

Answer Key

23rd Edition



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23<sup>rd</sup> Edition



# Let your imagination RUN WILD!

Imagine your future in agriculture—a future where passion meets purpose, and every day offers an opportunity to make a difference. Choosing a career in agriculture means more than planting seeds; it means laying the groundwork for our society. When you work in agriculture, you're working for all of us.

Today's agriculture encompasses much more than tending crops and milking cows. It thrives on a diverse network of scientists, growers, accountants, mechanics, marketers, and educators, all dedicated to delivering agricultural products safely and efficiently. With your unique talents

and interests, the perfect job awaits you in agriculture and natural resources. So, let your imagination run wild and discover the endless opportunities that await!



**EXPLORE  
YOUR FUTURE IN  
AGRICULTURE**

AgExplorer is your ultimate tool for exploring all the possibilities in the world of agriculture!

Jump in by watching engaging videos, exploring career profiles, and trying out the interactive Career Finder to discover which career could be your perfect match. Start exploring and see how far your future can grow!



## READ ALL ABOUT IT!

Welcome to the 23rd edition of *What's Growin' On?*—an annual production by California Foundation for Agriculture in the Classroom. For over two decades, we've been on a mission to ignite the curiosity of students, guiding them in exploring the countless ways agriculture impacts our daily lives.

In this year's edition, *Imagine Your Future in Agriculture*, we shine a spotlight on the diverse career pathways within the agriculture industry. Many schools offer career pathway programs designed to prepare students for high-skill, high-wage jobs in emerging and expanding sectors. In agriculture, these pathways encompass fields such as animal science, plant science, agricultural business, agricultural mechanics, forestry, and natural resources. Together, these professionals tackle the challenges of feeding and clothing our ever-expanding world.

Crafted by educators and reviewed by agriculture industry experts, each edition of *What's Growin' On?* is engaging, relevant, and accurate. The activities inside align with California's Academic Standards, including Common Core and Next Generation Science Standards, for grades three through eight. We hope you enjoy exploring the rich array of career opportunities that await you in California's fields of opportunity!



# Drones to Data: EXPLORING AG TECH CAREERS

Welcome to the exciting world of ag technology, where cutting-edge gadgets and clever ideas team up to support California's farmers and ranchers! In this field, farmers, engineers, scientists, ranchers, builders, and computer programmers work together to drive innovation. Their goal? To tackle the challenges of feeding and clothing a growing population while making farming smarter and more efficient!

## Activity Sky High

Drone operators control a drone from the ground, soaring above fields, farms, and ranches to capture incredible aerial views and gather important data. Drones are used for many different jobs on the farm, like adding **nutrients** to the soil, watching over livestock, and making sure plants get enough water.

Imagine you're a drone pilot, looking down at Byte Sized Farms. Use the coordinate grid to locate the following landmarks on the farm.

*In your answer, be sure to list the letter on the x-axis first.*

- BARN:** ( F , 4 )  
**PASTURE:** ( H , 4 )  
**FARM OFFICE:** ( B , 8 )  
**WINDMILL:** ( A , 7 )  
**MECHANIC SHOP:** ( D , 5 )  
**VEGETABLE FIELD:** ( C , 7 )



## SCAN & SEE



Check out two different robotic apple harvesters in action! These high-tech tools are making apple picking a lot easier, improving worker health, and speeding up the harvest. See what's so "a-peel-ing" about robot technology.

Sources:  
 Good Fruit ([www.goodfruit.com/news](http://www.goodfruit.com/news)),  
 NC State University ([cais.ncsu.edu/psi](http://cais.ncsu.edu/psi))

Standards: 5.G.A.1, 5.G.A.2, 6.RP.A.2, 6.RP.A.3, 7.RP.A.2, 7.RP.A.3, 6.NS.C, 6.NS.C.6, History-Social Science: Analysis Skills K-5 CST 4

## Activity Incredible Inventors

Imagine you're an ag tech product engineer—a real-life inventor who designs amazing gadgets and tools to help farmers and ranchers tackle their everyday challenges. Your task is to talk to a family member or friend (extra points if they work in agriculture!) about what kind of technology could make their job easier.

### STEPS:

1. Have a conversation with them about their work and the challenges they face.
2. Think about what kind of tech could help solve these problems.
3. Write down your ideas and be prepared to share them with the class.

Standards:  
 CC ELA:  
 W.3-4.7, SL.3-8.4



## FIELD NOTES

### Full of Beans:

*Henry Ford Grows a Car* by Peggy Thomas is a picture book that introduces young readers to the innovative mind of Henry Ford. While Ford is best known for advancements in car manufacturing with his assembly line, his innovations also had a profound impact on agriculture.

## Activity

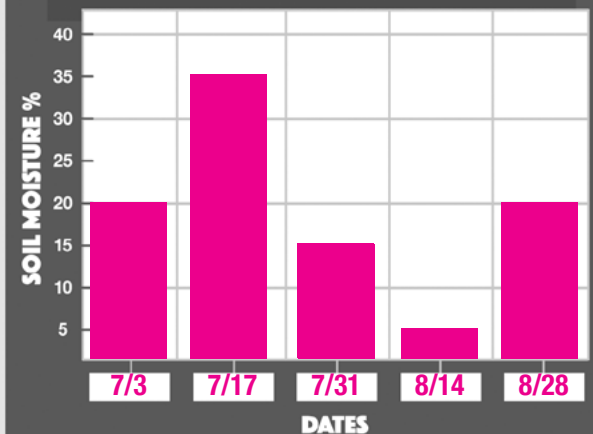
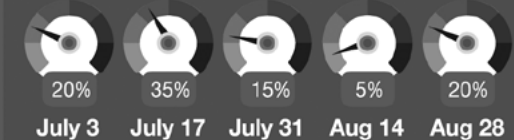
### Farm Fresh Data: MAKING EVERY DROP COUNT

As an agricultural data scientist, you mix farming knowledge with technology to improve how we grow crops. Technology, such as **sensors** and drones, collects farm data, and your job is to figure out how to use the data to help farmers grow crops better.

You've been asked to help a local tomato farm, Ketchup Acres, use their **irrigation** water more efficiently. First, analyze the soil moisture readings between July 3 and August 28. Then, plot the readings on a line graph, connecting the dots to show water moisture trends over time. What recommendations would you make to the farm leadership team based on your findings?

## KETCHUP ACRES

### Soil Moisture Readings (% of water in the soil, by volume)



Standards: CC Math: 3.MD.B.3, 4.MD.B.4, 5.G.A.2, 6.SP.B.4



# THE DIRT on Soil & Plant Science

Food starts in the soil, but not all soil is the same! Did you know there's a whole rainbow of soil types beneath your feet? Strawberries love sandy soil, carrots grow best in clay, and tomatoes need a mix of both, called loam.

Let's dig in and explore the careers that help keep our soil healthy and our plants thriving!

## Activity

### Size It Up!

Soil can be categorized into three major types: sand, silt, and clay. Soil scientists help us understand which soil is best for plants. They examine soil's texture, color, and **nutrient** content to understand which soils help plants thrive.

Each type of soil is made up of tiny particles, and these particles come in different sizes. The size of the **particles** affects how the soil works and how well it can support plants. Can you match the ball size to the right soil?

#### CLAY:

This soil has the smallest particles, anchoring roots firmly in place. It's great for plants that love wet conditions.

