



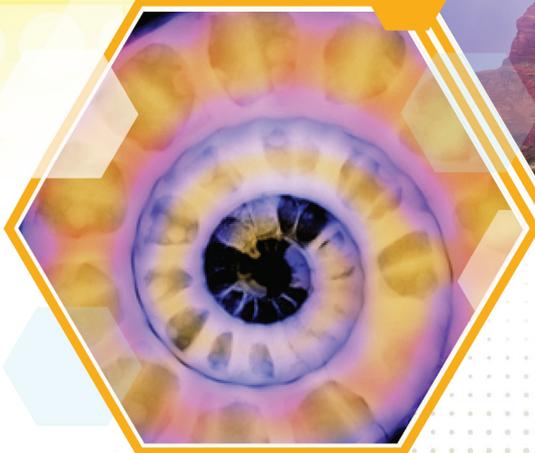
Program Overview

CALIFORNIA

Miller & Levine

Biology

Life in all its dimensions





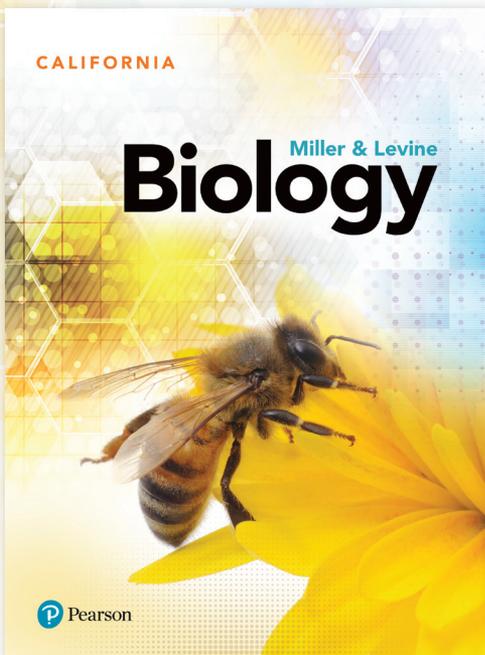
CALIFORNIA

Miller & Levine

Biology

Built for the California NGSS Classroom

New *California Miller & Levine Biology* is here! Developed by preeminent biologists and passionate educators, Ken Miller and Joe Levine, this blended print and digital curriculum immerses students in biological inquiry. Students think, investigate, and talk about biology. They interact with natural phenomena through case studies, problem-based learning, and inquiry focused lab experiments.



ONE BOOK, TWO MODELS

- Earth Science content integrated into chapter narrative.
- Guidance and strategies in the Teacher Edition to assist instructors with the **3-Course** and **4-Course** model.
- Pacing Guides for both programs.

SUPPORT ENVIRONMENTAL LITERACY

- California's Environmental Principles and Concepts integrated in core course.
- Fuel student inquiry by applying EP&Cs in chapter activities.
- Correlated in Teacher Edition for easy reference

Life in all its dimensions

Investigate Phenomena

Inquiry engages students in all three dimensions of the California NGSS.

Connect Learning

A clear, coherent instructional model advances student understanding.

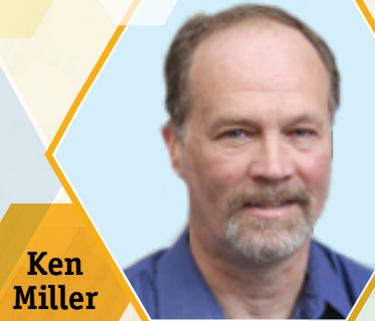
Challenge Thinking

Problem-based learning creates innovators and collaborators.



MEET THE AUTHORS

Active scientists,
passionate storytellers



Ken
Miller

“You don’t need a lab coat, degree, or laboratory to be a scientist. What you need is an inquiring mind, the patience to look at nature carefully, and the willingness to figure things out.”



Joe
Levine

“We want students to really understand biology—which means more than memorizing facts. We’ve worked hard to put the information together in ways that will help you understand why that information is important.”

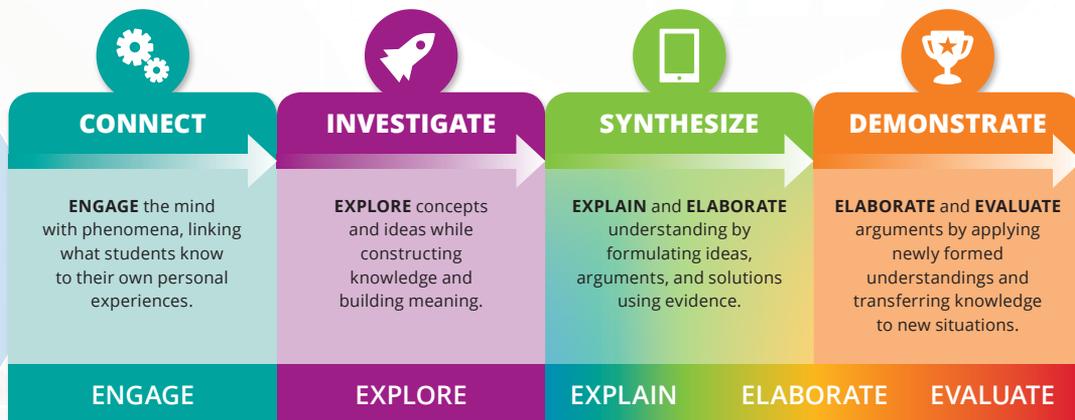


Future and forward thinking

California Miller & Levine Biology prepares students for the modern workplace—with a focus on STEM-related fields and college and careers. A next-generation instructional model requires complex thinking skills, the use of scientific knowledge within and across science disciplines and STEM practices.

NEXT GENERATION INSTRUCTIONAL MODEL

5E LEARNING
Intersects with
21st Century
Competencies



California Miller & Levine Biology integrates 5E learning in a new CISD Instructional Model (Connect, Investigate, Synthesize, Demonstrate). This model emphasizes the science and engineering practices that include obtaining, synthesizing, and communicating information.

CHAPTER 6

ONLINE RESOURCES

- DISCUSSION BOARD Fitting In
- INTERACTIVITY Life on the Reef
- ANALYZING DATA Predator-Prey Dynamics
- INTERACTIVITY Symbiotic Relationships
- ASSESSMENT Lesson 6.1 Quiz

OBJECTIVES

6.1.1 Identify the factors that determine and describe habitats and niches.

6.1.2 Explain how competition shapes communities.

6.1.3 Explain how herbivory shapes communities.

6.1.4 Explain how keystone species shape communities.

6.1.5 Identify the three primary ways organisms depend on each other.

CONNECT

Activate Prior Knowledge

Assign the **Discussion Board Fitting In** to get students thinking about their local species, and remind them that plants and fungi are organisms too.

Alternatively, direct students to this image of the moray eel in the coral reef. Ask what kinds of interactions the moray eel has with the other species around it. (Sample answer: Cleaner shrimp clean the eel of debris.) Ask What other interactions between species could be found in a coral reef? (Sample answer: Sharks prey on fish.)

