

Air

What's Growin' On?

Elements for Life



Water



Sun



Soil



California Foundation for
Agriculture in the Classroom

A NEWSPAPERS IN EDUCATION SUPPLEMENT

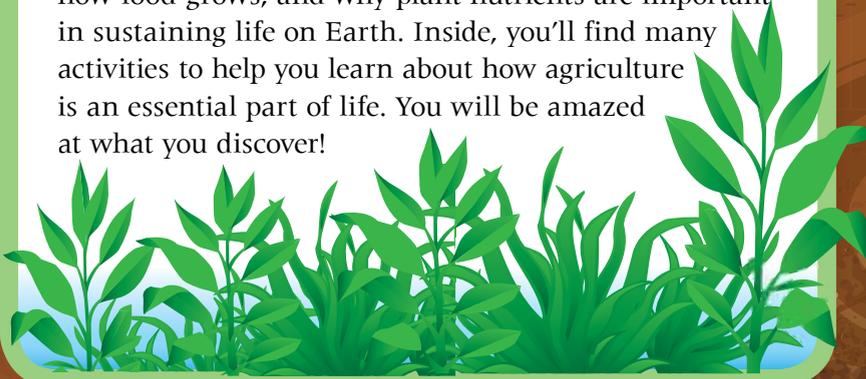
For an accompanying Teacher's Supplement, visit www.LearnAboutAg.org/wgo or call (800) 700-AITC.

Nutrients for a Healthy Life

Nutrients provide nourishment essential for growing and staying healthy. They are important for every living thing—including us! Consuming the right nutrients, such as vitamins and minerals, can help us be smarter, stronger, and healthier. The plants we eat provide us with nutrition, but they—just like us—require nutrients to grow. These essential nutrients are found in the air, water, and soil, and through photosynthesis. This edition of **What's Growin' On?** will help you understand the many ways that California agriculture sustains life.

Plants are an important part of California agriculture. From the pear in our lunch to the jeans that we wear and the homes that we live in—plants provide us with **Elements for Life**. That's why it's so important to replenish the land that we use with the proper nutrients and elements. This edition of **What's Growin' On?** will help guide you in your discovery of the elements that plants need to grow and how agriculture impacts the world around us. Throughout the newspaper, look for "Conservation Connections." These interesting facts introduce some of the ways that California farmers and ranchers care for the environment to conserve our natural resources.

In this newspaper, you will discover how to sustain healthy plants and a healthy lifestyle through California agriculture. Investigate where your food comes from, how food grows, and why plant nutrients are important in sustaining life on Earth. Inside, you'll find many activities to help you learn about how agriculture is an essential part of life. You will be amazed at what you discover!



A message for teachers...

For the past 11 years, California Foundation for Agriculture in the Classroom has produced **What's Growin' On?** to help students discover the many ways agriculture impacts their daily lives. This year's edition, **Elements for Life**, is inspired by the essential elements needed to live a healthy and productive life. For children, this might mean the nutritious food, warm clothing, and protective shelter provided by California farmers and ranchers. For plants, this might mean clean water, healthy soil, and ample sunlight. The articles and activities featured in **What's Growin' On?** are designed to educate students about how agriculture truly provides **Elements for Life**.

As a teacher, you have the opportunity to influence your students to become good stewards of our environment. Throughout the newspaper, look for "Conservation Connections," a feature highlighting how farmers conserve resources for future generations.

Each annual edition of **What's Growin' On?** is developed by educators and reviewed by leading agriculture industry experts to provide accurate and factual information. The activities on the following pages meet Content Standards for California Public Schools and the Common Core State Standards for grades three through eight, while encouraging students to explore the countless ways agriculture is part of their lives.

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Something's Fishy

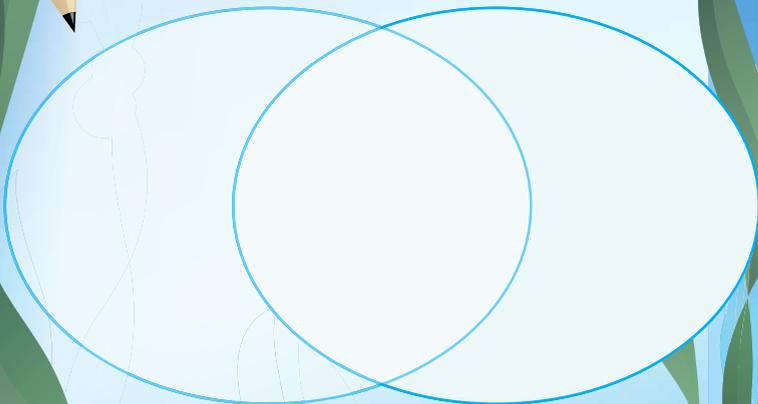
Aquaculture is the farming of plants and animals in water. Aquaculture is different from fishing. Fishing involves hunting and catching wild fish, while aquaculture involves cultivating aquatic plants and animals under conditions that the farmer can control.

Seaweed

“Seaweed” is the common name for numerous species of marine plants. One group, called algae, range in size from microscopic algae to the enormous giant kelp that grows in sea forests. Kelp are chock-full of vitamins, minerals, and fiber, and are used in making ice cream, jelly, toothpaste, and other consumer products.

Activity

Complete the Venn diagram to illustrate the differences and similarities between algae and other plants. Use encyclopedias, websites, and other research tools to learn more about the topic. Think about structures, scientific classification, growing environments, and uses.



Standards: Science – Grade 3: 3b; Grade 4: 3b; Grade 5: 2a; Grade 7: 5a

Shellfish

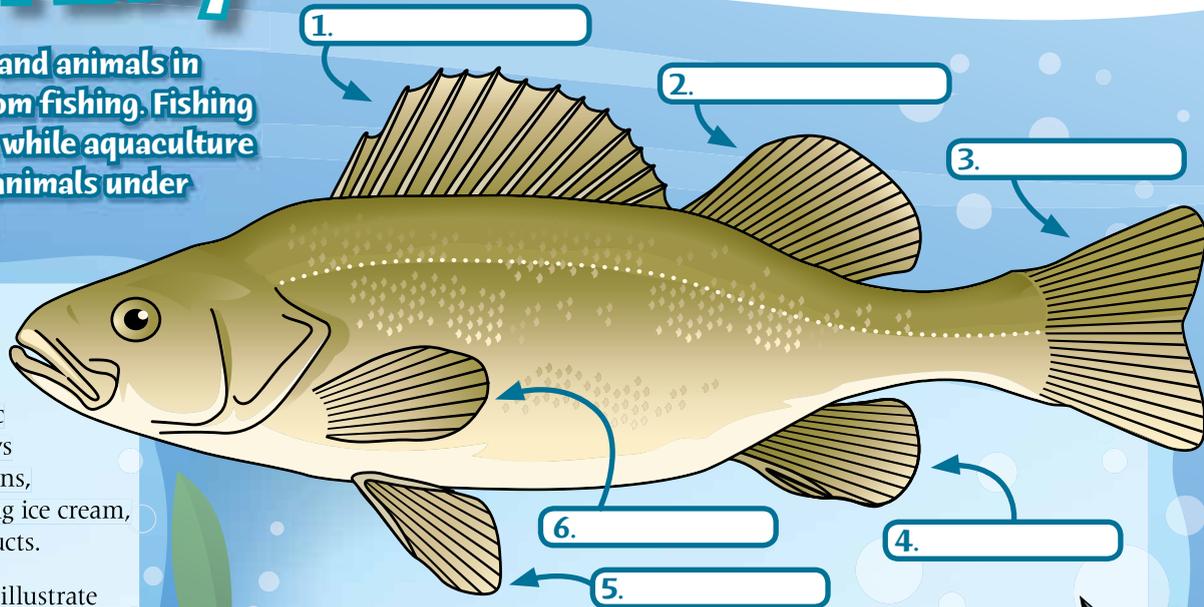
Shellfish is a common name given to aquatic animals with a hard exterior, such as mussels, clams, oysters, abalone, and shrimp. Shrimp have an external covering called an exoskeleton, which is periodically shed and discarded as the shrimp grows. Mussels, clams, oysters, and abalone do not shed their shells, but add new shell as their body continues to grow.