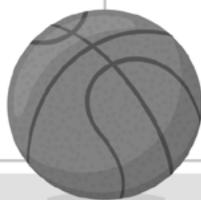
#### Silt



#### SAND:

With the largest particles, sand allows water to flow through easily. It's best for plants that prefer dry environments.

#### Sand



#### SILT:

This soil has medium-sized particles, keeping plants perfectly balanced—neither too wet nor too dry.

#### Clay



Standards: CC ELA: CCRA.W.8

## Activity

### Fertilizer Formulas

An agronomist is like a doctor for plants. They analyze soil health and nutrient levels, recommend fertilizers, and make a plan to improve plant health.

Fertilizers are materials added to soil or water to increase the nutrients available to plants. With the right nutrients, plants can really thrive! The three main nutrients that help plants are **nitrogen** (N), **phosphorus** (P), and **potassium** (K).

Imagine you're an agronomist tasked with calculating how much of each nutrient is in a bag of fertilizer. Each bag lists the percentage of nitrogen, phosphorus, and potassium it contains. Your job is to use these percentages to find out how many pounds of each nutrient are in the bag. Don't forget to round your answers to the nearest whole number!

Nitrogen: **9 lbs.**  
Phosphorus: **5 lbs.**  
Potassium: **11 lbs.**

% Phosphorus

% Nitrogen

% Potassium

Fertilizer

12-6-14

Total Wt. 75 lbs

Standards:  
CC Math: 5.NBT.4, 6.RP.3,  
6.NS.3, 7.RP.3

**What did the soil say during an earthquake?**  
"This is ground-breaking!"

### Did you know?

One teaspoon of healthy soil holds more **microorganisms** than there are people on Earth!

SCAN & SEE



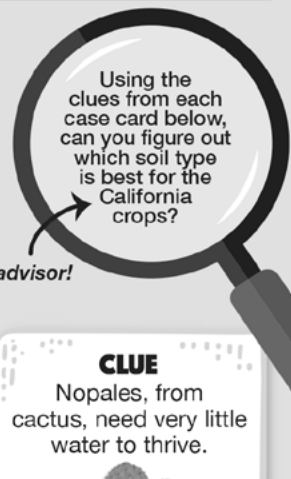
Meet a certified soil scientist who really "digs" her work. From construction sites to septic systems, she uncovers how soil shapes our world. Blending science with hands-on problem-solving, a soil scientist supports our communities from the ground up.

## Activity

### Be a Soil Sleuth

Crop advisors are soil and water experts. They have a special talent for uncovering how these two elements help crops reach their full potential. Think of them as crop detectives, guiding farmers in keeping soil healthy and managing water wisely.

Now, it's your turn to be a crop advisor!



**CLUE**  
Strawberries prefer less water and soil that drains well.



Recommended Soil:  
**Sand/Silt**

**CLUE**  
Nopales, from cactus, need very little water to thrive.



Recommended Soil:  
**Sand**

**CLUE**  
Lettuce plants prefer loose, well-drained soils.



Recommended Soil:  
**Silt**

**CLUE**  
Rice grows in five inches of water.



Recommended Soil:  
**Clay**

**CLUE**  
Brussels sprouts need soil with a tight texture. It keeps the stalks upright in strong winds.



Recommended Soil:  
**Clay**

**CLUE**  
Cotton needs soil that drains water easily and holds air.



Recommended Soil:  
**Sand/Silt**

Sources: Nutrients for Life Foundation (nutrientsforlife.org); Nutrient (growingthenextgeneration.com); Kids Gardening (kidsgardening.org)

Standards: CC ELA: CCRA.R.1



# The BUSINESS behind the BLUEBERRIES

Bite into a blueberry lately? Whether you've enjoyed a blueberry smoothie, a muffin, or just eaten them fresh, there's a whole world of work behind that juicy fruit! From managing blueberry farms to marketing the product and ensuring smooth logistics, this page will take you through the diverse agriculture business careers that bring your favorite fruit from farm to fork.



## BLUEBERRY BATTLE: Robot or Hand-Pick?

As the farm manager, you play a crucial role in overseeing the daily operations of the farm, including how blueberries are harvested. You have two options for harvesting this year's blueberry crop: using a robotic harvester or continuing with hand-picking. **Each method has its own advantages and challenges, brainstorm yours below.**

### ROBOTIC HARVESTER

PROS (the advantages)	CONS (the challenges)
<b>Answers Vary</b>	

### HAND-PICKING

PROS (the advantages)	CONS (the challenges)
<b>Answers Vary</b>	

### Bonus:

Which method would you choose for your farming operation? Write a persuasive paragraph explaining why you would pick that method and give three reasons to support your choice. **Standards:** CC ELA: W.3-8.1, W.3-6.7



## FROM DESK TO DUST: In the Blueberry Field

What's it like to switch from an office career to farming?

Check out this video to see how Ed Seaman traded his IT job for life on a picturesque blueberry farm at Santa Barbara Blueberries, where he's found a fresh new passion!



*I grow blueberries*

### Did you know?

California exports an amazing seven million pounds of blueberries each year, sharing these blue beauties with people all around the world!

Sources: U.S. Highbush Blueberry Council (blueberry.org), California Blueberry Commission (calblueberry.org)



Talking about California crops is an important part of any agriculture business. As an agriculture marketing specialist, you get to research, write, and come up with fun ways to share the news about California **commodities.**

Check out this recipe from @calblueberries. Pretend you're making it for your whole class.

**(Based on 24 students)**  
Can you figure out how much of each ingredient you'll need so everyone gets a serving?

- 18** cups almond milk
- 12** cups blueberries
- 12** bananas
- 36** tbsp almond butter
- 12** tbsp honey
- 12** tbsp raw flax seeds
- 12** cups ice

**Bonus!** Blend up some fun by making this smoothie with your family or class!

**Standards:** CC Math: 3.NF.1, 4.NF.4, 5.NF.4, 5.NF.5, 6.RP.3, 7.RP.2



Watch this robot picking blueberries like a pro! It's a "berry" big deal!



## Promoting That Produce!

calblueberries

**Blueberry Blast Smoothie Recipe (Serves 2)**

- 1 1/2 cups cold almond milk
- 1 cup fresh or frozen blueberries
- 1 medium ripe banana
- 3 tbsp smooth almond butter
- 1 tbsp honey
- 1 tbsp raw flax seeds
- 1 cup ice

**Directions:** Combine all ingredients in a blender and process until smooth. Serve.





# SUSTAINABLE Superheros

Imagine being able to see the future— talk about a superpower! Agricultural sustainability looks at our growing population and asks, "How do we feed everyone while protecting the planet?" Sustainable superheroes grow food on the roof of a skyscraper, use rainwater to irrigate crops, and create plastic bags that turn into soil. Careers in agricultural sustainability make our world a better place!

Sources:  
California State University, Northridge (csun.edu),  
USDA Urban Agriculture (usda.gov/topics/urban),  
UC Master Gardener Program (mg.ucanr.edu)



Take a look at this news story showcasing urban farming in action in Los Angeles! After watching, brainstorm a list of careers that could be supported by an indoor urban farm.



As cities get bigger, we need to find ways to bring farming into our neighborhoods. Urban agriculture is all about growing food in places like backyard gardens, community gardens, urban farms, and even on rooftops!

