06-447207-4

Kalman, Bobbie. **What is a Plant?** Crabtree Publishing Company, 2000. Learn the basic anatomy of plants, unique characteristics, and how and why plants are essential in various ecosystems. ISBN 978-0-86505-982-5

Hart, Avery and Mantell Hart. **Kids Garden!** Williamson Publishing Co, 1996. Using black and white illustrations, this book provides more than 100 activities children and their families or classmates can do to learn more about plants. ISBN 978-0-913589-90-8

Royston, Angela. **How Plants Grow**. Heinemann Library, 1999. Discover how a plant's life begins, what plants need to make them grow, and why some trees lose their leaves in the fall. ISBN 978-1-57572-538-3

Stewart, Sarah. ***The Gardener***. Farrar Straus Giroux, 2000. A series of letters tells the story of a girl who, when forced to leave the country, takes her love of gardening with her. ISBN 978-0-374-42518-0

ELL Adaptation

Use play dough and digital photos to illustrate the life cycle of a plant. Students use the play dough to create different 'scenes' illustrating everything from planting seeds, to harvest, to the dinner table. For each scene, snap a digital photo. Next, students work in the computer lab to digitally arrange photos in chronological order and create descriptions of each photo. Emphasize the use of complete sentences and correct spelling.

CFAITC Resource

Check out CFAITC's resource, ***A Garden Plot The Tale of Peter Rabbit***. This unit uses *The Tale of Peter Rabbit* and other stories by Beatrix Potter as a vehicle to teach reading, writing, and science concepts. This unit encourages students to think about where their food comes from, distinguish between fact and fiction, observe roots and soil, and write about personal experiences they have while caring for the personal gardens they create.

www.cfaitc.org/LessonPlans

From Seed to Sushi

Extension Ideas

1. When you take a moment to think about it, most Americans interact with individuals who work in the agriculture industry every day! With the class, review the wide-ranging careers found in agriculture. As a class project, instruct students to photograph and interview a person working in the agriculture industry. Students share their photos and findings with the entire class.
2. There are many employment opportunities in agriculture. All of these jobs are important to the economy of our state, country, and world. There are more than 250 careers available and one out of 10 careers in California is directly related to agriculture. Play “Agriculture Career Bingo” with your class. Before beginning, brainstorm with the class a list of at least fifty agriculture-related careers. Given a bingo grid, students individually fill each square with pictures that represent twenty-five different careers. At random, call out careers from the list developed by the class. The first student to get five in a row wins.
3. Teach students how to write a resume and cover letter. Although many students will have no “technical” work experience, challenge them to think critically about the activities they are involved in and the skills they develop by participating in those activities. Sports, student leadership, community service, 4-H, Girl Scouts and Boy Scouts are examples of activities that equip students with technical and interpersonal skills. Visit www.resume-help.org for free resources related to writing resumes and cover letters.



As an extension activity, student can role play a job interview. Distribute agriculture job postings to the class. One student acts as interviewer and develops relevant questions for a specific job posting, while another student “applies” for the job by showcasing their skills and talents. Discuss with the class the challenge of finding a job in a tough economy and brainstorm ideas for developing skills needed to be the best candidate for the job.

Guest Speaker Idea

- Ask a school academic counselor to visit your classroom and share their insight about pursuing an agriculture-related career. Ask the academic counselor to present information about several agriculture-based colleges and universities and possible majors, and suggest actions that students can take today to prepare for their future careers.

Field Trip Idea

- Take a trip to an agriculture production site, such as a dairy or rice farm. Ask the farmer to also invite individuals who play an integral role in the production process. As your touring the site, have each individual share about their role, the skills and tools they use, and how it contributes to the final product. Write thank-you letters to all the individuals as a follow-up activity.

Technology Opportunity

View an online video that highlights the history and personal stories of the residents of Richvale, California. Students will come to appreciate the quiet values of this 100-year-old community and their concern for one another, while producing one of California's top 20 commodities—rice. Visit www.tsp-rice.com to access this 20 minute video. While watching the video, have students keep track of all the careers involved in California rice production.