Activity

Shrimp are the most popular shellfish and, on average, Americans consume 4.1 pounds of shrimp each year. Given the pounds consumed per person per year, estimate how much shrimp each population will consume.

Population	Pounds
Your family	
Your class	
Your school	
Your city	

Standards: Mathematics – Grade 3: 3.OA.2, 3.OA.3, 3.OA.7, 3.NBT.3; Grade 4: 4.OA.2, 4.NBT.5; Grade 5: 5.NBT.5, 5.NBT.7; Grade 6: 6.RP.1, 6.NS.3; Grade 7: 7.RP.1



Fin Fish

Fin fish is just another common name given to fish. However, not all fish have fins, or the fins have been modified so that they are not apparent as fins (hagfish and eels). The size, location, and type of fins are closely related to the fish's way of life. Catfish, trout, sturgeon, and bass are examples of fish that are farmed in California.

Fins are appendages fish use to maintain position, move, steer, and stop. Different species of fish may vary in the exact positions of the fin. There are single fins along the centerline of the fish—the dorsal (back) fins, which include the spiny dorsal fin and soft dorsal fin, anal fin, and caudal (tail) fin. Fish also have paired fins, which include the pectoral (chest) and pelvic (hip) fins. The dorsal and anal fins primarily help stabilize the fish. The caudal fin is the main fin for **propulsion** to move the fish forward.

Activity

Use the underlined words in the text to label each type of fin!

Answer key: 1) spiny dorsal fin; 2) soft dorsal fin; 3) caudal fin; 4) anal fin; 5) pelvic fins; 6) pectoral fins

A Simple & Sweet Snack

California Raisins

How Raisins Are Made:

Dried on the vine

or

Hand-picked clusters

Dried by the sun

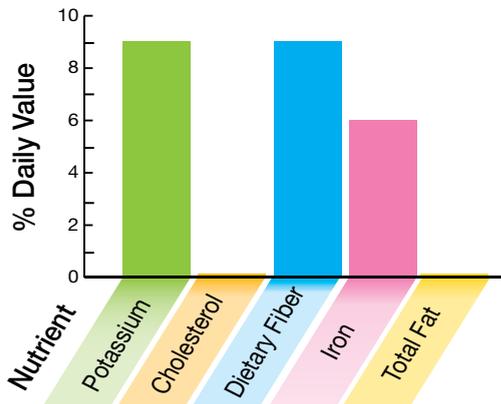
Rolled into bundles

Prepared for market

Nutrition Facts

Raisins are fat- and cholesterol-free, naturally low in sodium, with potassium and fiber. The ingredient label shows it's just raisins inside every box. Read the graph "Nutritional Value of Raisins" to complete the nutrition facts label.

Nutritional Value of Raisins



Nutrition Facts

Serving size: ¼ cup % Daily Value

Total Fat

Potassium

Cholesterol

Dietary Fiber

Iron

Standards: Health – Grade 4: Nutrition and Physical Activity (NPA) 3.2.N; Grade 5: NPA 1.2.N, 3.2.N 4.1.3; ELA – Grade 3: Reading Informational Text (RIT) 7; Grade 4: RIT 7

Activity

Locate and color the five top raisin producing counties in California. These five counties produce 99 percent of the nation's total production.

Fresno, Madera, Tulare, Kern, Kings

Use weather maps (radar.weather.gov) to compare the weather in these five counties. What do they have in common?

Use soil maps (websoilsurvey.nrcs.usda.gov) to compare the soil conditions in these five counties. What do they have in common?

Standards: History-Social Science – Grade 3: 3.1, Grade 4: 4.1.3; Science – Grade 4: 3b, Grade 5: 4d

Recipe

California Raisin Trail Mix

- 1 cup dry cereal
- ½ cup chopped almonds
- ¼ cup raisins
- ¼ cup chopped dried apricots
- ¼ cup yogurt chips
- Mix all ingredients together.

Serves 4

Activity

Express the following recipe ratios in simplest form.

Ingredients	Ratio
apricots : raisins	
cereal : raisins	
almonds : yogurt chips	

Standards: Math – Grade 6: 6.RP.1, 6.RP.3d

Conservation Connection

California raisins are dried by a renewable energy source—the sun. **Oxidation** and **caramelization** of the naturally-occurring sugars result in the fruit's dark color.

Sources: California Raisin Marketing Board (www.loveyourraisins.com), Produce for Better Health Foundation (www.fruit-and-vegetablesmorematters.org), University of California Cooperative Extension (ucce.ucdavis.edu/files/datastore/391-316.pdf)

Get Cultured

Yogurt is a **fermented** dairy product made by adding bacteria to milk, which causes the transformation of the milk's sugar, lactose, into lactic acid. This process gives yogurt its tart flavor and pudding-like texture, a quality that is reflected in its original Turkish name, "yoghurtmak," which means "to thicken."

How Yogurt is Made

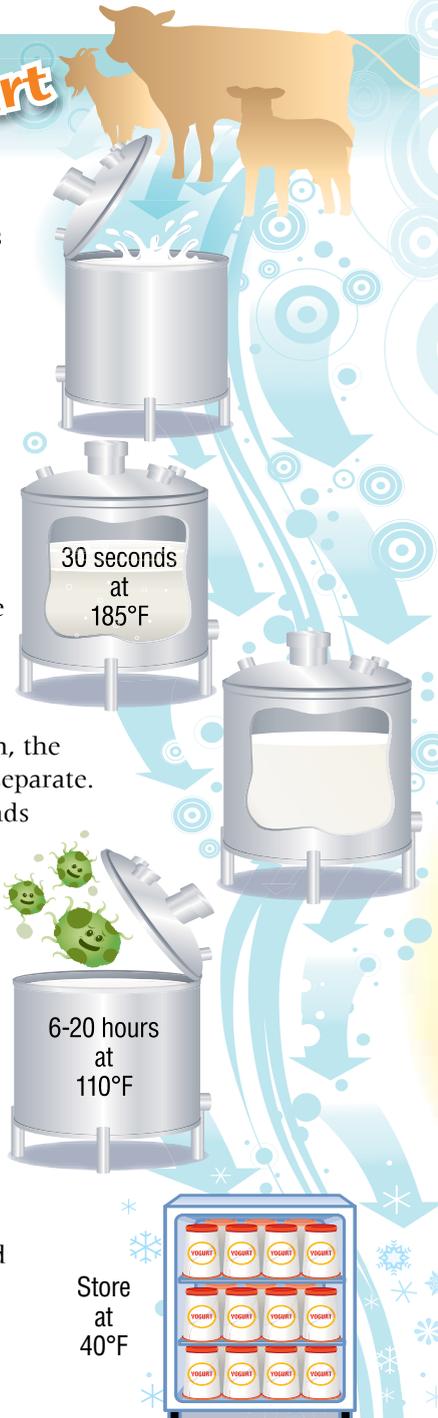
Milk: Typically cow's milk is used to make yogurt, but sheep and goat's milk may be used too.