Imagine you're an urban farming specialist. Your job is to help people learn how to grow their own food, especially where there isn't much space. You're going to help an apartment complex plant a raised garden bed on their roof. The garden bed is 8 feet by 4 feet.


Answers Vary

**Your Challenge:**  
Plan out a winter garden in this space using the following spacing guidelines.  
**Broccoli:** 24" apart  
**Lettuce:** 12" apart  
**Cabbage:** 24" apart  
**Swiss Chard:** 12" apart



Many food companies are now using "super" packaging to help reduce waste! Packaging designers work behind the scenes to create containers made from recyclable, compostable, or biodegradable materials. Take a look around your kitchen and find a container that's designed to reduce our impact on the environment. Write a paragraph describing its superpowers: what it's made from, how it helps protect the planet, and what happens to it after you throw it away.

Standards: NGSS: 5-ESS3-1, MS-ESS3-3; CC ELA: W.6-8.1

## Did you know?

By 2050, farmers will need to grow enough food to feed nearly 10 billion people worldwide. More than 65% of the world's population will live in urban areas.



## LET'S SORT IT OUT!

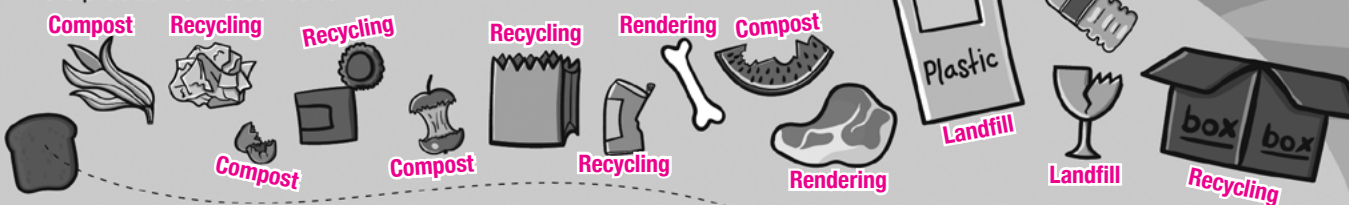


This website features a helpful search tool to ensure your waste finds its way into the right bin. [csun.edu/zero](https://csun.edu/zero)

Standards:  
NGSS: 5-ESS3-1; CC ELA: RI.3-8.1



As our population grows, so does the waste we create. It's important to find ways to reduce the amount of waste that goes to landfills. Waste reduction specialists use their superpowers to help grocery stores, theme parks, cafeterias, and other businesses sort waste into bins for recycling and composting. Imagine you're a waste reduction specialist for a large grocery store chain. Draw a line to connect each waste product to the correct bin.



**RECYCLING**

The process of collecting materials like paper, plastic, & glass to make new products.

**RENDERING**

Meat scraps and bones are cooked at very high temps. The fat & protein can be used to make other products.

**COMPOST**

Food scraps are turned into nutrient-rich soil that helps plants grow.

**LANDFILL**

A place where waste is buried. Items that cannot be recycled or composted end up in landfills.



# FUTURE AG MECHANICS, *Start Your Engines*

Do you enjoy fixing things and solving problems? If the hum of a motor or the crack of a hammer sound exciting to you, you might enjoy the field of ag mechanics! In this field, you get to work with tools and equipment that keep agriculture moving. From repairing tractors to welding equipment, you'll use your math, science, and technology skills to ensure agriculture operations run smoothly.

**SCAN & SEE**

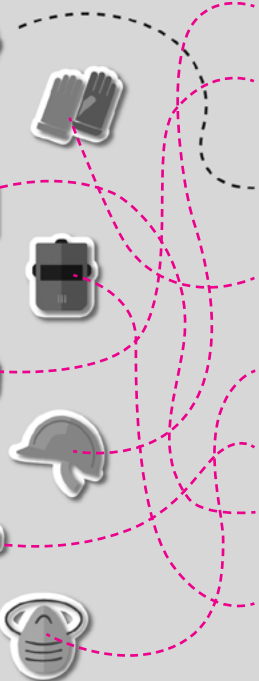


Does a career as a welder spark your interest? For Stephanie Hoffman, welding isn't just a job – it's who she is. In this video, you'll see how welding has helped her follow her passion for art and build a career she loves.

## Activity

**GEAR UP FOR SAFETY**

Agricultural safety specialists are the go-to person for keeping agricultural environments safe! You create and enforce safety rules to protect workers and equipment. PPE stands for **Personal Protective Equipment**. In agricultural settings, wearing PPE helps keep you safe while working with tools and equipment. Each piece of PPE protects a different part of your body. Draw a line from each piece of PPE to the matching description.



**HELMET** - Protects you from falling objects

**EAR PROTECTION** - Protects your hearing from loud machinery

**SAFETY GLASSES** - Protects your eyes from dust and debris

**GLOVES** - Keeps your hands safe when working with tools

**MASK** - Helps keep out harmful dust or fumes

**BOOTS** - Protects your feet from heavy items

**VEST** - Helps you stand out around equipment and vehicles

**FACE SHIELD** - Protects your face from flying particles or chemicals

## Did you know?

A typical tractor weighs between 8,000 to 20,000 pounds. For comparison, that's about the same as one or two elephants, which weigh around 10,000 to 14,000 pounds each! This weight helps tractors pull heavy loads and tackle tough farm tasks.

**What kind of music do welders like?**  
Heavy Metal!

## Activity

### *Pump Up The Math*

As a farm equipment mechanic, you're the expert who keeps tractors, trucks, and other machinery running smoothly.

Your job? Making sure every tire is at the right pressure, so the equipment is safe, fast, and ready to tackle tough jobs on the farm.

PSI stands for Pounds per Square Inch, the standard unit of measurement for the amount of air in tires. A tire gauge is used to measure the PSI. Pump up your math skills (and some tires!) by solving these problems:

Standards: CC Math: 3.OA.D.8, 3.NBT.A.2, 4.NBT.B.4, 7.EE.B.3

1. A tractor tire needs 35 PSI. It currently has 27 PSI.

**How much more air is needed?**

**8 PSI**

2. A truck's front tire should have 120 PSI, but it only has 86 PSI.  
**How much air does the tire need?**

**34 PSI**

3. A machine's tires should be 45 PSI. They are at 40 PSI and 42 PSI.  
**How much air is needed in total to fill both?**

**8 PSI**

Sources: AgriSafe Network (agrisafe.org), Universal Technical Institute (www.uti.edu)

## Activity

**FORGE YOUR FUTURE**

Imagine you're a welder, using powerful tools to shape metal into equipment that helps farms run smoothly. Whether you're fixing a tractor, building irrigation systems, or making livestock enclosures, your skills are essential in agriculture. The process of welding involves heating metals to melt (solid to liquid) and then cooling to form a strong bond (liquid to solid).

In this fun experiment, you will see how materials change states during welding by using chocolate (yum!). You'll need chocolate chips (which represent metal), aluminum foil, a hair dryer, an ice pack or freezer, and some tongs or gloves. Place chocolate chips on a piece of aluminum foil to represent metal.

Use the hair dryer to melt the chocolate chips. Once they start to melt, turn off the hair dryer. Carefully place the foil with melted chocolate on an ice pack or in the freezer to cool it down. Watch how the melted chocolate cools and hardens, forming a solid "welded" bond.