6.1 Habitats, Niches, and Species Interactions

KEY QUESTIONS

- What factors determine and describe habitats and niches?
- How does competition shape communities?
- How do herbivores shape communities?
- How do keystone species shape communities?
- How and for what primary may their interactions depend on each other?

VOYAGER

How do keystone species shape communities?

READING TOOL

Identify each main idea and the supporting details that lead to the main idea.

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DIFFERENTIATED INSTRUCTION

Support Struggling Students Point out to students that ecologists are interested in microhabitats, because they may have important effects on ecosystems even though they are small and hard to see. Ecology has biases, just like any human activity, and most ecology has been carried out on organisms that are easy to see, culturally popular, or economically important, such as birds, mammals and insects. Very little is known about the importance of microhabitats because of this lack of study.

Support Advanced Students Ask interested students to research a particular type of microhabitat in the library or by searching for information using keywords like "leaf microhabitat." Have them create a profile of the microhabitat that describes its location, conditions, benefits, and species. Ask selected students to present their findings to the class.

INVESTIGATE AND SYNTHESIZE

Habitat and Niche

Use Visuals

Have students think of a human microbiome (the bacteria in their digestive tract, for example) and compare it to the microhabitats found in association with a tree in Figure 6-1.

Ask What roles do the tree and the human play in each of these cases? (Sample answer: These are larger organisms that provide small microhabitats for the smaller organisms, as well as food and protection.)

Ask What do the other organisms provide for the human and the tree? (Sample answer: They may provide protection from disease and nutrients.)

Build Science Skills

Construct Explanations

Have students examine Figure 6-1. Point out that although different microhabitats will be quite different, there tends to be little change in the conditions within a microhabitat. Have students write a brief hypothetical explanation for why living in microhabitats would be advantageous and why it would be disadvantageous. Have the students exchange their explanation with a partner for review and suggested revisions. (Sample answer: An advantage is that organisms living in a microhabitat would be protected from large changes and can specialize on one type of food or environmental conditions. A disadvantage is that conditions change dramatically or the local microhabitat disappears, death is the likely result.)

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California Miller & Levine Biology integrates the three-dimensions into each lesson to help students achieve the Performance Expectations. Students model the behaviors of real scientists as they investigate and build models and theories about the natural world, making the transition to the California NGSS seamless.

ANALYZE AND CONCLUDE

- 1. SEP Use Models** How do the materials you used in the model represent Earth's surface?
- 2. Draw Conclusions** Use the data in your data table as evidence to draw a conclusion about the way Earth's surface is heated by sunlight.
- 3. Form a Hypothesis** What if you turned off the heat lamp, and then measured the



Science and Engineering Practices

Students build science and engineering practices in every lesson by doing science every day.

Crosscutting Concepts

Students experience crosscutting concepts, such as stability and change, and systems and system models. These broader, related ideas transcend across disciplines to help students form a coherent and scientifically based view of the world.

Cross-Curricular Connections

- Chapter Assessments include connections to Math and Language Arts.
- The Teacher Edition provides connections to other disciplines, such as Physical Science, Chemistry, Physics, Language Arts, Math, Art and more.
- The Teacher Edition includes Build Writing Skills and Build STEM Skills activities to extend discipline skills.
- Find Common Core Math and ELA connections throughout the curriculum at point of use.

MATH CONNECTIONS

Analyze and Interpret Data

N-Q.1.1

The graph below shows the volume of ice in a glacier surface area. Changes on the y-axis represent the overall loss of volume. Questions 40–42.

LANGUAGE ARTS CONNECTIONS

Write About Science

WHST.9-12.2

- 43. Write Explanatory Texts** Choose one of the major biomes, and write an overview of its characteristics. Explain how abiotic factors and common plants and wildlife are interrelated. Support your explanation with specific examples.
- 44. Write Informative Texts** Write a paragraph that (1) names and defines the levels of organization that an ecologist studies; (2) identifies the level that you would choose to study if you were an ecologist; (3) describes the method or methods you would use to study this level; and (4) gives a reason for your choice of method or methods.



Learning Progressions

Learning Progression maps with grade-band endpoints help teachers prioritize instruction.



Three-dimensional storyline

Authentic Case Studies drive inquiry-based learning. Students directly engage in real-world problem solving, analysis, and critical thinking.

CHAPTER 3 The Biosphere

Go Online to access your digital course

3.1 Introduction to Global Systems

3.2 Climate, Weather, and Life

3.3 Biomes and Aquatic Ecosystems

CASE STUDY

How can we model the phenomena called the biosphere?

Phenomenon Rising like a mirage in the desert, a greenhouse shaped like an Aztec pyramid towers over a cluster of smaller greenhouses and domes. Is this a set for a movie about a Mars colony? That guess wouldn't be too far from the truth.

This project, named "Biosphere 2," was partly inspired by a book called, *Operating Manual for Spaceship Earth*. That book described Earth ("Biosphere 1") as a planetary spaceship, whose interacting systems keep its passengers alive. Despite the book's title, when it was written decades ago, we didn't have anything even close to a planetary operating manual! We knew little about how Earth's global systems operate, or how they interact with each other and with human society.

"Biosphere 2" was built in the late 1980s as an attempt to model those global life support systems, and to provide data that could be used to design space colonies. The team knew that space colonists would need systems to recycle waste products and other systems to produce food, oxygen, and clean drinking water. But what would those systems look like? How would they work?

To try to answer those questions, a STEM "dream team" of biologists and engineers designed a miniature model of the biosphere.

Eight "biosphereans" then sealed themselves inside, and the experiment began. Was it a success?

That depends on how you define "success." Almost as soon as Biosphere 2 was sealed, its atmosphere started changing in ways that threatened the health of the biosphereans. Nuisance insects and weeds grew exponentially. The biosphereans lasted two years before the experiment was terminated.

Mass media quickly labeled the project a failure. But was it? In science, few experiments are total failures, because even flawed designs usually produce useful data. Biosphere 2 was no exception.

What did data gathered from Biosphere 2 teach us about how Earth's global system work? Can this kind of the biosphere model help us understand planet-sized phenomena? Many scientists think so. Today, the facility serves as one of the few places where certain large-scale experiments can be conducted.

CASE STUDY WRAP

How can we model the phenomena called the biosphere?

Biosphere 2, a habitat design colony, didn't make the grade

HS-LS2-2, EP&C1a, EP&C1b, EP&C1c, EP&C1d, EP&C1e, EP&C1f, EP&C1g, EP&C1h, EP&C1i, EP&C1j, EP&C1k, EP&C1l, EP&C1m, EP&C1n, EP&C1o, EP&C1p, EP&C1q, EP&C1r, EP&C1s, EP&C1t, EP&C1u, EP&C1v, EP&C1w, EP&C1x, EP&C1y, EP&C1z

Make Your Case

Phenomenon Engineers and ecologists thought they'd designed a system that could sustain eight people sealed off from the outside world. But unexpected things happened. Some problems involved chemical reactions with parts of the project's structure. Others arose when organisms that were stocked in the system—and some that got in on their own—interacted in unexpected ways.