Pasteurization: This process heats milk to kill bacteria that may be harmful to humans and increase the shelf-life of milk products.

Homogenization: During pasteurization, the milk and the cream separate. Homogenization blends the milk and cream together again.

Fermentation: Live **bacteria cultures** are added to the tank.

Package and store: The yogurt is packaged into plastic containers and stored in a refrigerator for delivery to grocery stores across the United States.



Recipe Yogurt Guacamole

- 1 package (8 oz.) cream cheese, softened
- 1 carton (16 oz.) plain yogurt
- 4 ripe avocados
- 1 cup salsa verde
- 2 teaspoons lemon or lime juice

Beat cream cheese in a mixing bowl with electric beaters. Beat in yogurt until smooth. Peel, seed, and mash avocados with a fork in a small bowl. Add to yogurt mixture along with salsa and lemon juice. Serves 48.



Activity

Re-write the recipe to serve 6 people.
Hint: Use fractions.

- _____ package (8 oz.) cream cheese, softened
- _____ carton (16 oz.) plain yogurt
- _____ ripe avocado
- _____ cup salsa verde
- _____ teaspoon lemon or lime juice

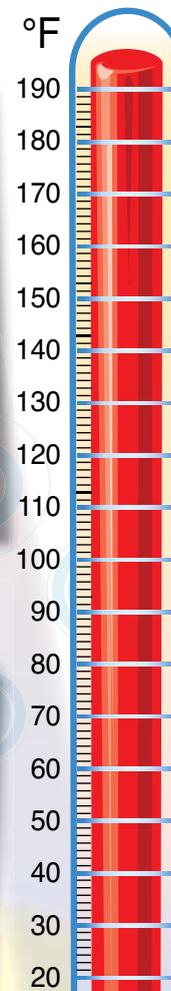
Standards: Math – Grade 3: 3.OA.3; 3.NF.1; Grade 4: 4.NF.4a; Grade 5: 5.NF.3

Did You Know?

A one cup serving of low-fat or non-fat yogurt contains calcium and vitamin D for strong bones and teeth, protein for lean muscles, and vitamin A for growth and eyesight.

Tech Check

Scan the QR code for a video about making yogurt.



Activity

Use the thermometer to record and label the average temperature for:

- Yogurt pasteurization
- Yogurt fermentation
- Yogurt storage
- A winter day
- A summer day
- A tropical climate
- A Mediterranean climate
- Your body
- Your classroom

Standards: Science – Grade 3: 5c; Grade 4: 6e; Grade 5: 6g; Grade 7: 7d; ELA – Grades 3: Reading Informational Text (RIT) 4, 7; Grade 4: RIT 4, 7; Grade 5: RIT 4, 7; Grade 6: RIT 4, 7

The Tomato Trek

The Journey to California

The first tomatoes can be traced to the South American Andes Mountains where they grew wild as cherry-sized berries. Padres following the Spanish conquistadors likely sent the first seeds to Spain in the early 1500s. The fruit gained little attention in Spain, but soon traveled to Italy—a country that embraced tomatoes with great passion. By the mid-sixteenth century, English colonists brought tomatoes back to the Americas, settling in the northeastern part of the country. Tomatoes likely reached California by the late 1700s, as Spanish missions were established throughout the state.



Activity

Draw arrows to track the tomato's journey from its origin to California.



Standards: ELA – Grades 6-8: Reading in History-Social Science 3, 7; History-Social Science – Grades K-5: Chronological and Spatial Thinking 1, 4; Grades 6-8: 1, 3

Tomatoes on Trial



In 1893, the U.S. Supreme Court heard a case to determine whether the tomato was a fruit or a vegetable. In the case of “Nix v. Hedden,” the tomato was declared a vegetable, along with cucumbers, squash, beans, and peas.

Use the historical report from the trial (caselaw.lp.findlaw.com/cgi-bin/getcase.pl?court=US&vol=149&invol=304) to record at least three arguments as to why tomatoes should be classified as a fruit or a vegetable. Use your findings to support your stance in an oral debate.

The Great Debate

Fruit	Vegetable
1.	1.
2.	2.
3.	3.

Standards: Science – Grade 3: 5b; Grade 7: 5f; ELA – Grade 3: Reading Informational Text (RIT) 2, Writing 1b, Speaking and Listening (SL) 1; Grade 4: RIT 2, Writing 1b, SL 1; Grade 5: RIT 2, Writing 1b, SL 1; Grade 6: 1b, SL 1; Grade 7: 1b, SL 1; Grade 8: 1b, SL 1; History-Social Science – Grades 6-8: Research, Evidence, and Point of View 3, 4; Historical Interpretation 2, 3

Sources: California Tomato Growers Association (www.ctga.org)

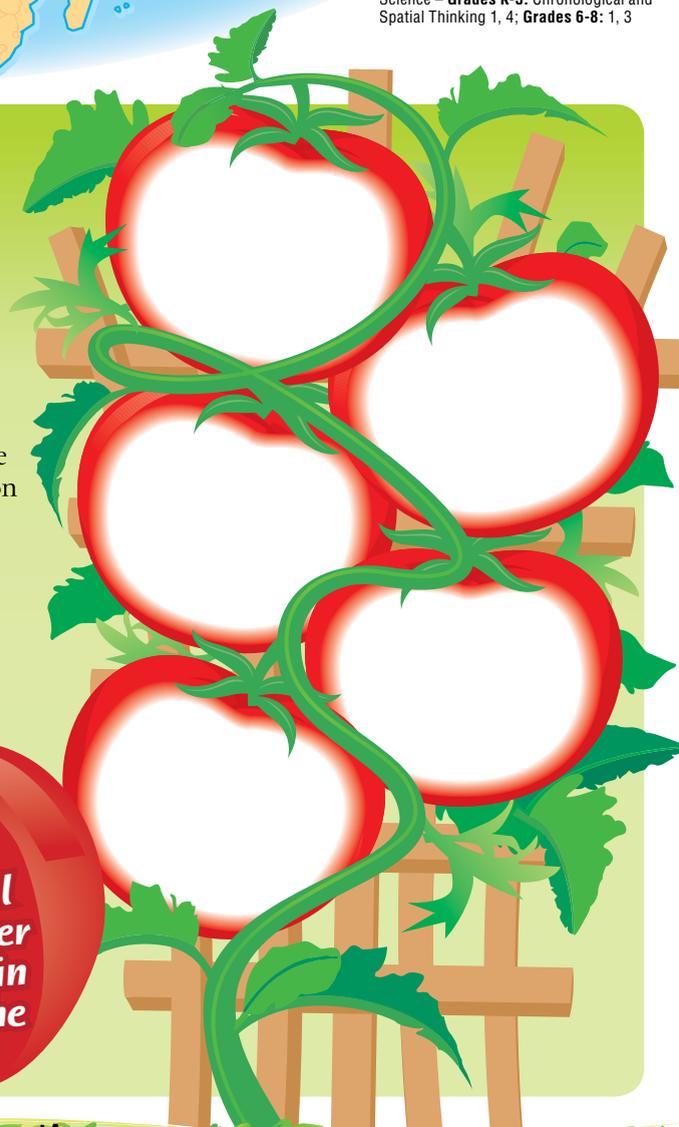
Tomato Vine Timeline

Use the information on this page to create a timeline featuring significant events in tomato history. Include the date and description of each event, in chronological order.