*Think about what you saw and discuss how this process relates to real welding.*

Standards: NGSS: 4-PS3-2

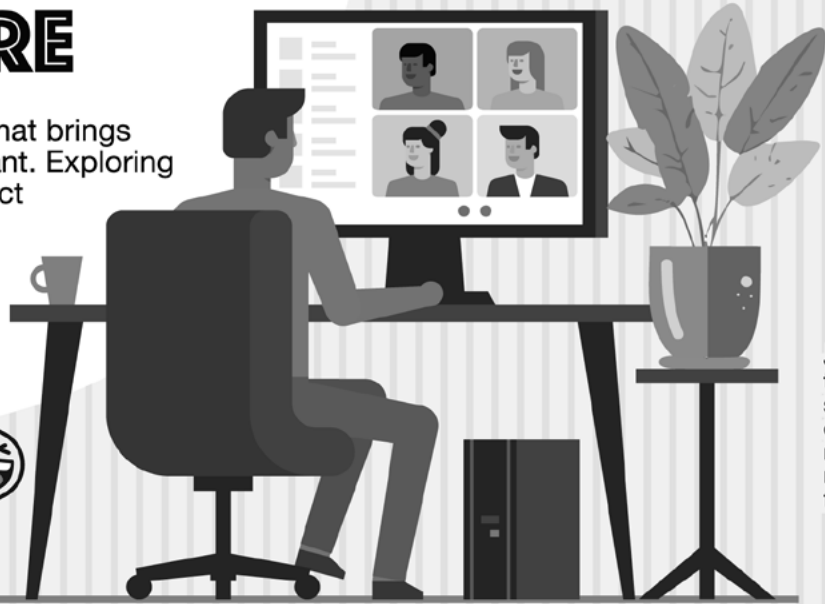


Standards: CC ELA: RI.3-8.1, RI.3-4.7; Health Education Content Standards: Grade 4: 1.17.S, Grade 5: 1.1.P

Pump up the Math Answers:  
1) 8 PSI; 2) 7 PSI; 3) 8 PSI

# Growing YOUR FUTURE

Imagine your future in agriculture! Picture yourself in a role that brings together your interests, values, and vision for the life you want. Exploring these qualities can help you find a career path that's a perfect match. Answer each question to uncover what truly matters to you in a career. It's never too early to plant the seeds and see where your future in agriculture grows!



Sources: Food and Agricultural Education Information System (faeis.cals.vt.edu), United States Department of Food and Agriculture (usda.gov)



**JUSTIN SMITH MORRILL**

1810-198

Justin Smith Morrill created the land-grant college system, making agricultural education available to more people and funding research to improve farming practices.



**NORMAN BORLAUG**

1914-2009

Norman Borlaug developed high-yield crops that saved millions from hunger and sparked the Green Revolution in agriculture.

**WHAT IS YOUR FAVORITE SUBJECT IN SCHOOL?**

Answers Vary

**DO YOU LIKE WORKING...**

ALONE WITH OTHERS BOTH

(circle one)

**LIST THREE ADJECTIVES THAT DESCRIBE YOUR PERSONALITY**

#1

#2

#3

Answers Vary

**DO YOU LIKE WORKING...**

INDOORS OUTDOORS BOTH

(circle one)

What's a problem you would like to solve in the world?

Answers Vary

**Why did the scarecrow get promoted?**

Because he was outstanding in his field!

**WHAT CAUSE DO YOU CARE A LOT ABOUT?**

Answers Vary

**WHAT ARE THREE THINGS YOU'RE REALLY GOOD AT?**

Answers Vary

**ARE YOU MOST INTERESTED IN...**

Animals Technology

Plants The Environment Food

Machines Business

(circle one)

**NAME A HOBBY/ACTIVITY YOU ENJOY. WHY DO YOU ENJOY IT?**

Answers Vary

With this information in mind, consider the careers featured in this newspaper. Which careers interest you the most?

Standards: CC ELA: RI.3-8.1, W.3-5.10, L.3-5.5

Sources: Horticultural Research Institute (www.hrresearch.org); UC Master Gardeners (mg.ucanr.edu); Forestiere Underground Gardens (undergroundgardens.com); Vecteezy



## Activity

### Agriculture Wall of Fame

Agriculture has been shaped by many amazing people who created new ideas and solved big problems. Check out these famous agriculturalists who made a difference. After reading their profiles, think about how you might help change agriculture in the future!



**CYRUS McCORMICK**

1809-1884

Cyrus McCormick invented the mechanical reaper, a game-changing tool that made harvesting crops faster and more efficient.

## Activity

### Skills for Success

Use the clues to fill in the crossword with important skills that will help you succeed at school, with friends, and in future jobs. As you complete the puzzle, think about how you can use these skills every day.

#### ACROSS:

- Showing consideration for others
- Thinking of new ideas or ways to solve problems
- Paying close attention to a task
- Doing what you're supposed to do
- Telling the truth and being trustworthy
- Being friendly and caring about others

#### DOWN:

- Staying calm and not getting frustrated easily
- Believing in yourself and your abilities
- Paying attention to others when they speak
- Working well with others

Soft skills are personal qualities and abilities that help people work well with others and handle challenging situations. Unlike hard skills, which are specific job-related abilities, soft skills apply to almost any career!



Standards: CC ELA: L.3-8.6, RF.3-8.4



**TEMPLE GRANDIN**

1947-present

Temple Grandin revolutionized livestock handling with **humane**, efficient designs based on her deep understanding of animal behavior.



**GEORGE WASHINGTON CARVER**

1864-1943

George Washington Carver promoted crop rotation and found many uses for peanuts, helping farmers improve soil and **diversify** their crops.

### CULTIVATE SKILLS FOR YOUR FUTURE WITH 4-H AND FFA

4-H and FFA are youth organizations that teach important skills for your future. 4-H is a community program open to youth ages 5 to 18, while FFA is a school-based program for middle school and high school students. These programs focus on leadership and responsibility, and you can learn about agriculture, too!

Find a 4-H club or FFA chapter in your community and join today! Scan the codes to find out more.



4-H



FFA



### BUILDING SKILLS OUTSIDE OF SCHOOL

School isn't the only place to gain important skills for your future career. The activities you do outside of school also help you grow and prepare for success. Just like water, sun, and soil help plants grow, these experiences nurture your skills and help your future flourish!

#### WHAT IS AN INTERNSHIP?

An internship is like a short-term job where you have the chance to try out a career and learn new skills. Interns work with real companies or organizations to gain hands-on experience in a field they're interested in.

#### WHAT IS SERVICE LEARNING?

Service learning is a way to learn by helping others. It's a hands-on activity that combines helping in the community with school learning. For example, you might learn about plants in science class and then plant a garden to grow food for a local food bank.



*Your Turn!*

Now it's your turn to think about how YOU can make a difference in agriculture! Add your self-portrait to the wall of fame, and include information about the kind of impact you want to have on farming, food production, or the environment.