Inquiry Opportunity

Create a research opportunity that encourages students' curiosity about agriculture-related careers. In small groups, have the class develop surveys to learn the public's perception of agriculture-related careers. Discuss with the class the presence of stereotypes and how they affect our perceptions. Also review techniques for developing an unbiased survey. Review students' questions and approve, or provide suggestion for improvements. Have students conduct surveys at school or in a safe, public place. Upon completion of the survey, challenge students to illustrate their results with charts and graphs. Discuss with the class how young people can help create accurate perceptions of agriculturalists.

Books About Careers and/or Rice

United States Department of Agriculture. **Americans in Agriculture: Portraits of Diversity.** The 1990 Yearbook of Agriculture, 1990. People of American agriculture, their jobs, lives, goals, and families. Includes facts and figures about our food and fiber system.

Morrison, Marianne. **Rice.** National Geographic, 2002. Learn where and how rice is grown and harvested. ISBN 978-0-7922-8516-8

Demi. **One Grain of Rice.** Scholastic Inc, 1997. This mathematical folktale illustrates the concept of doubling, using rice as the example. ISBN 978-0-590-93998-0

GATE Adaptation

Using *What's Growin' On?* pages eight and nine as a guide, students can work in groups to develop their own board game that tests their knowledge about agriculture-related jobs. Ask students to bring in their favorite board game to use as potential models (e.g., Monopoly, Cranium, Chutes and Ladders, Parcheesi, etc.) Have students study different game boards and identify different components of each game. Discuss the different goals of each game and how the goals are achieved.

Next, discuss ways in which a board game might be able to teach information about agriculture-related careers. Ask students about how the game can show an agriculture setting, careers that can be highlighted, and appropriate tokens and rewards for successful play. Determine what kinds of positive or negative elements might be used to advance or delay a player. Provide basic materials for creating the board game. When the games are completed, have each group trade with another to try out the other groups' games.

CFAITC Resource

Check out CFAITC's resource, **Agricultural Fact and Activity Sheets.** These fact sheets contain one-page of current facts on a specific agricultural commodity or natural resource including information on its history, production, top producing regions, varieties, and economic value. A Rice Fact Sheet is available. www.cfaitc.org/Commodity

California's True Environmentalists—Farmers

Extension Ideas

1. Farmers are continually looking for cost-effective ways to reduce the amount of water used to grow the food we eat. Instruct students to research a specific irrigation technique and prepare a two-minute commercial illustrating the benefits of using this technique and addressing the shortcomings. Upon completion of the presentations, work as a class to install an effective and water-conserving irrigation system somewhere on the school grounds.
2. When trees lose their leaves in the winter, it can be pretty challenging to identify them. Go to a wooded area and find five trees with very different bark. Hold a sheet of paper to each tree's bark and make a rubbing with a crayon. Number each tree one through five and where the tree is located. Once returning to the classroom, use a tree identification manual or online tools (www.hsu.edu/default.aspx?id=7544) to match the bark from your five tree rubbings to the bark pictured on your chosen source. Once students know each tree's species name, write that name below the rubbing.
3. In groups, students can create their own watershed and observe how water moves from high to low points in elevation. To begin, students crumple up a two-foot piece of wax-coated butcher paper to make a three dimensional topography, complete with hills and valleys. Next, students gently flatten out the paper so the topography remains and place the paper in a large plastic storage container. Lift one end of the container a few inches off the ground using a book or block. Next, fill a spray bottle with colored water, instructing students to make it "rain" on their piece of land. Where does the water flow? Why? Use the model to illustrate erosion and run-off pollutants by placing cocoa powder throughout the model and watching the water sweep it downstream.
4. Use owl pellets to illustrate the nature of food chains and the role of predators in the ecosystem. Look for USDA approved, heat-sterilized (no odor) pellets. Owl pellets are a natural educational tool to introduce skeletal anatomy and practice identifying prey. Pellets also reveal the natural wildlife living in the habitat. Dissect the pellets and based on student findings, determine what animals share the owl's environment.