Developing and Using Models

1. SEP Obtain Information Biosphere 2 was intended to be a small-scale model of Biosphere 1. Working with a partner, research the detailed history of Biosphere 2, along with

Case Studies

Dig into interesting biology phenomena and understand core scientific concepts. Each chapter begins with an authentic Case Study, a problem that drives scientific inquiry. Students conduct investigations around the case as they progress throughout the chapter. They test ideas, analyze evidence, and construct solutions from their work.

Case Study Connections

Inquiry leads to analogous problems, more questions, and drawing comparisons. Students analyze data and create models to support their solutions.

CASE STUDY

HS-ESS2-4



Modeling Lab Guided Inquiry

Effects of Greenhouse Gases

Problem How does the concentration of atmospheric carbon dioxide affect climate?

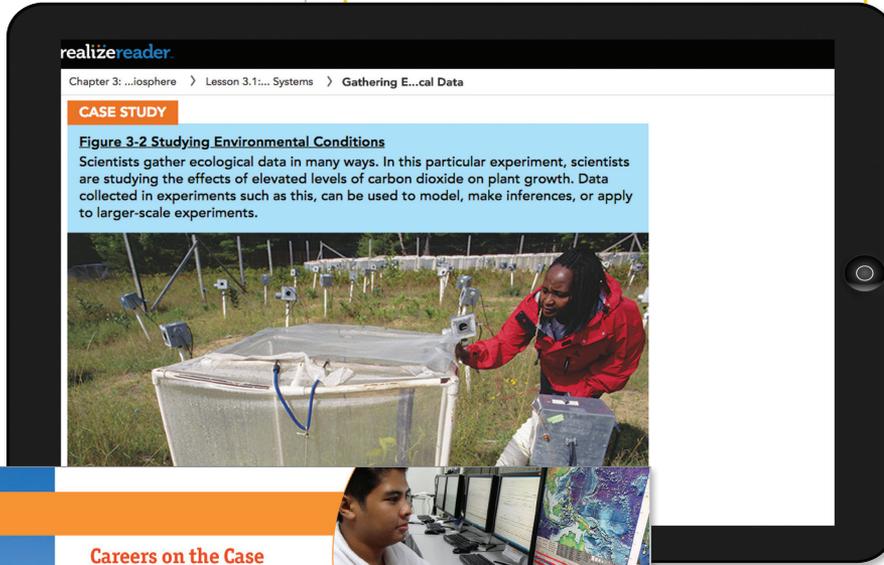
Gases such as carbon dioxide are called greenhouse gases because they trap energy from the sun's rays, in a similar way as a greenhouse traps heat energy. In this lab, you will use a model to test whether the concentration of greenhouse gases in the air affects the amount of heat energy trapped by the atmosphere.

You can find this lab online in your digital course.



INTERACTIVITY

Explore a tundra to learn about the levels of organization, earth systems, and abiotic and biotic factors that make up this biome.



UP

model the phenomena
sphere?



ned to model a life-sustaining space
e. But its "failure" taught us a lot.

EPSC

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Careers on the Case

Data Scientist

Data scientists gather and analyze data. Then they try to detect patterns, trends, and relationships within that data. Data scientists are experts at selecting the most useful way to display complex data. They design and construct their displays, often with the aid of computers. Some data scientists work to display data on climate or populations. Others work for engineers, financial institutions, and other businesses. A bachelor's degree in statistics, data science, computer science, or mathematics is required for this career.



VIDEO
In this video, Dr. Corina Tarnita uses mathematical modeling to explain the regularity of termite mound patterns in a savannah ecosystem.

HHMI | BioInteractive

Technology on the Case

Eyes Above the Sky

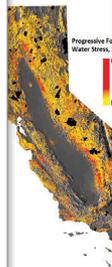
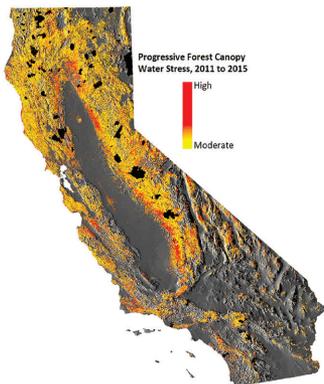
Biosphereans could easily see changes in their habitat's mini-ecosystems. They could see which species were doing well, and which were dying. They could record changes in plant and insect populations. But many natural systems are too large for that approach. New technology offers a

Satellites and airplanes equipped with instruments sensitive to ultraviolet (UV) and infrared (IR) light can identify forests, grasslands, and farms. Newer technology, developed at the Carnegie Institute for Science, can identify tree species, record their height, and even determine if they

Technology on the Case

Eyes Above the Sky

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Case Study Wrap-Up

How can we model the phenomena called the biosphere? Students develop science and engineering practices as they apply scientific reasoning to solve the case.

Wrap-Up includes:

- Make Your Case
- Technology on the Case or Society on the Case
- Careers on the Case
- HHMI BioInteractive Scientist at Work Career Videos



Experience science phenomena

DO MORE INQUIRY! Throughout each lesson, students learn about real-life issues—and take steps to solve them. Students are engaged with natural phenomena through case studies, labs, STEM activities, and research projects as they investigate key questions, apply science and engineering practices, and interpret data.

Quick Lab



Guided Inquiry

Why Do Different Earth Surfaces Have Different Temperatures?



1. Review the procedure. Prepare a data table to record the temperature measurements.
2. Half fill each of three cups: one cup with gravel, a second cup with soil, and a third cup with water.
3. Place a thermometer inside each cup. Record the temperatures.
4. Place each cup under the heat lamp. Wait 30 minutes and then record the temperatures again.

ANALYZE AND CONCLUDE

1. **SEP Use Models** How do the materials you used in the model represent Earth's surface?
2. **Draw Conclusions** Use the data in your data table as evidence to draw a conclusion about the way Earth's surface is heated by sunlight.
3. **Form a Hypothesis** What if you turned off the heat lamp, and then measured the temperatures of the three cups over time? Form a hypothesis, and then test it with your teacher's approval.

Quick Labs

- Interact with chapter concepts at point of use
- Focus on Science and Engineering Practices
- Save valuable time with easy setup and cleanup

Chapter Labs

- Customize and edit online in Savvas Realize™
- Conduct in-depth laboratory investigations
- Make and use models
- Plan and conduct experiments
- Aggregate, interpret, and present results
- Use appropriate laboratory equipment and technologies
- Two versions of each lab for differentiation

In Your Neighborhood Lab Open Ended Inquiry

Teacher Support

Chapter 4 Lab

The Effect of Fertilizer on Algae

Guided Inquiry • Develop a Solution Lab

Students plan and carry out an investigation that tests the effects of fertilizer concentration on algae growth. They determine the concentrations of fertilizer to test, measure the amounts of algal growth, and construct a graph to analyze their data.