Answers Vary

Standards: CA Visual Arts: 3.VA:Cr1.1, 3.VA:Cn10; CC ELA: W.3.2-8

### Did you know?

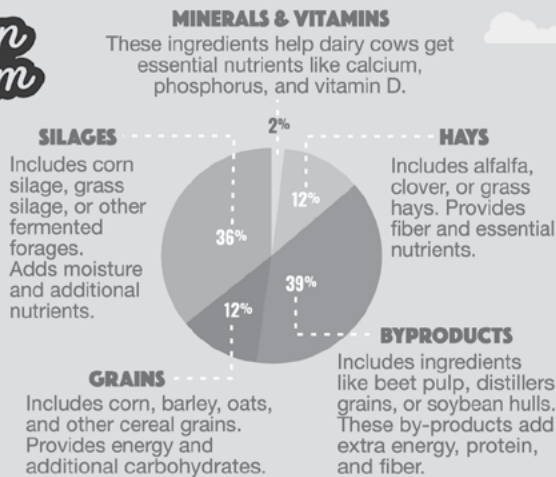
There are over 300 colleges and universities in the United States that offer agriculture programs! These programs teach important topics like caring for animals, growing plants, managing farms, protecting the environment, and developing new food technologies.

# HOOVES, HORNS & FEATHERS: Careers in Animal Science

Dive into the thrilling world of animal science, where every day brings a new adventure with our furry, feathered, and hooved friends! From galloping horses to clucking chickens, discover the exciting careers that make a real difference in the lives of animals and turn your passion into a profession.

## Activity *Feast on the Farm*

Imagine being an animal nutritionist, where your job is to create the perfect diet for animals to keep them healthy and productive. Just like how we choose balanced meals to stay fit and energized, animal nutritionists craft something called a **total mixed ration (TMR)** for animals. It's similar to how humans combine veggies, grains, and proteins to create a well-rounded meal.



A single dairy cow eats approximately 95 pounds of feed each day. How much of each ingredient are they consuming? Round to the nearest pound.

Minerals & Vitamins: 2 pounds  
 Hays: 11 pounds  
 Byproducts: 37 pounds  
 Silages: 34 pounds  
 Grains: 11 pounds

Standards: CC Math: 5.NBT.A.4, 5.NBT.B.7, 6.RP.A.3, 7.EE.B.3, 7.RP.A.3

Why did the chicken join a band?  
 "Because it had drumsticks!"

Sources: UC Davis Animal Science (animalscience.ucdavis.edu); National Ag Safety Database (nasdonline.org); Penn State Extension (extension.psu.edu)

In science, weight is often measured in kilograms (kg) because it's part of the metric system used worldwide. For example, if an object weighs 10 kilograms, that's about the same as 22 pounds (lb).

## Activity *Syringe Savvy*

### PERFECTING YOUR VET TECH SKILLS

Today, we'll explore a vital vet tech task: determining the right medication **dosage** for sick animals based on their weight. Check the health records, calculate the correct amount of medicine, and plot your findings on the syringe below to ensure accurate treatment.

<b>Animal: Weight:</b> Goat 80 kg  <b>Dosage:</b> 0.7mg/kg  <b>Total Medication:</b> <b>56 mg</b>	<b>Animal: Weight:</b> Sheep 70 kg  <b>Dosage:</b> 1mg/kg  <b>Total Medication:</b> <b>70 mg</b>	<b>Animal: Weight:</b> Pig 100 kg  <b>Dosage:</b> 0.4mg/kg  <b>Total Medication:</b> <b>40 mg</b>
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### Did you know?

Did you know that more than 80% of what dairy cows eat can't be eaten by people? Cows munch on things like grasses, grains, and **byproducts**, like almond hulls and citrus pulp, which aren't delicious for us but are perfect for cows.

## Activity *Animal Attitudes*

Ever wondered why animals behave a certain way? It might be because of their environment! An animal behaviorist studies why animals, from pigs to porcupines, behave the way they do and explores ways to improve their behavior. This can lead to better health and productivity for farm animals by addressing issues that affect their well-being.

Jump into the shoes (or boots!) of an animal behaviorist. Follow the link to learn about this important field in animal science. Make sure to take the quiz to show what you know.



Standards: 3.OA.3, 5.NBT.7, 5.MD.C.3, 6.SP.B.4

Standards: CCSS ELA: KI.3.1, W.3.7-4.7



# GUARDIANS OF GREEN:

## Careers in Natural Resources

### Activity

## Unravel The Secrets of The Forest

Do you like spending your free time outdoors, appreciating all that nature has to offer? Maybe a career in **forestry** is right for you. Our woodlands and parks play a critical role in California's landscape. In this career, you would help manage the conservation of forested areas, prevent forest fires, and ensure the **sustainability** of **habitats** and forest resources.

### RIDDLE:

I roam through the forest, both day and night, from the tallest tree to the ground's soft light. I'm the plants that grow and the animals that roam, in the forest, I'm always at home.

### ANSWER:

**W I L D L I F E**

Find the letters hidden throughout the page, then unscramble them to solve the riddle!

### Activity

## Exploring Water Resources

Imagine you're a hydrologist tasked with teaching the public about California's **groundwater**. Using household materials, research and build a model that demonstrates how groundwater is stored, pumped, and used in agriculture.

### MATERIALS

- Clear container (ground)
- Sand
- Gravel (soil/rock layers)
- Small Cup (aquifer)
- Straw/Syringe (pump)
- Water
- Spray Bottle (rain)

- ### STEPS
1. Design your model with soil, rock, and water layers to represent the ground.
  2. Simulate rainfall with the spray bottle and observe how water moves through the layers.
  3. Pump the water using the syringe and explore how groundwater levels change.

Discuss how water moves through the ground layers and what happens when you pump water from the aquifer. How does rain affect the groundwater level? What happens if too much water is pumped from the aquifer?

Standards: NGSS: 3-5-ETS1-1, 5-ESS2-1

Every tree, stream, rock, and animal is part of an adventure waiting to be explored. These things—plants, animals, rocks, and water—are called **natural resources**. In California, nearly 10,000 careers involve working with these resources. Whether it's turning trees into houses, helping snow become clean water, discovering minerals in rocks, or protecting animals from wildfires, there's so many careers in forestry and natural resources.

### Activity

## Riches from the Earth

There is gold, and green, in those hills! In 1949, miners not only unearthed treasure in California, they also planted trees and crops. Just like the 49ers, today's treasure hunters - scientists called **geologists** - discover valuable resources in rocks, caves and hills.

The 49ers used maps to help them travel west in search of gold. Now, imagine you are a 49er who just arrived in California, eager to strike it rich. Can you find your way to each of the mining sites (marked with a triangle) on the map where gold has been discovered? Don't forget to stop in Sacramento first (marked with a circle) to gather your supplies!

How do trees check their Instagram?

They LOG-in!

## Did you know?

Your cell phone is made from rocks! Geologists explore caves and dig into the earth to find valuable minerals like **lithium**, which powers cell phones and video game consoles. Lithium was first mined in California's Salton Sea, a saltwater lake, in 1990.

SCAN & SEE



Dive into the amazing world of forestry with CAL FIRE! Discover how foresters care for our forests, protect wildlife, and stop wildfires from spreading. Find out how you can become a forester and make a big difference for our environment.

### LOCATIONS

#### Sacramento:

Stop here for mining tools.

#### Marshall Gold Discovery Mine:

Where gold was first discovered in California in 1848 by James W. Marshall, sparking the Gold Rush.

#### Angels Camp:

Founded in 1850, making it one of the earliest mining towns established during the Gold Rush.