Standards: ELA – Grades 3-5: Reading Informational Text 9; Grades 6-8: Reading Informational Text 9; History-Social Science – Grades 6-8: Chronological and Spatial Thinking 2

Did You Know?

The mechanical tomato harvester was developed in California in the 1950s.



Home on the Range

Cattle, Horses, and Hay

Horses

Horses are as important to ranching today as they were 100 years ago. Historically, horses were used to herd cattle during **cattle drives** and **round ups**. Horses are still the first choice for herding cattle. They keep cattle calm, can navigate rocky terrain, and run on renewable energy—hay.

Beef Cattle

Columbus introduced cattle to the U.S. in 1493. They arrived in California in 1773 to supply the early missions with food, **tallow**, leather, and other necessities.

Cattle graze on land too steep or hilly for building houses, or too rocky and dry for growing crops.

Cattle promote grass growth, thanks to nutrient-rich manure, and reduce **erosion**, thanks to hooves that **aerate** the soil.

Hay

Hay is fed to cattle, horses, and other livestock when grazing is not an option in the winter.

Alfalfa is a type of hay produced in California and commonly fed to cattle and horses.

Alfalfa plants enhance soil health by adding nitrogen back into the soil.

Did You Know?
Beef cattle are raised in every California county except San Francisco.

Tech Check

Check out *Ranching in California*, a YouTube video that provides a brief history of California's ranching heritage. After watching the video, use www.popplet.com to organize the main ideas, key details, historical events, and current challenges facing ranchers.

Standards: ELA – Grade 3: Reading Informational Text (RIT) 1, 2, 4, 7; Grade 4: RIT 1, 2, 4, 7; Grade 5: RIT 1, 2, 4, 7; Grade 6: RIT 1, 2, 4, 7; Grade 7: RIT 1, 2; Grade 8: RIT 1, 2; History-Social Science – Grades K-5: Chronological and Spatial Thinking 1, Historical Interpretation 1; Grades 6-8: Chronological and Spatial Thinking 1, Historical Interpretation 3

Sources: California Cattlemen's Association (www.calcattlemen.org), American Farm Bureau Foundation for Agriculture Beef Ag Mag (www.ageducate.org), California Beef Council (www.calbeef.org)

Activity

Which component of the ranch—cattle, horses, or hay—provides the biggest benefit to the environment?

Write an opinion statement and provide at least three pieces of supporting evidence.

I think that...

Evidence 1: _____

Evidence 2: _____

Evidence 3: _____

Standards: ELA – Grade 3: Writing 1, Reading Informational Text (RIT) 1, 4; Grade 4: Writing 1, RIT 1, 4; Grade 5: Writing 1, RIT 1, 4; Grade 6: Writing 1, RIT 1, 4; Grade 7: RIT 1; Grade 8: RIT 1

Conservation Connection

When cattle graze they reduce the length of the grass. This helps reduce the spread of wildfires since there is less material to fuel the flames.

What Goes Around...

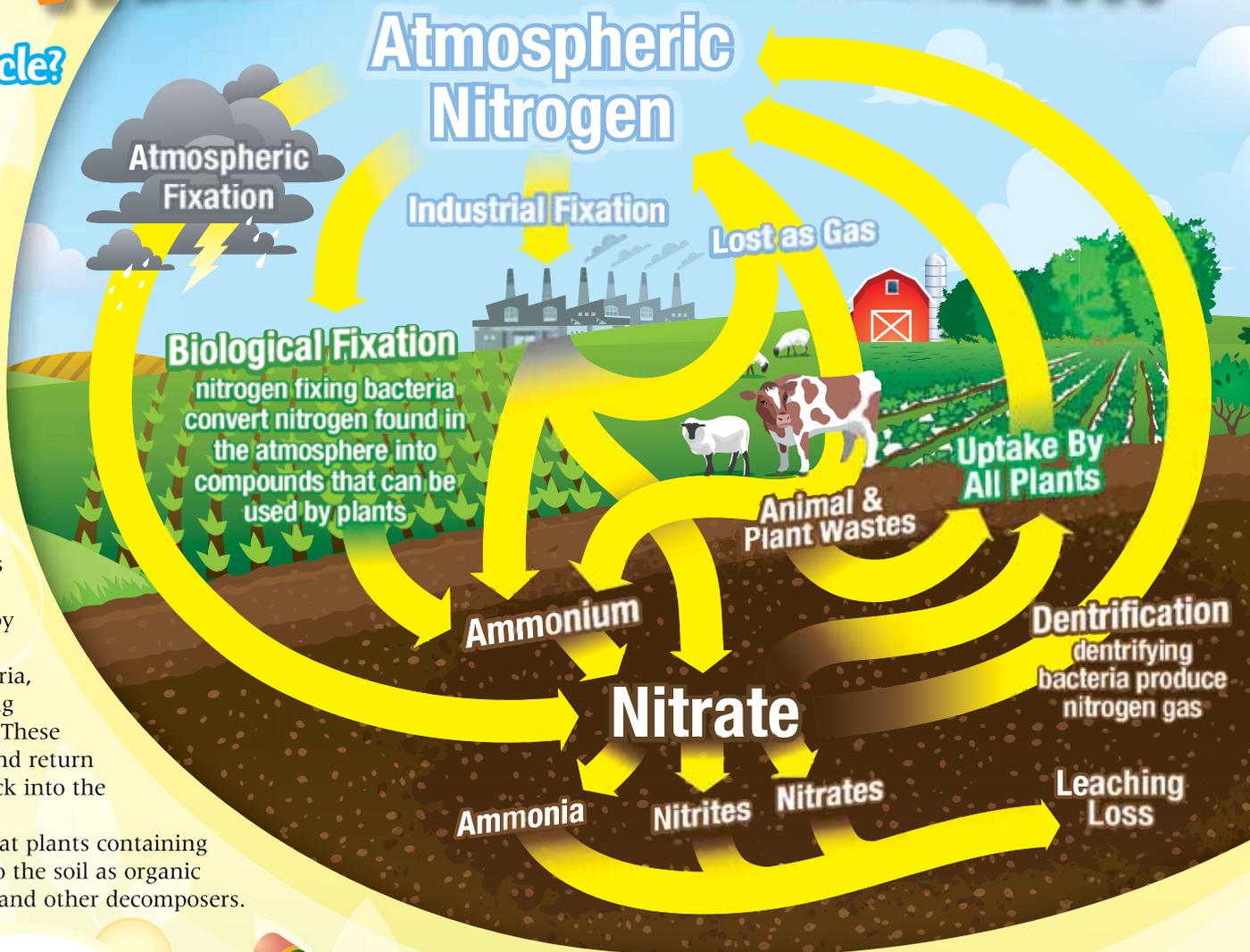
What is the nitrogen cycle?

Nitrogen is the most common gas found in the earth's atmosphere. It is necessary for plant growth and for the survival of all ecosystems. Free nitrogen—the nitrogen found in the atmosphere—is all around. Nitrogen in this form is unusable to most living things. It must first be converted or 'fixed' into a more usable form.

In the nitrogen fixation part of the cycle, nitrogen-fixing bacteria found in the soil and roots of certain plants convert free nitrogen into substances that other organisms can use. When the fixing process is finished, free nitrogen is converted into nitrates, nitrites, and ammonia. These substances can be used by plants. As the plants become food, the nitrogen can be used by animals.

