

SAVVAS

**PROGRAM
OVERVIEW**

VIRGINIA **Biology**

Miller & Levine

**100%
Match to the
VA SOLs**

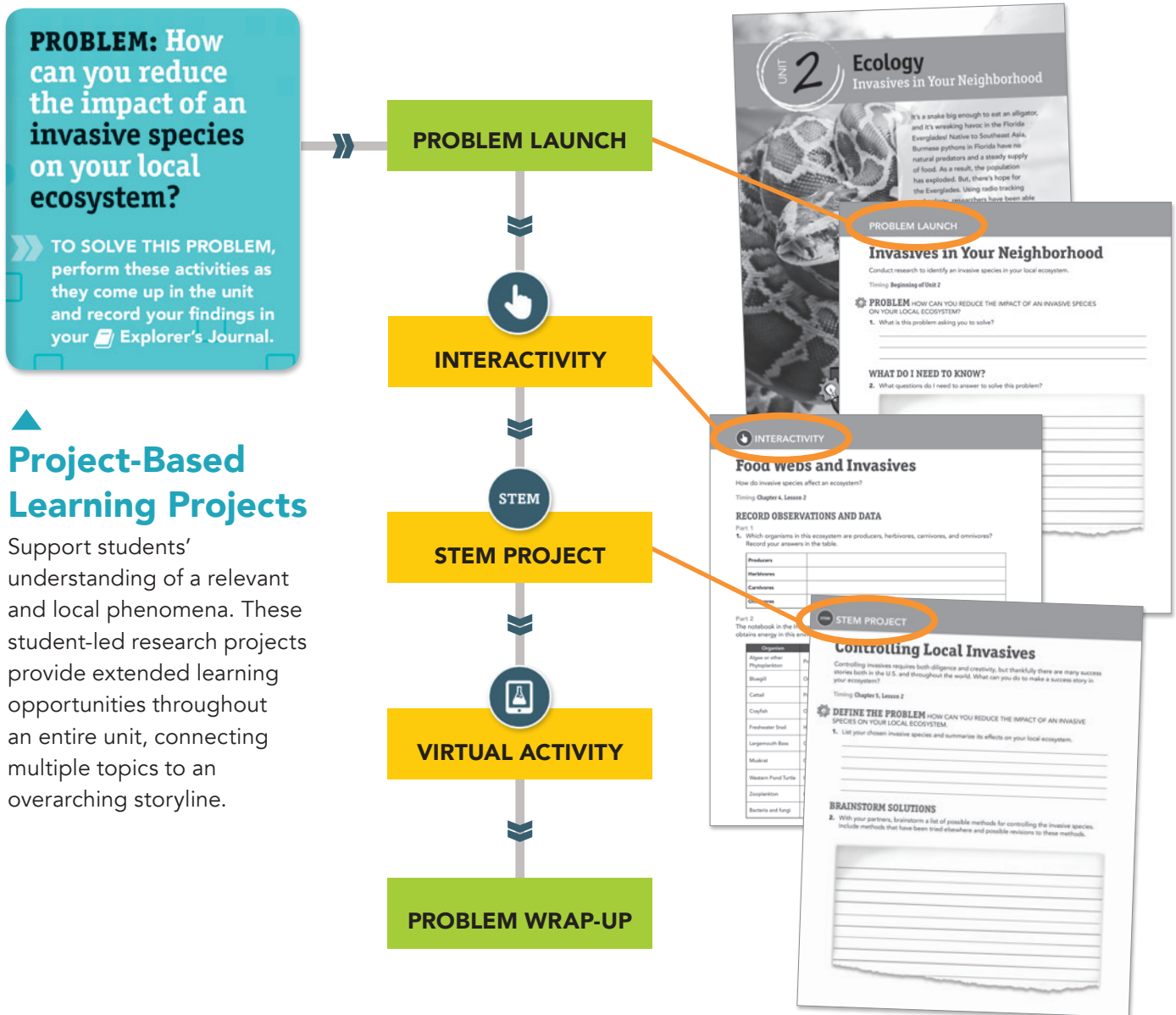


Experience It!
IT'S THE SCIENCE OF DOING!

Phenomenal

experiences drive student inquiry.

Observe it. Explain it. Use evidence. *Virginia Miller & Levine Biology* immerses students in phenomena-based lessons through Project-Based Learning and Case Studies. The program organization matches the Virginia Scope and Sequence. Send students on a journey of discovery with compelling real-world phenomena.





How do species interactions shape ecosystems?

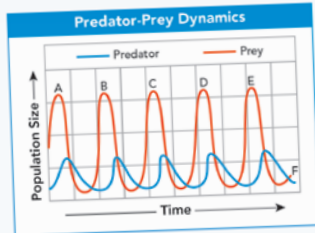
CASE STUDY Analyzing Data

Predator-Prey Dynamics

The relationships between predator and prey are often tightly intertwined, particularly in an environment in which each prey has a single predator and vice versa. The graph here shows an idealized computer model of changes in predator and prey populations over time.

1. **Use Computational Models** Suppose a bacterial infection kills off most of the prey at point B on the graph. How would this affect the predator and prey growth curves on this computer model at point C? At point D?

2. **Analyze Graphs** Suppose a sudden extended cold spell destroys almost the entire predator population at point F on the graph. How would the next cycle of the prey population appear on the graph?



3. **Develop Possible Solutions** Suppose a viral infection kills all the prey at point D. What effect would this have on the predator and prey curves at point E? What will happen years to the predator population? What could ecologists develop to ensure the survival of the predators?