#### Empire Gold Mine:

Discovered in 1850, Empire Mine is one of the oldest, largest, and richest gold mines in California.

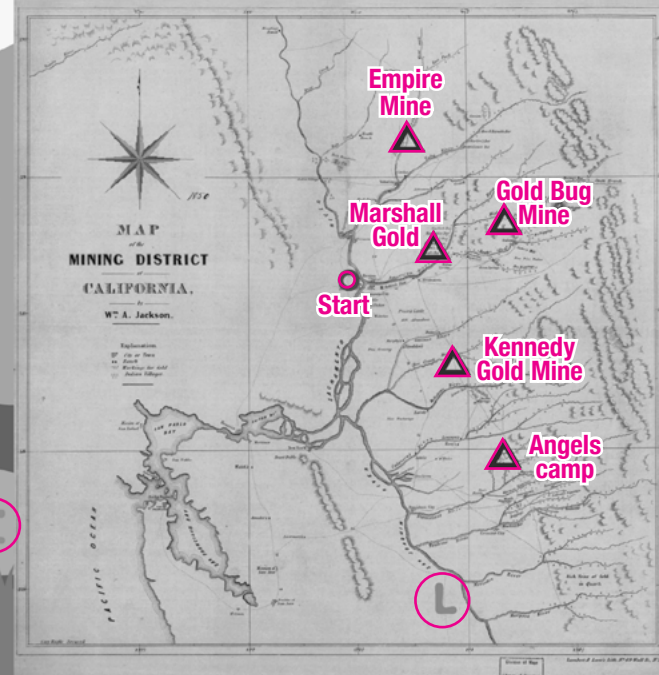
#### Gold Bug Mine:

In this Placerville (formerly "Hangtown") location, gold was discovered in a cave in 1888.

#### Kennedy Gold Mine:

This mine opened in 1848 and became one of the deepest gold mines in North America.

Standards: CA History-Social Science: 4.4.2





# Farming Futures

## EXCITING CAREERS IN AGRISCIENCE

Does it bug you that you're unsure about your future career? How about exploring exciting fields like entomology, food science, or genetic research? In agriscience, you'll dive into the science behind farming and food production, discovering how new techniques and technologies can boost crop yields, improve food safety, and tackle environmental challenges.



A plant breeder is a scientist who creates new plants with special features, like more food and better nutrition. They use methods like **selective breeding** to help plants grow in different **climates**. Norman Borlaug is called the "father of the Green Revolution" because he developed wheat that helped reduce hunger. George Washington Carver taught farmers to grow different crops, improving soil health and their lives.

Use online resources to learn more about these scientists and complete the Venn diagram below.

Standards: CC ELA: RI.3-8.1

Answers Vary

### Did you know?

The California Academy of Sciences has a huge collection of bugs and spiders, one of the biggest in the United States. They have around 14 million different specimens!

Sources: UC Riverside (entomology.ucr.edu), California Academy of Sciences (calacademy.org/scientists/entomology)



- PROJECT CHECKLIST:**
- Plan your trail mix recipe using California-grown ingredients. Consider nutritional value and flavor combinations.
  - Prepare your recipe with measurements.
  - Calculate nutritional information (such as calories, fat, protein).
  - Share your trail mix and gather feedback. Make changes if needed.
  - Determine the cost of ingredients and suggest a retail price.
  - Present your trail mix to the class.

Standards: NGSS: MS-ETS1.B, MS-ETS1.C



Entomologists are insect experts who study bugs and their behaviors! These scientists play a vital role in agriculture by investigating how insects affect crops, pest control, and pollination. As an entomologist, you might focus on wasps, which are natural predators that feed on pests harmful to crops. Like all insects, wasps have different body parts with unique functions.

Label the diagram with the correct names for each wasp body part.

**Forewing:** The larger front wings of a wasp used for flying.

**Antennae:** Sensory feelers on the head that help the wasp smell and feel things.

**Hindwing:** The smaller back wings that help keep the wasp steady while flying.

**Abdomen:** The back part of the wasp's body where it digests food and has reproductive organs.

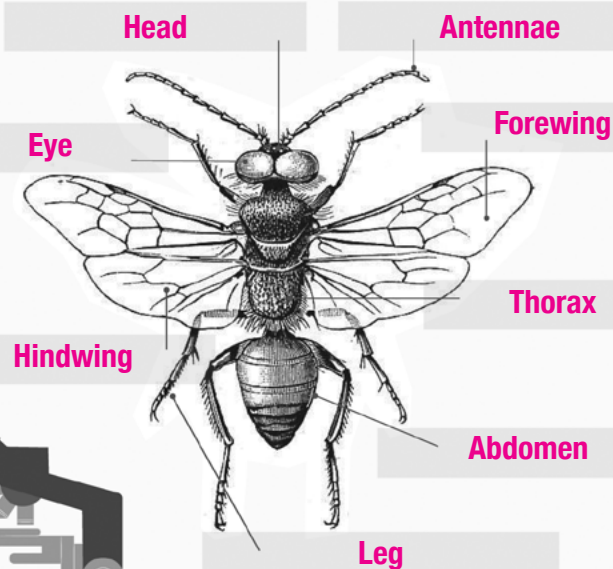
**Head:** The front part of the wasp that holds the eyes, antennae, and mouth.

**Eye:** Compound eyes that let the wasp see and have a wide view.

**Thorax:** The middle section where the legs and wings are attached.

**Leg:** Limbs that help the wasp walk, climb, and hold onto things.

Standard: NGSS: 3-LS3-1



SCAN & SEE



Explore the exciting career of a food technologist!

This role combines creativity and food science to develop new products and ensure safety. Learn what food science is and how food science can lead to fascinating careers.





# LEAF YOUR MARK *In Horticulture*

Ornamental horticulture is all about growing, arranging, and caring for plants and flowers. People in this job work in places like nurseries, gardens, and flower shops. They plant seeds, water and fertilize plants, design gardens, and keep everything green and healthy. Their work turns parks, offices, and hospitals into vibrant, more cheerful spaces where people feel happy and relaxed!



## Beneath the Surface

### DISCOVER FRESNO'S HIDDEN GARDENS

Fresno, California, is home to the Forestiere Underground Gardens, a breathtaking creation by the talented horticulturalist Baldassare Forestiere. Over 40 years, Forestiere crafted a network of underground rooms, tunnels, and courtyards, where fruit trees, grapevines, and other plants flourish beneath the surface.

Research the Forestiere Underground Gardens and use an index card to design a postcard. Make sure to include details about what makes this location special and why tourists should visit!

Standards: CC ELA: W.3-8.4; Visual Arts: 7.VA:Cr2.3, 6-8.VA:Cr2.1

**Symmetrical balance** is created by having the same amount of plant material on either side of the central axis. This type of floral arrangement is common in traditional wedding bouquets and classic floral centerpieces.



Button Mum



Snapdragon



Eucalyptus



Gerbera Daisy



Baby's Breath



Carnation



## Flower Power LIFE AS A FLORAL DESIGNER

Standards:  
CC Math: 4.G.3

A floral designer also known as a florist, creates flower arrangements, bouquets, and decorations for everyday occasions and special holidays. They use fresh flowers, and sometimes dried or artificial ones, to craft beautiful displays.