Just as there are nitrogen-fixing bacteria, some bacteria have the job of denitrifying the soil to keep the nitrogen in balance. These bacteria take the nitrogen compounds and return them to nitrogen gas that is released back into the atmosphere.

In another part of the cycle, animals eat plants containing usable nitrogen. That nitrogen returns to the soil as organic material and is decomposed by bacteria and other decomposers.



Activity

Determine the number of atoms in each compound.

Standards: Science – Grade 8: 3b, 3f

Nitrate: NO_3^-
N = ___ O = ___

Nitrite: NO_2^-
N = ___ O = ___

Ammonium: NH_4^+
N = ___ H = ___

Activity

Use print and digital reference materials (dictionaries, thesauruses, glossaries) to determine the pronunciation and meaning of the terms. Match each term with its definition.

Term	Definition
___ Nitrogen cycle	a. Nitrogen in the atmosphere is converted into ammonia.
___ Nitrogen	b. A product of nitrogen fixation, used as a fertilizer in agriculture.
___ Bacteria	c. An organism in the soil involved in every step of the nitrogen cycle.
___ Ammonia	d. The primary gas in the atmosphere.
___ Denitrification	e. Bacteria convert ammonia into nitrites, and then to nitrates.
___ Deficiency	f. To lack something, such as necessary nutrients.
___ Nitrogen fixation	g. Bacteria convert nitrates back to gaseous forms.
___ Nitrification	h. The continuous recycling of nitrogen.

Tech Check

Visit www.growingthenextgeneration.com for kid-friendly videos, educational games, interactive visualizations, and a forum called "Ask the Agronomist."

Comes Around

Plant Nutrients

A fertilizer is any type of substance that is added to soil or water to increase the nutrients available to plants.

Letter to a Farmer

Dear Farmer Kenny,
Who helps farmers decide how much fertilizer to put on their soils so that crops are healthy?
Sincerely,
Olivia
Fresno, CA

Dear Olivia,

Farmers need to know a lot about their fields in order to determine the right amount of fertilizer to put on their crops, but there are no magic answers. Here are some of the things farmers use to determine the amount of nutrients their crops need:

The amount of useable nitrogen already in the soil—this can be determined by taking samples and sending them to a laboratory.

The kind of soil the farmer has—some soils are a better storehouse of nitrogen and other nutrients, others need more nutrients added.

The crop the farmer intends to grow—some crops, like alfalfa and soybeans, can make their own nitrogen, with the help of soil microbes.

The amount of crop the farmer wishes to grow—the larger the crop, the more nutrients needed.

Sincerely,
Farmer Kenny



Activity

Nitrogen is all around us! It is a naturally occurring element in the earth's atmosphere. Complete the chart by converting the percentages to decimal and fraction form. Create a pie chart to illustrate the amount of each element in the atmosphere.

Element	Percent	Decimal	Fraction
Nitrogen	78		
Oxygen	21		
Other (argon, carbon dioxide)	1		

Standards: Math – Grade 4: 4.NF.2, 4.NF.5, 4.NF.6; Grade 5: 5.NBT.3a; Grade 6: 6.RP.3c; Science – Grade 4: 6e; Grade 5: 6g, 1g, 1h

Activity

Identify the element symbol for each nutrient. Draw a personalized graphic that represents the agricultural benefit of each nutrient.

	Benefit	Element Symbol	Origin	Graphic
Nitrogen	Helps plants grow quickly, promotes fruit and seed development.	<input type="text"/>	Nitrogen is everywhere. Primarily found in the earth's atmosphere, it also occurs in all living organisms.	
Phosphorous	Stimulates root growth, helps flowers bloom.	<input type="text"/>	Phosphorus comes from fossilized sea creatures mined from rock deposits in the earth.	
Potassium	Helps plants resist pests, disease and drought, essential for photosynthesis.	<input type="text"/>	Potassium comes from potash, a salt that is mined from evaporated ocean beds.	

Activity

Determine the main idea of the farmer's letter and list the key points.

The Main Idea



Key Points

- 1
- 2
- 3
- 4

Standards: ELA – Grade 3: Reading Informational Text (RIT) 3; Grade 4: RIT 3; Grade 5: RIT 3; Grade 6: RIT 2

Conservation Connection

Firefighters use clay and fertilizer as a fire retardant. The mixture helps control wildfires while providing the nutrients needed for re-growth.

Activity

Check your local newspaper ads for bags of fertilizer. Record the N-P-K ratio and calculate the cost per pound.

- -
 (N) (P) (K)
 Cost per pound:

Standards: Math – Grade 4: 4.MD.2; Grade 5: 5.NF.3

A is for Avocado

Growing your own ornamental houseplant from an avocado seed is fun and easy.

Just follow the six steps below.



Wash the seed.

Suspend the seed (broad end down) over a water-filled glass using three toothpicks. The water should cover about an inch of the seed.

Place the glass in a warm location, out of direct sunlight. A mature seed will crack as roots and stem sprout in about two to six weeks.



When the stem grows to six or seven inches, cut it back to about three inches.

When the roots are thick and the stem has leafed again, plant it in a rich humus soil, leaving the seed half exposed.



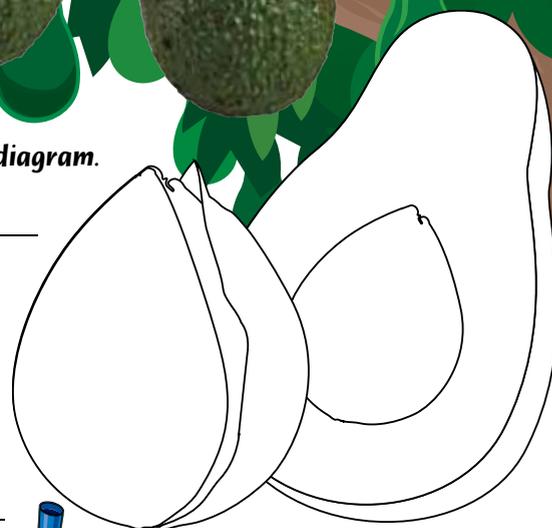
Water your avocado houseplant generously, allowing it to dry out somewhat between waterings.

*Avocado trees require grafting to produce fruit. It is rare for an avocado houseplant, grown from a seed, to bear fruit.

Avocado Anatomy

Cut open an avocado seed. Use online or print resources to identify, draw, and label the seed parts: embryo, hypocotyl, radicle, cotyledons, and seed coat.

Complete the diagram.



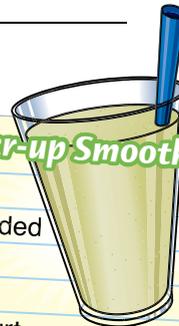
Standards: Science – Grade 3: 3a; Grade 7: 5f

Recipe

California Avocado Power-up Smoothie

- 1 cup orange juice
- 1 ripe avocado, peeled and seeded
- 1 ripe banana
- 1 tablespoon honey
- 1 cup non-fat vanilla frozen yogurt

Combine orange juice, avocado, banana, and honey in a blender. Cover and blend until mixture is smooth. Add frozen yogurt; process again until thick and smooth. Serves 3.



Activity

Re-write the recipe to serve your entire class.

Hint: 1 cup = 16 tablespoons.