Develop a Solution Lab Guided Inquiry

The Effect of Fertilizer on Algae

Problem How do excess nutrients affect the growth of algae?

In this lab, you will plan and carry out an investigation that tests the effects of fertilizer concentration on algae growth. You will determine what concentrations of fertilizer to test, measure the amount of algal growth, and construct a graph to analyze your data.

You can find this lab in your digital course.



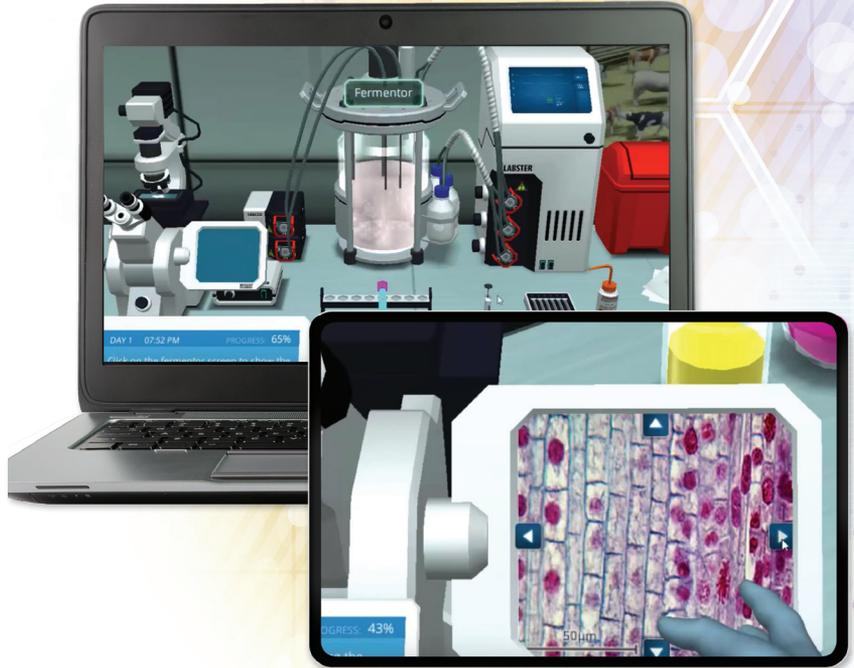
Google Expeditions

Embark on 3D expeditions around the world.

LABSTER

Award-winning Virtual Lab Simulations ▶

- Immersive, interactive learning
- Lifelike 3D animations
- Gamified missions and storytelling
- Real-life, open-ended cases
- Point-of-use quizzes
- No expensive lab equipment
- Eliminates all safety issues



◀ Animations

Engaging animations, integrated at point of use in the student program, combine scientific rigor with best practices of visual storytelling.

◀ Scientists at Work Career Videos

Watch scientists describe how they apply the scientific process to understanding a range of phenomena, from dying coral reefs to the distribution of elephants across the African continent.

◀ Spreadsheet Data Analysis Tutorials

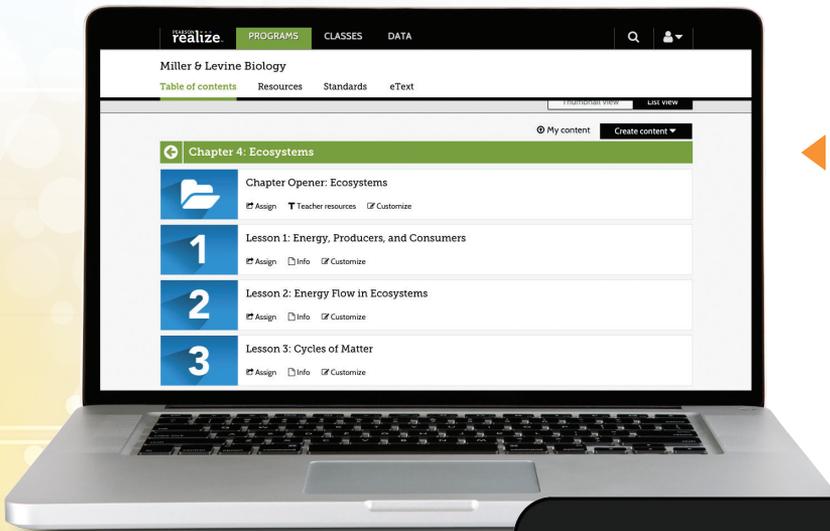
Students learn essential quantitative skills applied to biology research, such as organizing data, calculating statistical values, achieving 95% confidence intervals, and plotting graphs with error bars.



Realize a better way

SAVVAS realize™

SavvasRealize.com is your online destination for **California Miller & Levine Biology**. A single sign-on provides access to all content, management tools, and real-time student data. Realize partners with edtech providers to create a seamless digital experience.

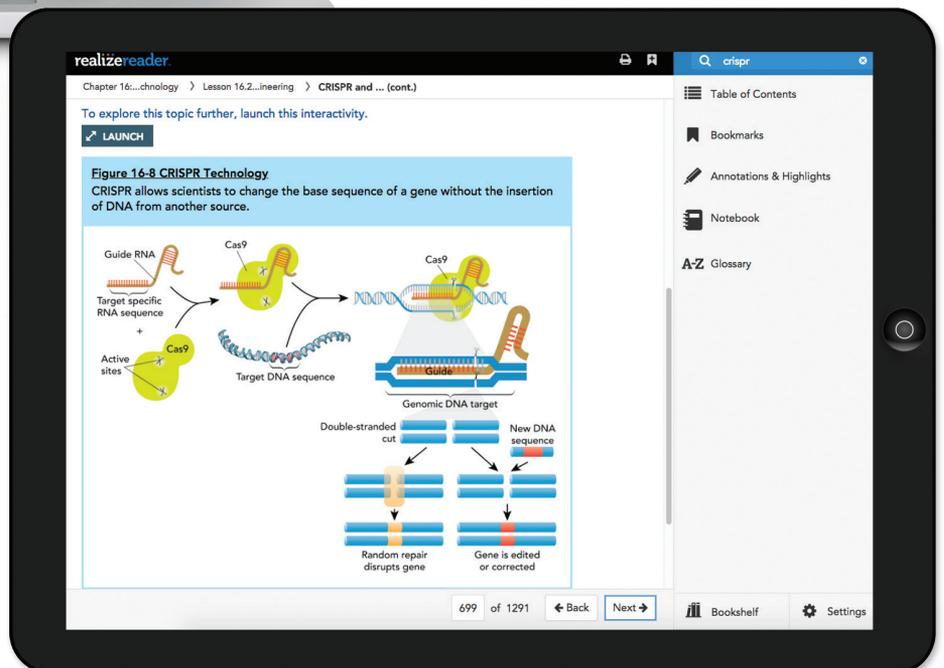


Make It Your Own

Savvas Realize™ is fully customizable. Reorder chapters and lessons and upload, link, and edit your own resources. Find content quickly by standard or keyword.