Pretend you're a floral designer! You need to pick the best flowers for each client's order or event. Using the internet or a plant ID application, identify and label the plant photos. Then, using colored pencils, design your own floral arrangement on a separate piece of paper. Keep in mind the importance of symmetry in floral design.

Baby's breath  
Gerbera daisy

Button mum  
Eucalyptus

Carnation  
Snapdragon

## Activity Green Beginnings

### GROW PLANTS LIKE A PRO



As a nursery manager, your job is to care for plants and help them grow! You'll plant seeds, use cuttings, or divide plants to make new ones, making sure each one stays healthy. You also get to help people choose the perfect plants for their gardens.

**Propagation** is how we grow new plants, and there are different ways to do it. Some common methods include planting seeds, using cuttings, or dividing plants. Below, draw a picture of each method to show how you would explain it to your customers.

### TYPES OF PROPAGATION

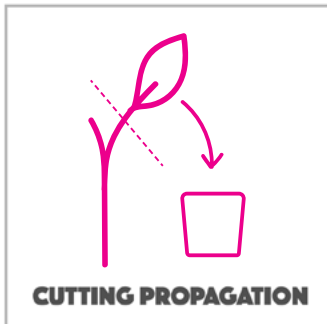
#### Seed propagation:

Growing new plants from seeds.



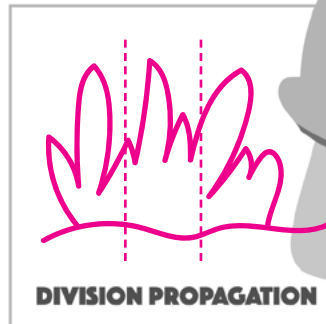
#### Cutting propagation:

Taking a piece of a plant (like a stem) and growing a new plant.



#### Division propagation:

Dividing a plant into smaller parts to grow new ones.



Standards: CC ELA: RI.3-8.1; CA Visual Arts: 3.VA:Cr2.3, 6.VA:Cr2.3, 7.VA:Cr2.3; NGSS: 3-LS1-1, 4-LS1-1, MS-LS1-4

Sources: Horticultural Research Institute ([www.hrresearch.org](http://www.hrresearch.org)); UC Master Gardeners ([mg.ucanr.edu](http://mg.ucanr.edu)); Forestiere Underground Gardens ([undergroundgardens.com](http://undergroundgardens.com)); Vecteezy

### SCAN & SEE

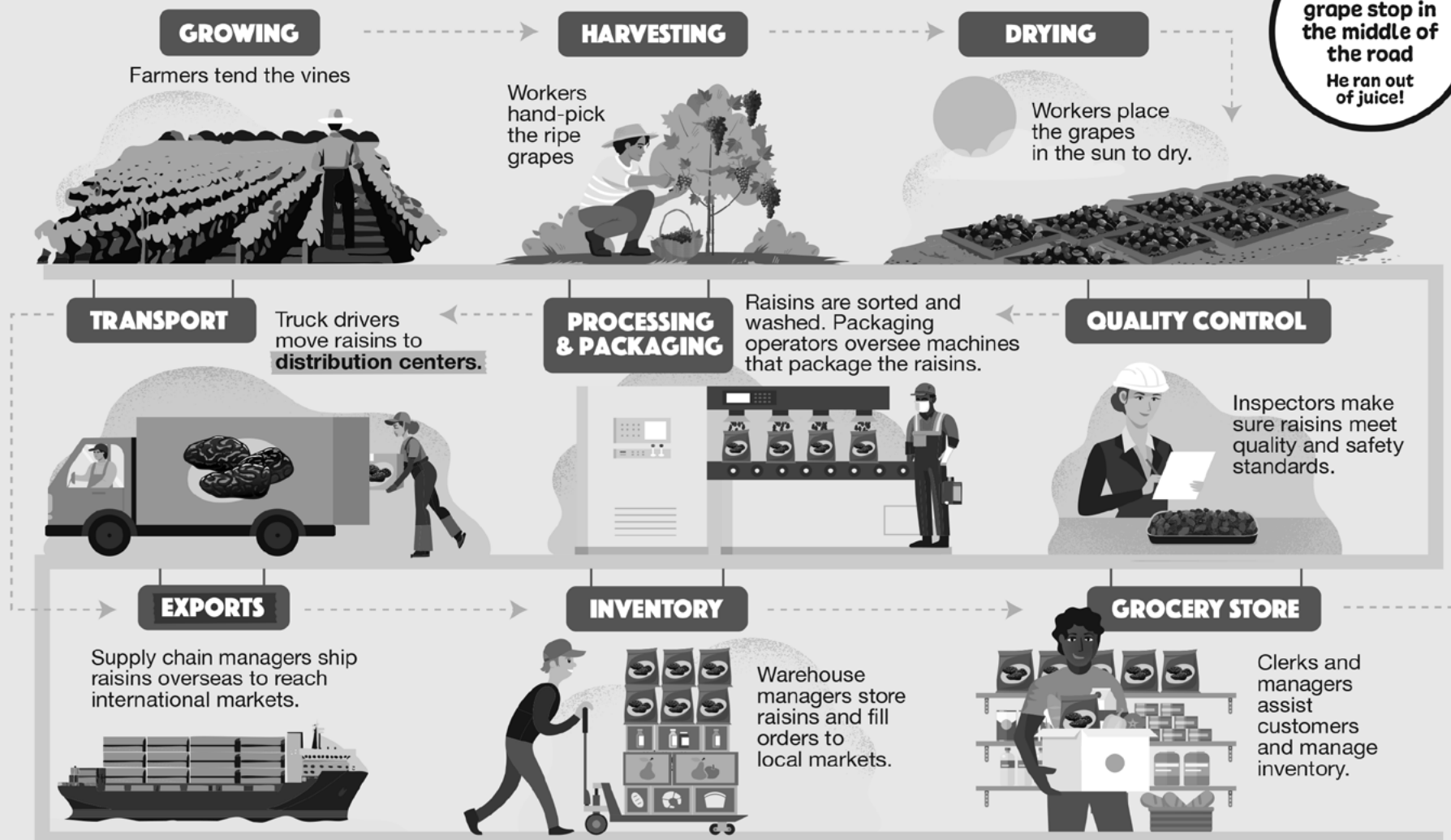
Ready to become a plant detective? Use this free app to solve the mystery of any plant you see! Just snap a photo of that plant, flower, tree, or shrub, and the app will tell you exactly what it is. Discover the secrets of nature with just a click!



Why can't the flower ride his bike?  
Because he lost his petals!

# THE PATH TO OUR PLATES: *The Food System*

The food system includes all the steps it takes to get food from farms to our plates. It starts with growing crops or raising animals, then the food is **processed** into products, like bread or yogurt. Next, it's packaged and sent to stores, where we buy and eat it. Every step matters!



## Raisin Design Challenge

Imagine you're a graphic designer, tasked with creating new packaging for a raisin producer. Your job is to design a colorful and eye-catching label that promotes California raisins. Think about including details like where they come from, their health benefits, and what makes them unique.

*What fun images or words will you use to make the label stand out and make consumers excited to try raisins?*



Standards CA Visual Arts:  
4.VA:Cr1.2, 6-8.VA:Cr2.1, 7.VA:Cr2.



## Truckin' Along

Use a highlighter to mark the **route** from Fresno County to your home on a map, following major highways and state roads. As you highlight your journey, estimate the total miles you'll travel and count the counties you'll pass through.