- ___ cups orange juice
- ___ ripe avocados, peeled and seeded
- ___ ripe bananas
- ___ cup honey
- ___ cups non-fat vanilla frozen yogurt

Standards: Math – Grade 3: 3.OA.1, 3.OA.3, 3.OA.7; Grade 4: 4.OA.3, 4.NBT.6, 4.MD.2

Nutrition Facts

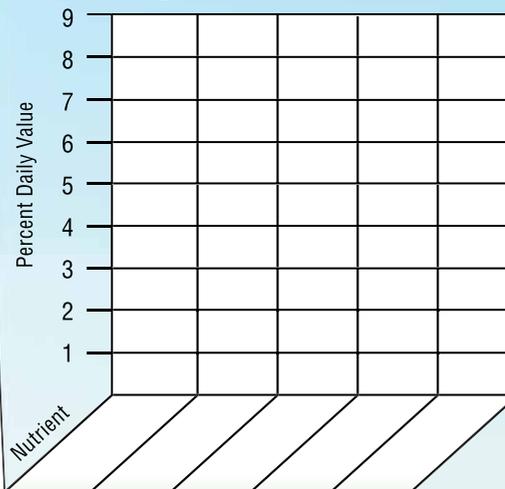
Serving size 1/5 medium avocado

Amount per serving	% Daily Value*
Calories 50	Calories from fat 35
% Daily Value*	
Total Fat 4.5g	7%
Saturated Fat 0.5	3%
Trans Fat 0g	
Polyunsaturated Fat 0.5g	
Monounsaturated Fat 3g	
Cholesterol 0mg	0%
Sodium 0mg	0%
Potassium 150mg	4%
Total Carbohydrate 3g	1%
Dietary Fiber 2g	8%
Sugars 0g	
Protein 0g	
Vitamin A 0%	• Vitamin C 4%
Calcium 0%	• Iron 2%
Vitamin E 4%	• Thiamin 2%
Riboflavin 4%	• Niacin 4%
Vitamin B6 4%	• Folate 6%
Pantothenic Acid 4%	• Phosphorus 2%
Magnesium 2%	• Zinc 2%
Copper 2%	• Manganese 2%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

Activity

Choose five nutrients from the avocado Nutrition Facts label. Create a bar graph comparing the Percent Daily Value of each nutrient.



Standards: Health – Grade 4: Nutrition and Physical Activity (NPA) 3.2.N; Grade 5: NPA 1.2.N; Grade 7/8: NPA 1.6.N; ELA – Grade 6: Reading Informational Text 7; Math – Grade 3: 3.MD.3; Grade 4: 4.MO.2



Conservation Connection

The roots of avocado trees help reduce storm runoff and the possibility of flooding. By slowing runoff and filtering rain water, orchards can improve water quality.

Sources: California Avocado Commission (CaliforniaAvocado.com)

Walnuts

Health in a Nutshell

Activity

Draw an arrow from each **nutrient** to the part—or parts—of the body that benefit from consuming the **Recommended Dietary Allowance**.

Protein:

This nutrient builds muscle and supports brain health and function.

Phosphorus:

This mineral works with calcium and vitamin D to build strong bones and teeth.

Vitamin A:

This vitamin helps maintain good vision, fight infection, and keep skin healthy.

Potassium:

This mineral helps your brain tell muscles when to move. Potassium also helps keep a healthy blood pressure.

Magnesium:

This mineral helps the body use the energy found in food. Magnesium also tells muscles to move.

Fiber:

This nutrient helps move food through the body to prevent constipation. It also helps control blood sugar levels.

Polyunsaturated fat:

One type of polyunsaturated fat, omega-3 fatty acid, promotes heart health.

Standards: Health – Grade 4: Nutrition and Physical Activity (NPA) 1.1.N; Grade 5: NPA 1.8.N; Grades 7 and 8: NPA 1.1.N, 1.2.N; ELA – Grade 3: Reading Informational Text (RIT) 1, 7; Grade 4: RIT 1; Grade 5: RIT 7

Walnuts for Wellness

Not only do walnuts taste great, but research suggests that walnuts may benefit your health. A one-ounce serving contains dozens of nutrients that support a healthy diet. Read the scenarios to determine which nutrients, many of which are found in walnuts, would support the desired health outcome.



Symptom: Feeling weak and wimpy
Rx _____



Symptom: Trouble seeing the board
Rx _____



Symptom: Stomach ache
Rx _____



Symptom: Can't think straight
Rx _____

Standards: Health – Grade 4: Nutrition and Physical Activity (NPA) 1.1.N; Grade 5: NPA 1.8.N; Grades 7 and 8: NPA 1.1.N, 1.2.N

Activity

Many walnut farmers use micro-irrigation to deliver water to their crops. Small sprinklers provide just enough water for optimal growth, and can reduce water use by 30 percent. Write a letter to the editor summarizing the water shortage in California and informing your audience how farmers and ranchers conserve this precious resource. Cite specific textual evidence from print and online resources to support your view.

Standards: ELA – Grades 3-5: Writing 1, 7; Grade 6: Writing 1, 7; Grades 6-8: Reading for Literacy in Science and Technical Subjects 1

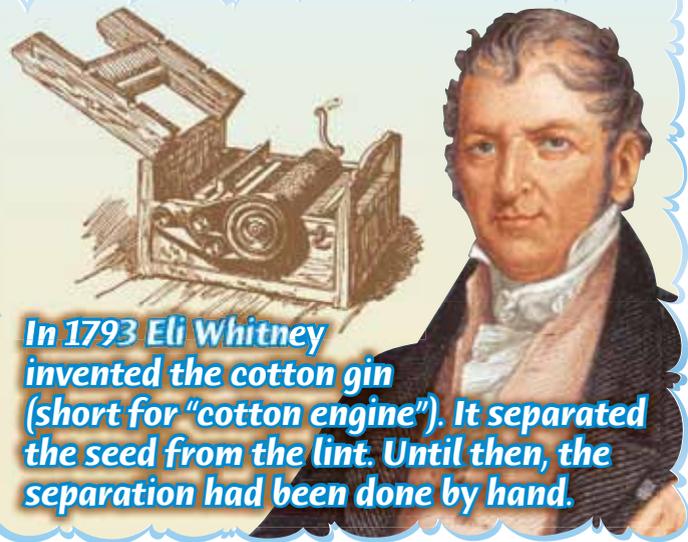
Did You Know?
99 percent of the nation's walnut supply is grown in California.

Sources:
California Walnut Commission (www.walnuts.org),
Network for a Healthy California's Harvest of the Month (www.harvestofthemonth.cdph.ca.gov)

Cotton

More Than Your T-shirt

Cotton is amazingly versatile. Over the centuries, people have found ways to use all parts of the cotton plant. Cotton is used to produce clothing, cosmetics, and money. It is also used to make white paper, bandages, cattle feed, and plastics.



History

When Spanish explorers arrived in California they found a plant that they believed was half plant and half sheep. That plant was cotton, which the Pueblo Indians of the Southwest had been farming for centuries. Today, major production areas in California include Fresno, Kings, Kern, Merced, and Tulare counties.

Standards: History-Social Science – Grade 3: 3.2.2; Grade 5: 5.1.1, 5.2.3; Grade 8: 8.7.1

Activity

Accurately draw and label the parts of a cotton plant using the stem provided.



Bract: The three modified leaves at the base of the cotton boll.



Lint: The raw lint is produced by the cotton plant and separated from the seed at the cotton gin.



Leaf: Leaves convert the light energy captured from the sun into chemical energy to be used for plant growth.