Guest Speaker Idea

- Invite a wildlife biologist to your classroom to provide insight about the wildlife species in your region. Ask the biologist about the value of providing advice to farmers and others involved in managing land in the area. What type of education is required to become a wildlife biologist? Also ask them to explain what type of person might enjoy wildlife biology as a career.

Field Trip Idea

- Visit a local forest to examine the types of animals and insects that call the forest "home." Which trees are used by animals for their homes? What animals live there? How are people using the forest? What kind of products does the forest produce? To enhance your field trip, ask a forest ranger or land manager to share the history of the forest and the management plan for sustaining it in the future.

Technology Opportunity

A Web quest is an inquiry-oriented lesson in which most or all of the information that students explore and evaluate comes from the Web. On this Web quest, students will explore how we use trees to produce a variety of forest products—from paper to rayon. Learn how our lives are closely tied to forestland by visiting www.mofb.org/webquest/wq53a.htm.

Inquiry Opportunity

Create a research opportunity that encourages students' curiosity about trees and forestry. Not only do forests provide a variety of products for our everyday use, they also provide us with shade and clean air. Encourage students to develop an experiment to test the hypothesis "leaf shape affects the ground temperature below the tree canopy." Determine a procedure to determine if the hypothesis is accurate. A soil probe, found in most hardware or garden stores can provide an accurate reading of the soil temperature. After repeated tests, create a chart depicting the relationship between leaf shape and soil temperature under the canopy. Brainstorm with the class other variables that could also be causing temperature changes. Discuss ways to improve the experiment for increased accuracy, and if time allows, repeat the experiment with improvements.

Books About The Environment

Batten, Mary. ***Aliens from Earth***. Peachtree Publishers, Ltd, 2003. An intriguing introduction to the serious and ongoing environmental problems caused by invasive plant and animal species and ideas on what young readers can do to minimize their own impact on the environment. ISBN 978-1-56145-450-1

Carle, David. ***Drowning the Dream***. Greenwood Publishing Group, 2000. This book uses firsthand voices of Californians to illustrate how imported water has transformed the Golden State's environment and quality of life. ISBN 978-0-275-96719-2

DeGregori, Thomas. ***Bountiful Harvest. Technology, Food Safety, and the Environment***. CATO Institute, 2002. The author expresses his opinion that technology, like an art, expresses the creativity of human beings and provides a world that is better fed. ISBN 978-1-930865-31-0

Gariand, Sarah. ***Eddie's Garden and How to Make Things Grow***. Frances Lincoln Children's Books, 2004. Learn how plants need soil, sun, and water to make plants in Eddie's garden grow, and learn some specifics about garden pests and flowers. ISBN 978-1-84507-015-1

Hayford, James. ***Gridley Firing***. New England Press, 1989. The family farm is not doing well and young Martin is concerned that the rich contractor, who is buying up land, will buy his farm and build houses, which will move wildlife inhabitants out of their homes. ISBN 978-0-933050-49-5

Lindeen, Carol. ***Water Basics***. Capstone Press, 2008. This simple text and photographs present water and the water cycle. ISBN 978-1-4296-0005-7

McClurg, Sue. ***Water and the Shaping of California***. Heyday Books, 2001. This chronicle of California's water follows the history of the precious resource from the Spanish settlement Period, through the Gold Rush, to the ban of hydraulic mining. ISBN 978-1-890771-33-1

ELL Adaptation

For centuries humans have been making paper from trees. In A.D. 500, the Mayan Indians of Central America invented a paper made from the bark of the fig tree. Demonstrate to students how paper can be made in the classroom from recycled newspaper. While demonstrating each step of paper making, provide a visual example for non-native English speakers. Following the demonstration, have each student make their own paper. After the project, discuss how making paper would be different on a commercial scale. For classroom tips and directions on making wood pulp paper, visit kids.cfaitc.org/wgo/makingpaper. For background information about making paper commercially, visit www.fpl.fs.fed.us/documnts/misc/fs_2.pdf.