Then, use a ruler and the map scale to calculate the total distance in miles.



Standards: CC Math: 3.MD.A.2, 4.MD.A.2,  
5.MD.A.1, 6.RP.A.3; CA History-Social Science: 3.1

## RESTAURANTS

Chefs incorporate raisins into dishes and menu offerings.



## Did you know?

California produces over 95% of the U.S. raisins. Fresno County alone produces about 80% of the nation's raisins. The city of Selma is even known as the "**Raisin Capital of the World.**"

Sources: Fresno State (jcast.fresnostate.edu), CA Department of Food and Agriculture (cdfa.ca.gov)



## GLOSSARY

### Biodegradable:

The ability of an object to be broken down with the help of microorganisms. For example, paper bags are biodegradable, but most plastic bags are not.

### Byproducts:

Something that is produced as a result of the production of something else. For example, when you make cheese, whey is a byproduct.

### Climate:

The general weather conditions for a place, including rainfall, temperature, and humidity.

### Commodities:

Products of agriculture, like corn, wheat, and milk, that can be bought and sold.

### Distribution Centers:

Places where products are stored and then sent out to stores or customers.

### Diversify:

To add variety. In farming, it can mean growing different crops or raising different animals to spread risk and increase production.

### Dosage:

The correct amount of medicine or treatment given to an animal based on its size, age, and health needs.

### Export:

To send goods or materials to another country.

### Geologist:

A scientist who studies rocks, soil, and the earth.

### Groundwater:

Water that is stored underground in layers of rock and soil.

### Habitat:

The natural home of a plant, animal, or other living thing.

### Humane:

Treating animals with care to support their health and wellness. Irrigation: The act of adding water to crops to help them grow.

### Irrigation:

The act of adding water to crops to help them grow.

### Lithium:

A soft metal that is silvery-white in color.

### Microorganisms:

Tiny living things, like bacteria, that are so small you need a microscope to see them.

### Nitrogen (N):

A nutrient found in soil that helps plants grow green and strong.

### Nutrient:

A substance that provides nourishment essential for growth and keeping plants and animals healthy.

### Nutrition:

Food and other substances that keep people, plants, and animals healthy and growing.

### Particles:

Tiny pieces of matter, like sand, silt, and clay, that make up soil and affect its texture and water-holding ability.

### Personal Protective Equipment (PPE):

Gear like gloves, goggles, and masks worn to keep people safe, especially when working with machinery.

### Phosphorus (P):

A nutrient in soil that helps plants grow roots and develop early.

### Potassium (K):

A nutrient in soil that helps plants take in water, resist pests, and stay healthy.

### Processed:

Changing something from one form to another. For example, tomatoes can be processed into ketchup.

### Propagation:

The process of making more plants.

### Selective Breeding:

Choosing animals or plants with desirable traits to improve the next generation's strength and health.

### Sensors:

Devices that detect and measure things, like soil moisture or temperature, to help farmers make decisions.

### Sustainability:

Meeting the economic, social, and environmental needs of the present without compromising the needs of the future.

### Total Mixed Ration (TMR):

A balanced mix of food ingredients that animals like cows eat to get all their nutrients.

### Waste:

Unwanted materials that are sorted into bins to be recycled, composted, or disposed of properly.

### Yield:

The amount of a crop or product produced, such as the tons of almonds harvested from an orchard.

**What's  
Growin' On?**  
Imagine your future  
in Agriculture

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QR code



or visit

[LearnAboutAg.org/resources/wgo](http://LearnAboutAg.org/resources/wgo)

- To find the answers to activities in this newspaper.
- To order additional free copies for your teaching team, classroom, or ag literacy event.
- To download complete lesson plans, fact sheets, farm to school resources, & much more!

## Career Resources

**Ag and Food Careers**  
[agandfoodcareersinpa.com](http://agandfoodcareersinpa.com)

**Ag Careers**  
[agcareers.com](http://agcareers.com)

**Ag Explorer**  
Careers of the Future  
[agexplorer.ffa.org/career](http://agexplorer.ffa.org/career)

**Ag for Life**  
[agricultureforlife.ca/cultivate-your-career](http://agricultureforlife.ca/cultivate-your-career)

**American Society for Horticultural Science**  
[thelandlovers.org](http://thelandlovers.org)

**Center of Agriculture**  
[centerofagriculture.org/career-pathways](http://centerofagriculture.org/career-pathways)

**Employment Opportunities in Food, Renewable Energy, and the Environment**  
[purdue.edu/usda/employment](http://purdue.edu/usda/employment)

**Journey 2050**  
[journey2050.com](http://journey2050.com)

**National Institute for Food and Agriculture**  
[nifa.usda.gov](http://nifa.usda.gov)

**Seed Your Future**  
[seedyourfuture.org](http://seedyourfuture.org)



Choose two glossary words and use both in a complete sentence.

Write your sentence in the space provided.

#### Standards

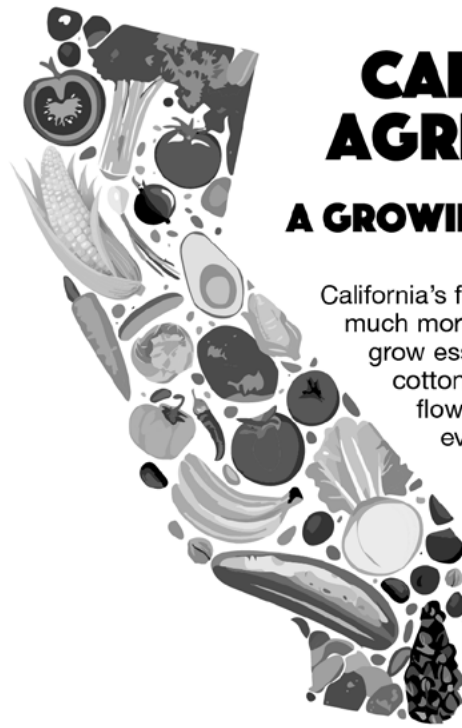
CC ELA: L.3.2G, L.3.4D, L.3.5B, L.4.2D, L.4.4C, L.5.2E, L.5.4C, L.6-8.4C, L.6-8.4D

Answers Vary

As the top dairy producing state in the country, **CALIFORNIA** produced **18% OF THE NATION'S MILK** in 2022.



In 2022, **CALIFORNIA SOLD \$23.6 BILLION** in agricultural products to other countries, making it the **#1 STATE FOR EXPORTING AGRICULTURE.**



# CALIFORNIA AGRICULTURE: A GROWING OPPORTUNITY!

California's farms and ranches provide much more than food—they also grow essential products like cotton for clothing, animal feed, flowers, nursery plants, and even materials used in construction. California is a global agriculture leader because of its great climate, natural resources, and innovative ideas.

**CALIFORNIA AGRICULTURE** provides around **400,000 FULL-TIME JOBS.**



There are more than **400 DIFFERENT CROPS** grown in **CALIFORNIA** including many of the fruits, vegetables, & nuts in the United States.



## About California Foundation for Agriculture in the Classroom

We are a 501(c)(3) nonprofit organization that provides educators with free standards-based resources about California agriculture. Our mission is to increase awareness and understanding of agriculture among California's educators and students. Our vision is an appreciation of agriculture by all.

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