Square: The cotton boll starts out as a square. Inside the square grows a small flower bud.



Flower: The square develops into a flower, the reproductive structure of the plant.



Closed Boll: The flower produces a segmented pod that contains immature seeds. Cotton fibers grow on the outside of the seeds.



Open Boll: The pod splits open along the seams, revealing the fully developed cotton fibers.



Standards: Science – Grade 3: 1a, 3a; Grade 5: 6a; Grade 6: 5a, 6c; Grade 7: 5f

Activity

Use a local newspaper to find 10 items made from cotton. Include food and non-food items.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Standards: Science – Grade 6: 6c

Baling is the final step in processing cotton at the gin. The cotton is pressed into a universal **density** bale, which is 54 inches high, 21 inches wide, 32 inches thick, and weighs 480-500 pounds. Determine the volume of the bale in inches and feet. Express your numbers in decimal form. (Use: $w \times t \times h = v$)

Width (w)	Thickness (t)	Height (h)	Volume (v)
in.	in.	in.	in. ³
ft.	ft.	ft.	ft. ³

Standards: Math – Grade 3: 3.OA.3; Grade 4: 4.MD.1; Grade 5: 5.MD.1, 5.MD.5b; Grade 6: 6.G.2; Grade 7: 7.G.6

Conservation Connection

The stalks and leaves of the cotton plant left after harvesting are shredded and plowed back into the field or composted by farmers to enrich the soil.

It's the pits

California Grown Stone Fruit

Introducing California Stone Fruit

In botany, stone fruit are called "drupes." This term describes a fruit in which an outer fleshy part surrounds a pit, or stone.

Peaches: It takes five years for a peach tree to reach full production. The fruit can have yellow or white flesh and the skin feels velvety. Peach tree leaves are **simple**, long (3 to 6 inches), fold inward, and curve downward.

Apricots: Approximately 95 percent of apricots grown in the U.S. come from California. Apricots are smaller than a peach, yellow to orange in color, often tinged red on the side exposed to the most sun. Apricot leaves are nearly round in shape with **palmate venation**.

Cherries: There are two kinds of cherries, sweet and tart. California farmers primarily grow sweet cherries. They may be red, black, or yellow in color. Cherry leaves are oval to oblong, with a **serrate** edge.

Activity

Identify and match each stone fruit to the most appropriate leaf type. Some leaf types may be a match with more than one fruit.

Nectarines: Nectarines are similar to the peach in appearance, but have a smooth skin. They have red, yellow, or white flesh. The leaves and buds of nectarine trees look similar to peaches—long, glossy, and bright green in color.

Plums: Plums come in a wide variety of colors and sizes. Some are much firmer-fleshed than others. Plums may have yellow, white, green, or red flesh, with varying skin color. Plum leaves are simple, oval to oblong, and come to a point at the end. The leaf margins are **scalloped**.

Appearance

Stone Fruit

Leaf Type



Apricot



Cherry



Nectarine



Plum



Peach



Standards: ELA – Grade 3: Reading Informational Text (RIT) 4, 7; Grade 4: RIT 4, 7; Grade 5: RIT 4,7; Grade 6: RIT 4, 7; Science – Grade 5: 6a

Activity

Using a ruler and the illustrations provided, calculate the exact measurements (in inches) of each fruit in decimal form. Assume that the fruit is a perfect sphere.

Hints: $C = \pi d$ Surface area = $4 \pi r^2$ $V = \frac{4}{3} \pi r^3$

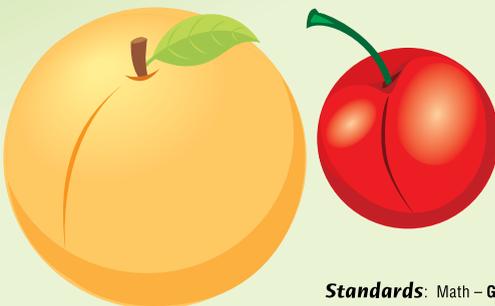
Diameter = _____

Circumference = _____

Radius = _____

Surface area = _____

Volume = _____



Diameter = _____

Circumference = _____

Radius = _____

Surface area = _____

Volume = _____

Standards: Math – Grade 6: 6.G.6, 6.EE.2; Grade 7: 7.G.4, 7.G.7

Imagine this...

Have you ever wondered what it would be like to be a peach? In the award-winning story "Just Peachy," sixth-grade author Nick O'Brien introduces readers to a young peach, Sims, and the quirky "neighbors" he shares a tree with. To read more, visit www.LearnAboutAg.org/imaginethis/2010.

Stalks - The Edible Petiole

Plants have structures that include roots, flowers, leaves, and stems. In botany, the plant part that attaches the leaf to the stem is called the petiole. In plants such as rhubarb, celery, and bok choy, the petiole is unusually large, and is harvested as a crop. We usually call the petiole of these vegetables "stalks."



Use the word bank to identify the parts of the celery plant. Then identify the structures of the stem.

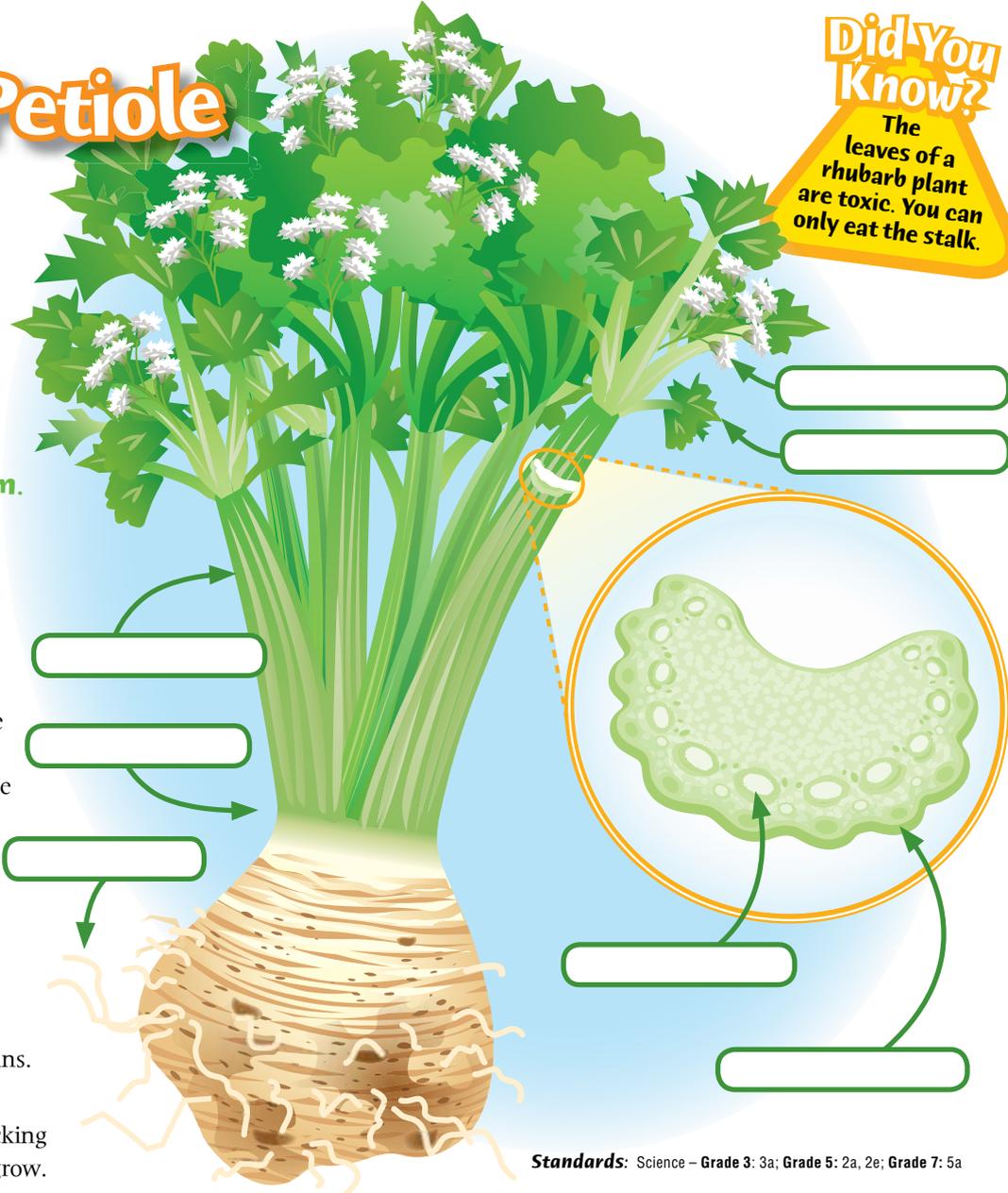
Flowers: The reproductive part of the plant. Celery flowers appear late in the growing cycle, after the stalks would normally be harvested.