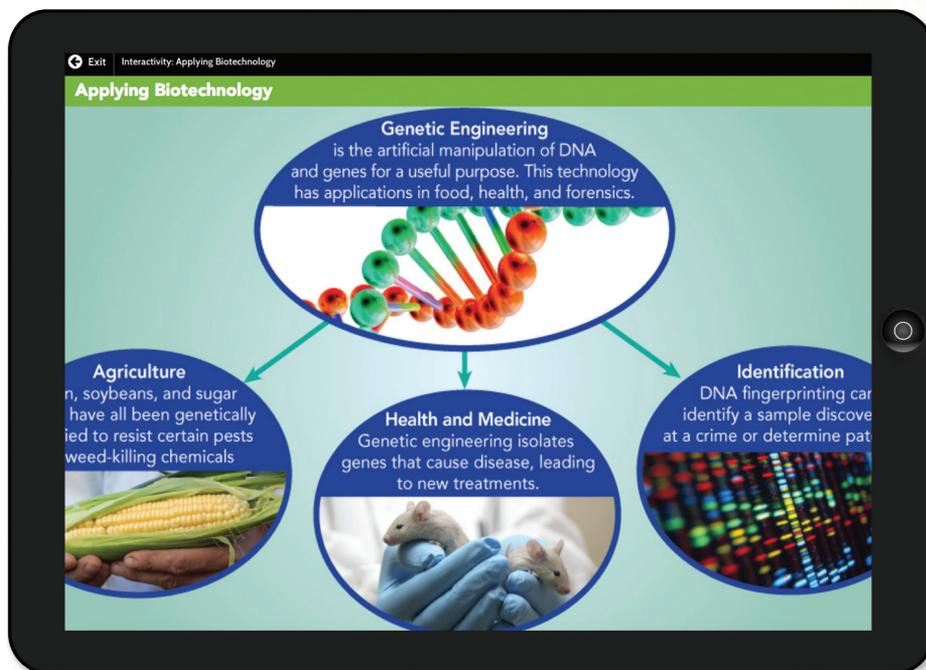
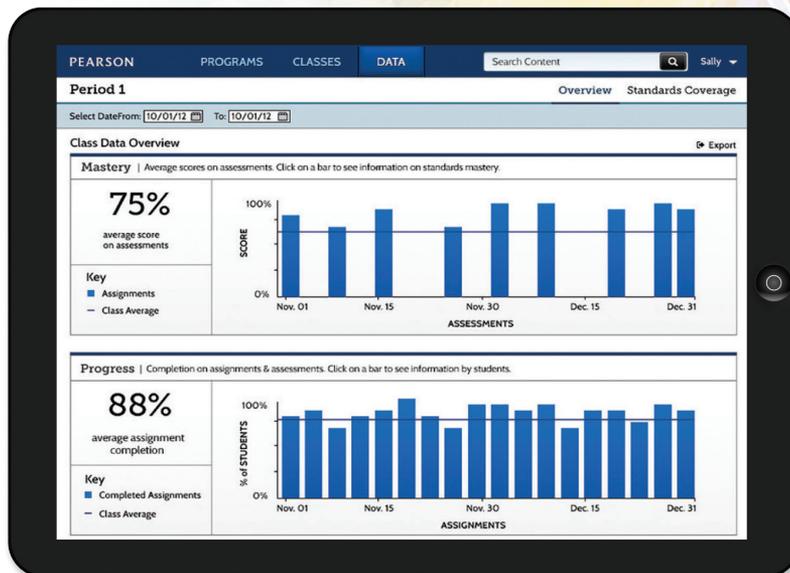
Online, Offline, Anytime!

The **Biology Student Edition eText** gives students access to assignments, content, and multimedia both online and offline. Everything syncs up when reconnected to the Web.



Access Student Data ▶

Are students mastering California NGSS? Get mastery reports, as well as real-time data on actual student activity. Monitor their progress and usage.



◀ Interactive Learning

Students interact with digital art, videos, and animations through prompts or questions—making **California Miller & Levine Biology** relevant to their lives.



Add content to Google® Classroom.
Submit Google Drive documents to Realize.
Seamless integration is in sync with teachers, students, and schools.



Search OpenEd resources and assign them with one click. Single sign-on, single-click assignments make it easy to add thousands of reliable, vetted resources.

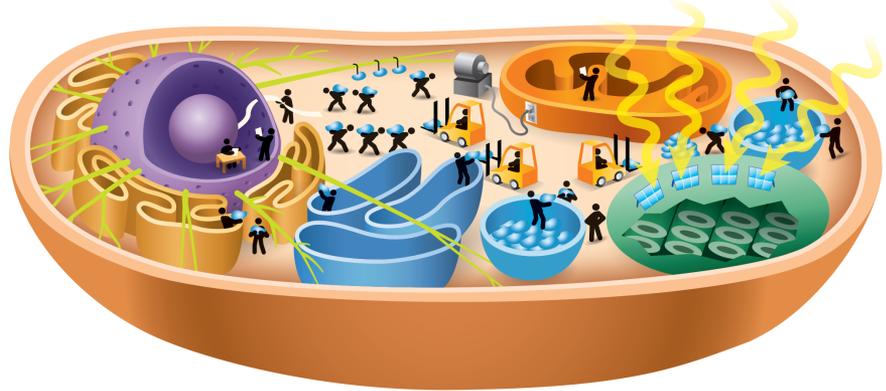


Get the big picture

Are students stuck on memorizing facts? *California Miller & Levine Biology* lets students “experience” science. **Visuals, interactivity,** and **built-in support** help students unpack information, ask questions, build understanding, and stay interested.

Visual Content

Visual Analogies, dynamic photos, illustrations, tables, and graphs help students understand each chapter’s core ideas.



The Nucleus In the same way that the main office controls a cell, DNA is the coded material to

Visual Analogy

Figure 8-6
The Cell as a Factory

Specialized machines enable a factory to function. Similarly, specialized structures in a cell enable a cell to carry out the processes of life.

Visual Analogy

Figure 3-5
The Earth Systems Model as a Jigsaw Puzzle

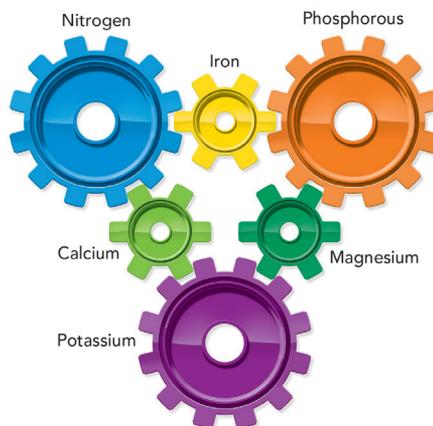
The earth system model is similar to a jigsaw puzzle. Each piece of the puzzle represents a different process within the biosphere. As you work through this unit, you will see references to the model and the icons that represent the processes.