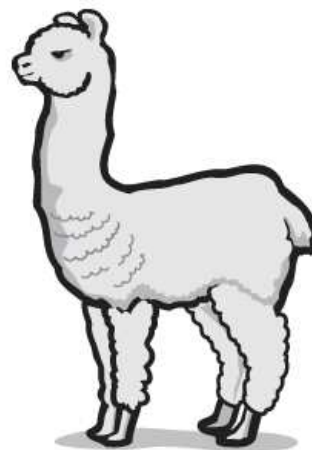
CFAITC Resource

Check out CFAITC's resource, **Agricultural Fact and Activity Sheets**. These fact sheets contain one-page of current facts on a specific agricultural commodity or natural resource including information on its history, production, top producing regions, varieties, and economic value. Agricultural Water and Forest Resources Fact Sheets are available. Each activity sheet provides specific lesson ideas and fun facts for each topic. www.cfaitc.org/Commodity

Unique Jobs

Extension Ideas

1. Animal domestication is essential for agriculture production. Brainstorm with the class a list of attributes that distinguish domesticated animals from their wild ancestors. Compare ideas and try to identify the most significant distinguishing characteristics. Develop a timeline illustrating when and where different animals were domesticated. Challenge students to determine what significant historical events occurred concurrently and may have played a role in taming each animal.
2. Biological classification is a method that biologists use to group and categorize organisms by biological type, such as genus or species. For example, llamas, camels and alpacas are all members of the biological family Camelidae. Biologists group organisms according to shared physical characteristics. Divide the class into six groups and assign each group an animal featured on page 13: bison, alpaca, ostrich, sheep, donkey or goat. Students will research the biological family of their given animal, determining other animals within the same family and indentifying physical characteristics shared by the family.
3. Livestock provide a variety of services and goods for humans. Research one of the animals featured on page 13 of *What's Growin' On?* and write a story from that animal's perspective. What type of services do they provide on a daily basis? How do humans rely on these animals for the production of food and fiber? How do agriculturalists care for these animals to ensure they are healthy and performing their best? The story should be written in first person narrative, with the animal telling the story. The final versions of the stories may include illustrations, a title page, and publisher and copyright information. Use this assignment when school starts and submit the top five stories from your class to the *Imagine this...* Story Writing Contest. Visit www.cfaitc.org/imaginethis for contest details.



Guest Speaker Idea

- Invite a local 4-H leader or FFA advisor into your class to share about their personal experience raising livestock. Ask them to explain the challenges, joys and skills learned from animal husbandry. Suggest that the guest speaker bring an animal to the class to demonstrate techniques in animal grooming and care, or to teach the students about animal by-products and basic animal anatomy. If students are interested in raising animals through 4-H or FFA, encourage them to visit 4-h.org or www.ffa.org to get involved.

Field Trip Idea

- Visit www.calpaca.org/ranchfinder.htm to find an alpaca ranch near you. Many ranches will welcome the opportunity to provide students with a tour of their facilities and an up-close look at this interesting camelid. Ask the owner to explain the purpose of raising alpacas and the importance of selective breeding.

Technology Opportunity

A Web quest is an inquiry-oriented lesson in which most or all of the information that students explore and evaluate comes from the Web. In this Web quest, students will take a closer look at ostriches while learning about the adaptation of unique animals over time and making connections between animal function and evolution. What would it take to give an ostrich an extreme makeover? To find out, visit www.ldcsb.on.ca/schools/cfe/rpt/RPT_Extreme/student.html

Inquiry Opportunity

Create a research opportunity that encourages students' curiosity about fiber and the animals that produce it. Fiber is produced by many animals, including sheep, goats, rabbits, bison, alpacas, llamas and even camels. Provide samples of a variety of yarn for students to experiment with. Ask students to compare different types of yarn to determine the "best" type of fiber. Students must first define what constitutes a high-quality fiber, and then develop tests to measure the quality of their given fiber. Possible characteristics may include strength, durability, feel, price per unit and more. Brainstorm with the class potential measuring criteria and discuss the effectiveness of each criteria in measuring quality. Have students execute their experiments by following the scientific method and carefully recording each step of the process. Ask each group to share with the class which fiber they deemed as "high quality" and why.