Stem: In celery, the stem is the small white part at the base of the plant. The stem protects the vascular system of the plant from environmental damage, and supplies the buds from which the stalks grow.

Petiole: Transports water and nutrients to the leaves and provides support to the leaves during high winds or heavy rains.

Roots: Absorb moisture and nutrients from the ground, sucking them into the plant to help it grow.

Leaves: Capture sunlight to help make food, a process known as **photosynthesis**.



Did You Know?
The leaves of a rhubarb plant are toxic. You can only eat the stalk.

LOL
Q: What did the carrot say to the celery?
Answer below.



Activity

Read the restaurant review section in your local newspaper. Note the reviewer's opinions and the evidence they use to support them. After reading, write your own restaurant review of a fictional café that features stalks in every menu item (entrée, beverages, and even desserts!).

Standards: ELA - Grade 3: Reading Information Text (RIT) 8, Writing 1; Grade 4: RIT 8, Writing 1; Grade 5: RIT 8, Writing 1

Epidermis: A single-layered group of cells that forms a boundary between the plant and the external environment.

Standards: Science - Grade 3: 3a; Grade 5: 2a, 2e; Grade 7: 5a

Vascular bundle: Part of the plant's transport system, includes **xylem** and **phloem**.

Activity

Place the historical events in chronological order by numbering them 1-6.

- Celery was first used as a food by the French around 1632.
- In 2700 B.C., rhubarb was cultivated for medicinal purposes in China.
- After being grown for centuries in China, bok choy made its way to Europe in the early 19th century where it began to be eaten and planted by the Europeans.
- Celery is believed to be originally from the Mediterranean basin around 850 B.C.
- Rhubarb was first introduced to America by a Maine gardener in 1790.
- Archaeologists excavating an ancient Chinese village discovered evidence that bok choy has been cultivated for more than 6,000 years.

Standards: History-Social Science - Grades 3-5: Chronological and Spatial Thinking 1, 2; Grades 6-8: Chronological and Spatial Thinking 1, 2

Sources: Western Growers (www.producepedia.com)

Growing Strong Glossary

Aquaculture (page 3)

Aquatic: Living or growing in, on, or near the water.

Cultivate: To foster growth.

Propulsion: The action of driving or pushing forward.

Raisins (page 4)

Carmelization: The process of sugar browning.

Oxidation: The process of combining with oxygen.

Yogurt (page 5)

Bacteria: Single-celled organisms that live in nearly every environment on Earth.

Culture: To maintain bacteria in a condition suitable for growth.

Ferment: The chemical breakdown of a substance by microorganisms.

Ranching (page 7)

Aerate: To introduce air into a material.

Cattle drive: The process of moving a herd of cattle from one place to another.

Erosion: The process by which the surface of the earth is worn away.

Round-up: To herd cattle together from various places.

Tallow: A hard fatty substance made from animal fat.

Plant Nutrients (pages 8 and 9)

Convert: To change from one form to another.

Microbe: An organism that is microscopic.

Organic material: Substances containing plant or animal matter.

Avocado (page 10)

Ornamental: A plant or tree grown for its appearance.

Percent Daily Value: Information on a Nutrition Facts label that identifies how much one serving of food contributes to meeting daily nutritional needs.

Runoff: Precipitation, snowmelt, or irrigation water that runs off the land into streams or other surface water.

Walnuts (page 11)

Nutrient: A substance that provides nourishment essential for growth and the maintenance of life.

Recommended Dietary Allowance: The average dietary intake recommended to meet the nutrient requirement of an individual.

Cotton (page 12)

Density: The mass of a substance per unit volume.

Modified: To transform a structure from its original form during development or evolution.

Segmented: To be divided into separate parts or sections.

Stone fruit (page 13)

Palmate: A hand-shaped leaf with lobes extending from a common point.

Scallop: A leaf border with short, rounded teeth.

Serrate: A leaf border with saw-like teeth.

Simple: A leaf with an undivided blade.

Venation: The arrangement of veins in a leaf.

Stalks (page 14)

Phloem: The tissue that transports food produced in the leaves to the rest of the plant.

Photosynthesis: The process in which leaves capture light and convert it to plant food.

Vascular: A system of pipe-like tissue and moves water and nutrients throughout the plant.

Xylem: The system of tubes and transport cells that transport water and dissolved minerals from the roots through the stems and leaves.



Resources:

California Aquaculture
aqua.ucdavis.edu

California Avocado Commission
www.californiaavocado.com

California Beef Council
www.calbeef.org

California Department of Food and Agriculture
www.cdffa.ca.gov

California Fertilizer Foundation
www.calfertilizer.org

California Milk Advisory Board
www.realcaliforniamilk.com

California Raisin Marketing Board
www.loveyourraisins.com

California Tomato Growers Association
www.ctga.org

California Walnut Commission
www.walnuts.org

National Cotton Council of America
www.cotton.org

Nutrients for Life Foundation
www.nutrientsforlife.org

Pacific Coast Producers
www.freshasfreshcanbe.com

USDA MyPlate
www.choosemyplate.gov

Western Plant Health Association
www.healthyplants.org

To request a free copy of **What's Growin' On?** Extra! Extra! Extensions to enhance the use of this newspaper, or for an answer key, visit www.LearnAboutAg.org/wgo or call (800) 700-AITC(2482).

Activity

Choose two glossary words and use both in a complete sentence. Write your sentence in the space provided.

Imagine This...

Story Writing Contest

Attention third through eighth grade students:

You could be a published author!

Write a creative story about your favorite agriculture topic and submit it to the *Imagine this...* Story Writing Contest for the chance to be selected as one of six state-winning authors! Stories will be illustrated by high school art students and published into a book that is used throughout the state to teach students about agriculture. Visit www.LearnAboutAg.org/imaginethis for more information.



Prizes include:

- E-reader
- Expense paid trip to Sacramento for you, your parents, and your teacher to attend awards ceremony
- Engraved plaque
- Agriculture-related book

Contest Deadline:
November 1, annually

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California
Cotton Alliance



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Electric Company