Visual Analogy

Figure 4-15
Interlocking Nutrients

The movement of each nutrient through ecosystems depends on the movements of all the others. All are needed for living systems to function.



Exit PBL Science Skills Acti

Pythons in the Ever

Overview

What is an effect of the int
Burmese python on the E
ecosystem?

Burmese pythons are intr
in Everglades National Park
studying how pythons affect
ecosystem. In this lab, you w
experiment to see how the p
is affecting a native populati
rabbit.

Use the worksheet that goes
activity to take notes and an
results.

Use the navigation buttons t
Investigation tab to repeat, o
earlier parts of the investigat

Reading Support ►

Modified instruction at point of use for special needs students, struggling students, less proficient readers, and advanced students helps instructors reach all students. Tips provided in the margins include connections to visuals, connections to other subjects, reading tools, and activities.

DIFFERENTIATED INSTRUCTION

Share this quote with students: "Viewed from the distance of the moon, the astonishing thing about the earth, catching the breath, is that it is alive Aloft, floating free beneath the moist, gleaming membrane of the bright blue sky, is the rising earth, the only exuberant thing in this part of the cosmos." This quote by Lewis Thomas uses visual imagery to describe some of Earth's abiotic factors.

Support Special Needs Students Ask students to supply other sensory descriptions of abiotic factors, such as the sound of wind or the smell of salt water at the seashore.

Support Advanced Students Have students explain how Lewis Thomas might have described Earth as "alive," though his quote mentions only abiotic factors.

ELD SUPPORT

ELD.PI.9-10.1

Exchanging Information/Ideas Students will work in pairs or small groups to discuss abiotic and biotic factors.

Emerging List examples of factors within an environment (*soil, rocks, water, rocks with lichen or moss growing on top, plants, animals*) and have students determine if each is abiotic, biotic, or contains both.

Expanding Ask students to describe abiotic and biotic factors in their own words. Have them paraphrase the text to support their explanations.

Bridging In groups, have students discuss how abiotic and biotic factors work together to support a functioning ecosystem. Have them share their findings with the class or with other groups.

Find More
in the
Multilingual
Glossary

► Support for English Learners

Teaching strategies at point of use support language proficiency and development.

The screenshot shows a digital course interface for 'Everglades'. At the top, there is a 'Download' button. Below it, the title 'Everglades' is displayed. There are two tabs: 'Learning Outcomes' and 'Investigation'. The 'Investigation' tab is active, showing an illustration of a scientist in a blue shirt and hat, kneeling in a swampy area, examining a small animal. In the background, another scientist is using a long pole to catch a snake. The interface includes a sidebar with text about 'Produced species in the Everglades' and 'Scientists are conducting an alligator population study in the marsh'. A 'Download' button is also visible in the top right corner of the interface.

Go Online to
access your
digital course.

- VIDEO
- AUDIO
- INTERACTIVITY
- ETEXT
- ANIMATION
- VIRTUAL LAB
- ASSESSMENT

◀ Interactive Content

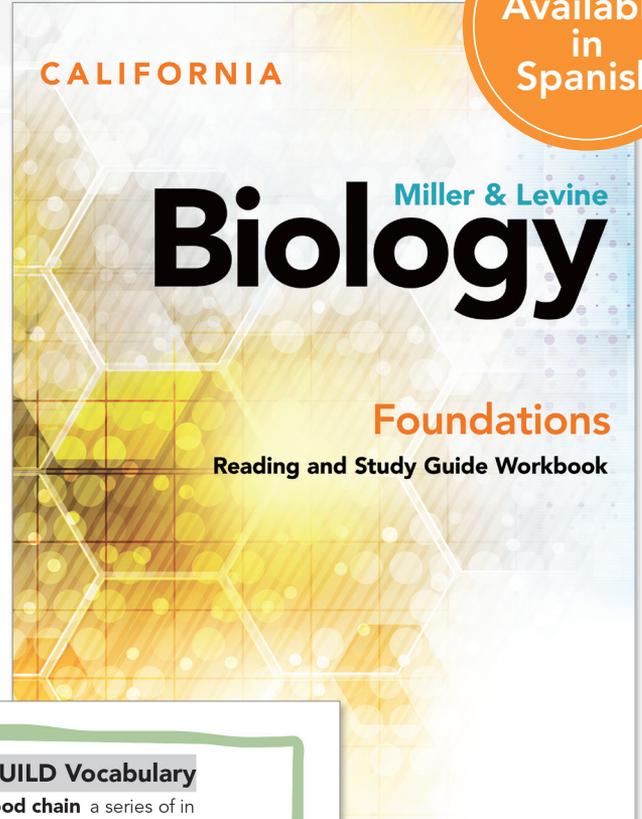
The online digital course provides multiple ways to unlock core ideas and keep the interest level high.



Self-scaffolding for students

Also Available in Spanish

Science texts can challenge many students. The **Biology Foundations: Reading and Study Guide Workbook** provides lesson summaries, vocabulary help, and reading tools and strategies. Build science literacy and improve students' abilities to read complex scientific text and comprehend



Lesson Summaries

Summaries help students recall key chapter content. A great study aid for the big exam!

Lesson Summary

Primary Producers

KEY QUESTION *What are primary producers?*

All living things need energy, but no living thing can create energy. Organisms called **autotrophs** capture energy from nonliving sources. Autotrophs store this energy in forms that make it available to other organisms, which is why they are also called **primary producers**. Primary producers are the first producers of energy-rich compounds that can be used by other organisms. All life depends on primary producers.

Energy From the Sun The energy for most life on Earth comes from sunlight. Algae and plants absorb solar energy through the process of **photosynthesis**. Photosynthesis uses light energy to power chemical reactions that convert carbon dioxide and water into oxygen and energy-rich carbohydrates such as sugars and starches. This process also adds oxygen to the atmosphere and removes carbon dioxide. Algae and plants are the main primary producers in most ecosystems.

Life Without Light Some bacteria can capture energy from inorganic molecules such as hydrogen sulfide. These bacteria use a process called **chemosynthesis** (kee moh sin thuh sis), in which chemical energy is used to **produce** carbohydrates.

BUILD Vocabulary

food chain a series of in an ecosystem steps in which organisms transfer energy by eating and being eaten

phytoplankton photosynthetic algae found near the surface of the ocean

food web network of complex interactions formed by the feeding relationships among the various organisms in an ecosystem

Use Prior Knowledge A chain could be made of beads on a string, or loops of paper or metal. Many chains could join together to make a model of a spider web. Food chains join together to form a food web.

Draw a model of a spider web. Then describe how a spider web is similar to a food web.

Science Vocabulary

Put the spotlight on new words and pronunciation to help students learn the language of biology. Extend practice for vocabulary development.

READING TOOL

Academic Words

produce create or form something as part of a physical, chemical, or biological process

acquire to gain an object or asset for oneself

☑ Look at the photosynthesis diagram on the prior page. If there were suddenly no sunlight reaching Earth, how would this affect the ability of plants to produce carbohydrates?