Books About Animals with Unique Jobs

Haugen, Brenda. **Unusual Farms**. Compass Point Books, 2004. Learn about some specialized farms such as tree, llama, silkworm, and fish farms. ISBN 978-0-7565-0668-1

Herriot, James. **Only One Wolf**. St. Martin's Press, 1993. A Yorkshire vet tells the story of two sheepdog puppies, Gyp and Sweep, born on Mr. Wilkin's farm.

Hodges, Meredith. **Jasper: The Story of a Mule**. Lucky Three Productions, 2003. A heartwarming story that introduces children to mules and donkeys in an educational and entertaining way. ISBN 978-0-9702309-8-0

Kalman, Bobbie. **Hooray for Sheep Farming**. Crabtree, 1997. Introduces the raising of sheep for wool; covers aspects like shearing, lambs, sheep dogs, wool processing, farm maintenance, and the proper care of sheep. ISBN 978-0-86505-669-5

Paulsen, Gary. **The Haymeadow**. Yearling, 1994. John Barron is asked to spend the summer taking care of six sheep and is not quite sure how he will survive. ISBN 978-0-440-40923-6

Wolfman, Judy. **Life on a Goat Farm**. Carolrhoda Books, 2001. Describes the practices that occur on a goat farm and includes information on breeds, care, milking, and more. ISBN 978-1-57505-515-2

GATE Adaptation

Focusing on livestock with unique jobs, assign each student a species to "ranch." Each student will investigate the species and develop a business plan for their new ranching endeavor. The business plan will include:

- A model of the ranch, to scale, showing the different structures on the ranch and enough acreage for the herd. Students should define the purpose of each structure and write a narrative justifying the space allotted.
- A budget that thoroughly identifies possible expenses and income. Students can assume that the land and structures are pre-existing. Students may want to include possible vet fees, feed, bedding, halters, marketing costs, etc. Income may include profits from harvest and selling manure, meat, fiber, etc. Research approximate prices to determine a reasonable budget.
- A ranch name and logo. What are some tools needed to market each product? If resources are available, have students design a web site to help market their livestock.

Give each student an opportunity to share their progress on a regular basis, allowing the class to share ideas that may help with the success of the project.

The Clever Consumer

Extension Ideas

1. A value-added product is a raw agricultural product grown by the farmer and modified in order to turn it into another product with a higher net worth. Examples of value-added products include pre-sliced apples, complete salad kits and pre-cooked rice. As a class, determine the true value of these products. With each group selecting a different value-added product, ask students to record the price of the product. Next, consider the product in its raw form and determine the amount of time—and possibly additional ingredients—needed to modify the product. How much time are consumers saving by buying value-added products? How much are we willing to pay for value-added products? How much is our time worth? Lead a class discussion to determine the pros and cons of buying value-added versus raw products. Visit www.sarep.ucdavis.edu/CDPP/valueadded.htm to read profiles of farms that offer value-added products for consumers.
2. Advertisements are a powerful marketing strategy. Advertisers use jingles, giveaways, cartoon characters and celebrities to entice consumers to buy products. Instruct students to tune into food ads while watching TV. Students that do not have televisions may peruse magazines and newspapers to find advertisements. For one half-hour, ask students to record what they see on a chart similar to the one below. Discuss the results in class.

Type of food	Brand name	Ad medium	Overall message

3. Farmers and ranchers receive an average of 19 cents out of every retail dollar spent on food that is eaten at and away from home. These 19 cents pay for fertilizers, seed, feed, construction and repairs, labor, livestock, machinery, rent, fuel and much more. After all these expenses, farmers take 3.5% of the 19 cents home as profit. Have students use the information below to create a pictograph. Work as a class to determine which careers are involved in each category.