READING TOOL Main Idea and Details As you read your textbook, identify the main ideas and details or evidence that support the main ideas. Use the lesson headings to organize the main ideas and details. Record your work in the table. Two examples are entered for you.

READING TOOL Compare and Contrast Before you read, preview the cycle diagrams in your textbook. Note the similarities and differences of the cycles in the graphic organizer.

Reading Tools

Target strategies to support reading comprehension for students using features such as:

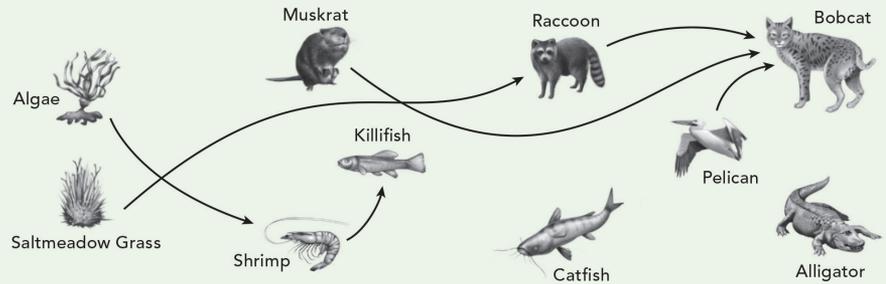
- Cause and Effect
- Main Idea and Details
- Academic Words
- Compare and Contrast
- Use Structure
- Make Connections

Visual Reading Tools

Support difficult concepts with interactive visuals and alternative practice opportunities.

Visual Reading Tool: Food Webs

1. Find a food chain that connects algae to the alligator. Then find another food chain from the saltmeadow grass to the alligator. Use two pencils of different colors to highlight the two food chains.



2. How are primary producers important to the alligator's energy supply?

4 Chapter Review

Review Vocabulary

Choose the letter of the best answer.

1. The conversion of nitrogen gas (N_2) to ammonia is called.
A. denitrification
B. nitrogen cycle
C. nitrogen fixation
D. nitrogen limitation
2. Which rely on other organisms for energy and food supply?
A. primary producers
B. biomass
C. autotrophs
D. consumers

Match the vocabulary term to its definition.

- | | |
|---|--------------------|
| 3. The total amount of living tissue | a. biomass |
| 4. Small pieces of dead or decaying plant or animal remains | b. denitrification |
| 5. A model of feeding levels in a food chain or food web | c. energy pyramid |
| 6. Changing nitrogen compounds to nitrogen gas | d. detritus |

Review Key Questions

Provide evidence and details to support your answers.

7. How does energy flow through ecosystems?
8. Describe two ways that primary producers produce high-energy compounds.
9. How does nutrient availability relate to productivity and species survival?

Chapter Review

The Chapter Review features open-response questions that require students to show an understanding of concepts using their own words.



Evidence-based student learning

The practice-focused assessments in *California Miller & Levine Biology* address multiple Depth of Knowledge levels, three-dimensional learning, multi-question scenarios and performance-based tasks. Multiple and varied assessments occur in every chapter.

Performance-Based Assessments

Authentic assessments of STEM learning allow students to demonstrate mastery of the chapter concepts and California NGSS.

PERFORMANCE-BASED ASSESSMENT

Meet the Anthromes

Construct an Argument

HS-ESS3-6, EP&C1a, EP&C1c, WHST.9-10.8, WHST.9-10.9

Chances are that you live in an anthrome that has been altered by human activity. If you compare the map of global anthromes with the global biome map in Figure 3-17, you'll see that almost the entire continental United States has been altered by human activity. Biomes have been converted into cities, suburbs, farmland community or ranch land. Now, there is nothing at all "wrong" or "bad" about anthromes! Still, you should recognize that anthromes differ from natural biomes in ways that affect local and global systems and processes you'll learn about in this unit. Anthromes may also respond differently than biomes to human-caused environmental changes, including climate change.

- Classify** Describe the general area you live in. Then, use information in the map, and from any more detailed anthrome maps you can find online, to classify your area.
- Synthesize Information** How does the distribution of anthromes along the west coast and across the United States compare to what you know about places where people live and the kind of work they do?
- Use Evidence to Construct an Argument** How do you think biomes and anthromes in your area of California will change in the future? How might those environments respond to global change? To help construct your argument, look for data and opinions from different sources.
- Communicate** Write a short essay to present your argument about the future of biomes and anthromes. Support your argument with evidence from this chapter and from your research. Address the following criteria:
 - Predict which biomes or anthromes will expand, which will shrink, and which will stay the same size.
 - Include data, scientific reasoning, and expert opinions to support your predictions.
 - Cite your sources and evaluate their credibility. If you find reliable sources that provide conflicting information or opinions, explain how you have evaluated them.

SCIENCE PROJECT

Natural biome; cropland anthrome; urban anthrome

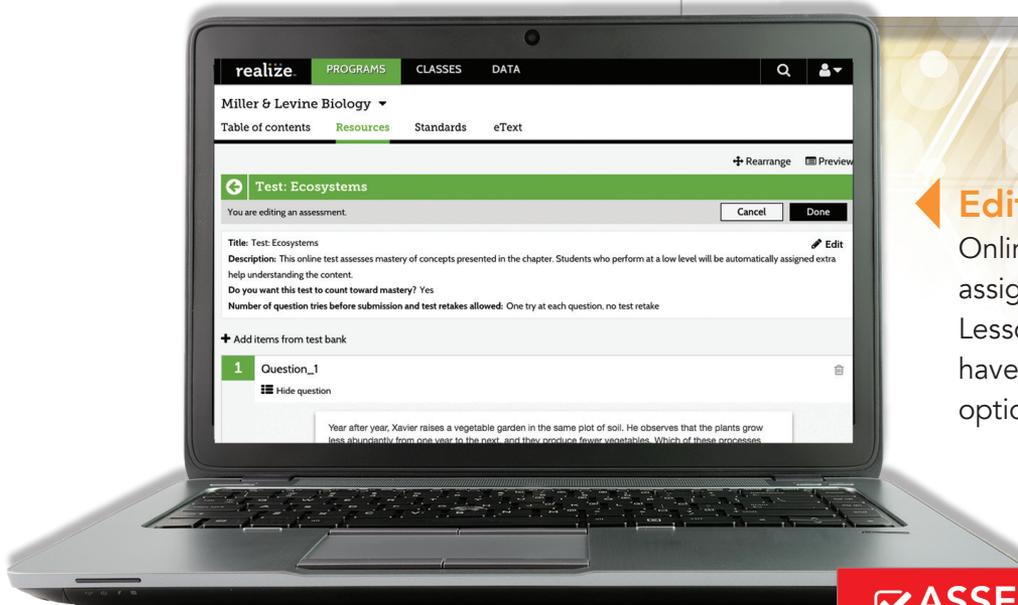
This map shows the locations of major anthropogenic biomes of the world.

Embedded Assessments

Formative assessments assist teachers in clarifying misconceptions and adjusting instruction as necessary.

ASSESS ON THE SPOT

Tell students that a biologist collected all the seeds from a meadow. When the seeds were compared, they showed a range of sizes all the way from 1 mm to 10 mm. Draw a range of seed sizes on the board. The biologist knows that there are 10 bird species that eat seeds from the meadow. What is the most likely relationship between bird species and seed size eaten that the biologist will find? Invite students to suggest patterns. (Sample answer: *Different species are likely to eat different sizes of seeds with very little overlap.*)

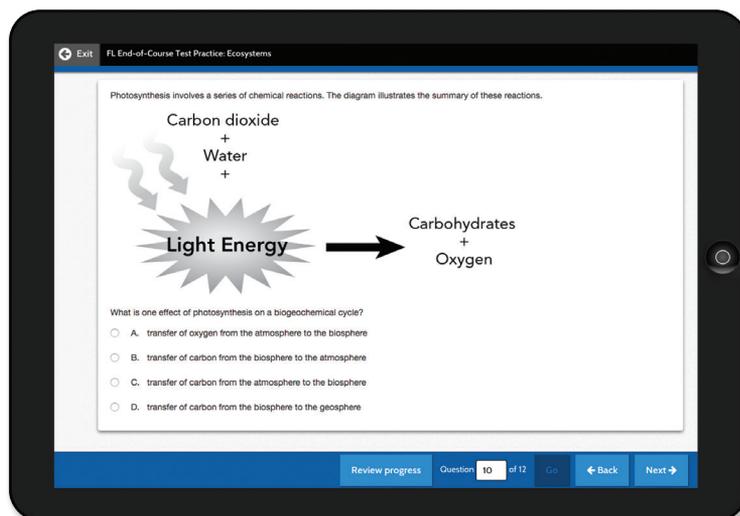


Editable Assessments

Online tools allow teachers to edit, assign, and print quizzes and tests. Lesson quizzes and assessments have automatic remediation options in Savvas Realize.

Three-Dimensional Assessments

Assessment tasks integrate science and engineering practices, crosscutting concepts, and disciplinary core ideas.



ASSESSMENT

CROSCUTTING CONCEPTS

- Scale, Proportion, and Quantity** Why is it useful to describe the soil of a forest as a microbiome, and separate from the forest biome above it?
- Stability and Change** After a climax community is disturbed, such as by a fire or flood, will it always return to its original condition? Explain why or why not.

End-of-Course Test Practice

Students prepare for high-stakes exams with practice tests in every chapter and online in Savvas Realize™.



A path to problem solving

PROBLEM:

How can you reduce the impact of an invasive species on your local ecosystem?

TO SOLVE THIS PROBLEM: perform these activities as they come up in the unit and record your findings in your Explorer's Journal.



VIDEO

Watch a video about Australia's battle with the poisonous cane toad.

PROBLEM LAUNCH

Choose an invasive species in your local ecosystem to focus on.

INTERACTIVITY

In Lesson 4.2 investigate how invasive species can disrupt a native food web.

INTERACTIVITY

In Lesson 5.2 conduct a virtual investigation to see the effect of the introduced Burmese pythons on the Everglades ecosystem.

UNIT

2

Ecology

Invasives in Your Neighborhood

It's a snake big enough to eat an alligator, and it's wreaking havoc in the Florida Everglades! Native to Southeast Asia, Burmese pythons in Florida have no natural predators and a steady supply of food. As a result, the population has exploded. But, there's hope for the Everglades. Using radio tracking technology, researchers have been able to investigate the habits of the pythons, including where they live, how far they travel, what they eat, and how often they reproduce. This information has made it possible to locate, trap, and remove pythons, and to destroy nesting sites. The success may be a model for the control of invasive species in other ecosystems. However, Burmese pythons have not been entirely eliminated, and work to reduce the population is ongoing.

How can you reduce the impact of an invasive species on your local ecosystem? Get ready to read and discuss the text, and devise a way to remedy the problems they cause.

PROBLEM LAUNCH

Invasives in Your Neighborhood

Conduct research to identify an invasive species in your local ecosystem.

Timing Beginning of Unit 2

PROBLEM HOW CAN YOU REDUCE THE IMPACT OF AN INVASIVE SPECIES ON YOUR LOCAL ECOSYSTEM?

1. What is this problem asking you to solve?

2. What questions do I need to answer to solve this problem?

STEM PROJECT

Controlling Invasives

Controlling invasives requires both stories both in the U.S. and through your ecosystem?

Timing Chapter 5, Lesson 2

DEFINE THE PROBLEM SPECIES ON YOUR LOCAL ECOSYSTEM?

1. List your chosen invasive species.

Students collect, organize, and synthesize information.

CALIFORNIA

Miller & Levine Biology



Connect
Learning

Investigate
Phenomena

Challenge
Thinking

FOR STUDENTS:

- Student Edition
- Student Edition eText with embedded multimedia
- Explorer's Journal Problem-Based Learning
- Biology Foundations: Reading and Study Guide
- Spanish Biology Foundations: Reading and Study Guide
- California Test Practice Workbook
- Savvas Realize™

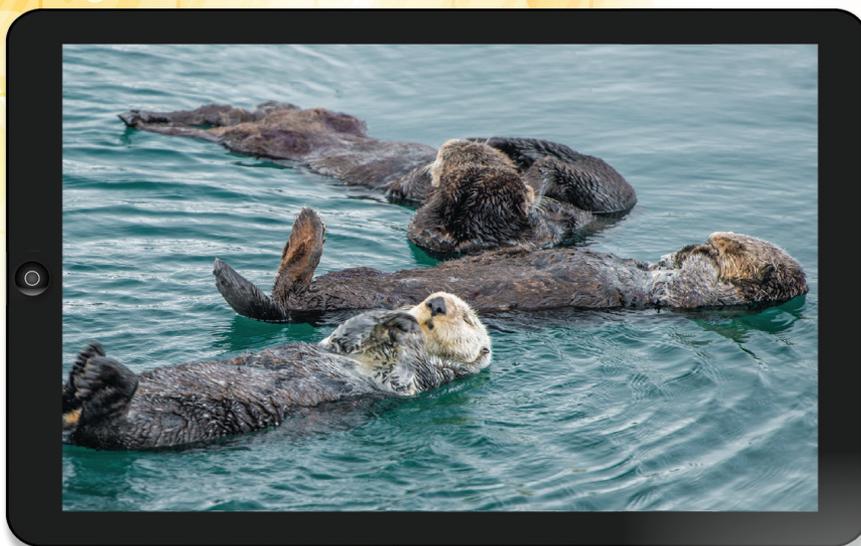
FOR TEACHERS:

- Teacher Edition
- Teacher Edition eText
- Digital Explorer's Journal: Problem-Based Learning Teacher Edition
- Digital Biology Foundations: Reading and Study Guide Teacher Edition
- Digital California Test Practice Workbook Answer Key
- ExamView® Test Bank
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