Expense	Percent of Food Dollar
Off farm labor	38.5%
Packaging	8%
Transportation	4%
Energy	3.5%
Profits	4.5%
Advertising	4%
Depreciation	3.5%
Rent	4.5%



Interest	2.5%
Repairs	1.5%
Business taxes	3.5%
Other costs	3%
Farm	19%

Guest Speaker Idea

- Grocery stores use many different strategies to gently persuade consumers to buy certain products. Invite a grocery store manager to the class to talk about the importance of these strategies. Prior to their visit, challenge students to research marketing influences such as store layout, planograms, shelf talkers, music and lighting, end caps, and point of purchase displays. Students can use their discoveries to brainstorm questions for the grocery store manager.

Field Trip Idea

- So how *does* food get to the grocery store? Most grocery store chains have distribution centers that receive products from a grower or processor and then re-distribute to grocery store locations throughout the region. Distribution center managers have to work effectively to keep grocery store shelves well-stocked, but not overstocked which could cause increased product waste. Take a field trip to a distribution center and experience the challenges (and successes!) of getting food from the farm to the table quickly and safely.

Technology Opportunity

Online grocery shopping is becoming a popular way for consumers to do their weekly grocery shopping without leaving the house. Visit a grocery store Web site, such as www.safeway.com, to experience online shopping. Instruct students to work in groups to develop a menu for a healthy meal, using MyPyramid as a guide. As a group, students make a detailed list including each ingredient needed to make the meal. Using online shopping tools, individual students compete with the rest of their group to see who can make meal for the lowest price.

Inquiry Opportunity

One way to reduce the amount of money spent on groceries is making sure food does not spoil. Methods of food storage play a critical role in how quickly food spoils. Post-harvest scientists dedicate their careers to determining the best way to store food after it has been harvested. Create a research opportunity that encourages students' curiosity about how they should store produce items by allowing them to be post-harvest scientists for a week. In small groups, instruct students to select a fruit or vegetable, and multiple storage methods for their experiment. Storage methods may include specific temperature and light exposure, storing with other fruits and vegetables vs. produce exclusion, cut vs. uncut, etc. Brainstorm with the class possible storage methods and why they think each method will (or will not) effectively reduce spoilage. Students choose three different treatments for their produce, and regularly monitor the fruits color, texture and appearance. Warn students not to taste the food, as a precaution to microbial growth. Students work in groups to determine the effectiveness of each treatment based on a set criterion. These criteria might include taste, color, softness, smell, etc. Ask students to follow the scientific method and keep a research journal for the duration of the experiment.

Books About Consumers

Leeper, Angela. **Grocery Store**. Heinemann Library, 2004. Take a field trip to a grocery store and learn about how it is organized and how to purchase items. ISBN 978-1-4034-5169-9

Phelan-Sissel, Peggy. **A Visit to the Farmers' Market**. Brain Child Books, 2006. This easy-to-read picture book highlights the benefits of shopping at the farmer's market. ISBN 978-0-9771010-0-9

University of California, Davis. **Shaping Agriculture in the 21st Century**. Agricultural Issues Center, 1995. This report covers the impact of science, environmental perspectives, and economic factors that will affect agriculture in the next century.

ELL Adaptation

Encourage students to create a visual illustrating the health benefits of different food items. Instruct each group to bring to class a nutrition facts label for a healthy product. If students would like to use the nutrition facts label for a fresh fruit or vegetable, labels for some produce items can be found by visiting www.harvestofthemonth.com/EdCorner. Using butcher paper, ask each group to draw an outline of the human body. Next, students use encyclopedias or online sources to research each beneficial nutrient listed on their nutrition facts label and determine which specific health benefits each nutrient provides to the human body. Instruct the groups to visually illustrate the health benefits on their drawing of the human body. If there are any connections to disease prevention, have students record their findings on a separate piece of paper. Ask each group to present their "body" to the class.

CFAITC Resource

Check out CFAITC's resource, **Edible Numbers**. Through a series of activities, third through sixth grade students analyze, using mathematical and scientific processes, the food they buy at the grocery store and understand that it ultimately comes from plants or animals. Includes grocery ad scavenger hunts. www.cfaitc.org/LessonPlans