Make Your Case

Scientists and park rangers agree that reintroducing wolves to Yellowstone was a wise action to take. Happily, the wolves helped reverse the changes in Yellowstone and make it a much healthier ecosystem. However, scientists are not convinced that the wolves were the only cause of the improvements that Yellowstone experienced.

Apply Scientific Reasoning

1. **Conduct Research** Compare the Yellowstone wolf story with a situation in your region where human activity that affected one species, or a couple of species, resulted in a trophic cascade. Which aspects are similar to the Yellowstone story, and which are different? Have researchers offered and tested hypotheses to explain the changes?
2. **Engage in Argument** Develop an argument, supported by evidence, about ways to protect or restore the ecosystem that you researched. Do you think your solution will work throughout the ecosystem, or just in certain parts of it? Compare and contrast your chosen system with Yellowstone.

Phenomena Case Studies

- Launch every chapter with an intriguing, open-ended scientific problem or question. Students conduct investigations around the case as they progress throughout the chapter.
- Learning connects to the Case Study in activities and examples, creating a cohesive storyline. Look for the orange Case Study Connections label.
- Students gather data, cite evidence, and apply scientific reasoning to develop argument-driven discussions with their peers as they Make the Case.

Secondary Succession When a disturbance affects an existing community but doesn't completely destroy it, a process of **secondary succession** occurs. Secondary succession proceeds faster than primary succession, in part because bits of the old community survive and can regrow rapidly. Secondary succession is shown in Figure 6-8B. On land, secondary succession often follows a wildfire, hurricane, or other natural disturbance. We think of these events as disasters, but many species are adapted to them. Although forest fires kill some trees, for example, other trees are spared, and fire can stimulate their seeds to germinate. Secondary succession can also follow human activities like logging and farming.

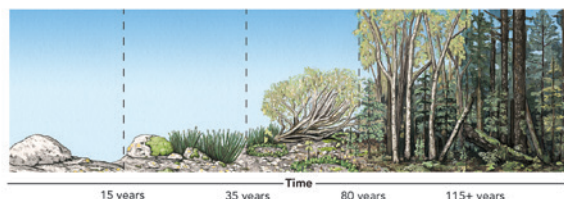
INTERACTIVITY

CASE STUDY

Figure 6-8

Primary and Secondary Succession

In both types of succession, one group of species replaces another group.



A. **Primary succession** occurs on newly exposed surfaces. In Glacier Bay, Alaska, a retreating glacier exposed barren rock. Over the course of 100 years, a series of changes has led to the hemlock and spruce forest.

Experience

creates real learning opportunities.

Do more inquiry! Throughout each lesson, students are engaged through inquiry labs, STEM activities, and interactivities as they investigate key questions, apply science and engineering practices, and interpret data.

Labster

Award-winning Virtual Lab Simulations ▶

- Immersive, interactive learning with gamified missions and storytelling
- Real science, stories, and data
- Open-ended case study research
- Point-of-use quizzes



◀ **Animations & Interactive Media**

◀ **Scientists at Work Career Videos**

◀ **Spreadsheet Data Analysis Tutorials**

Quick Lab Open-Ended Inquiry

Modeling DNA Replication

1. Cut out small squares of white and black paper to represent phosphate and deoxyribose groups. Label the white squares "phosphate" and the black squares "deoxyribose."
2. Then cut colored paper strips to represent the four nitrogenous bases. Match the colors used in **Figure 13-11**. Label each strip with its nucleotide name. Then tape together a set of five nucleotides.
3. Using your nucleotides, tape together a single strand of DNA. Exchange strands with a partner.
4. Model DNA replication by creating a strand that is complementary to your partner's original strand.

ANALYZE AND INTERPRET DATA

1. **SEP Use Models** The action of what enzyme was modeled by the taping together of the nucleotides?
2. **SEP Evaluate Models** In what ways does this activity accurately model DNA replication? How could you improve the activity to better model the steps of DNA replication?
3. **Defend Your Claim** How can errors during DNA replication lead to genetic variations? Use your model to support your answer.




◀ Quick Labs

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

Inquiry Labs ▶

- Strengthen inquiry skills as students make models, study local science issues, and complete in-depth experiments
- Customize and edit on the Realize digital platform
- Open-Ended, Argument-Based and Guided inquiry labs support development of science and engineering practices.



Modeling Lab
Open-Ended Inquiry

Chapter 12 Lab
A Model of Meiosis

Ask Questions
How does meiosis change a diploid cell into haploid gametes?

Introduction
Almost all the cells of a multicellular organism are produced by mitosis. Mitosis ensures that all the cells have the same set of chromosomes and the same DNA, which is essential for the cells to function properly. However, a different process is needed to produce the gametes of the organism. Gametes, such as sperm and egg cells, are cells that can unite to form the first cell of a new individual. The gametes are haploid (N), meaning they contain half the number of chromosomes of other cells, which are diploid (2N).

The process that produces gametes is called meiosis, and it is summarized in the diagram below. Meiosis involves two cell divisions, called Meiosis I and Meiosis II. Both processes are similar to mitosis, but with important differences. In Meiosis I the homologous chromosomes align along the metaphase plate. During anaphase, the chromosomes separate from one another. The result is two cells, each with the haploid (N) number of chromosomes.



Modeling Lab Open-Ended Inquiry

A Model of Meiosis

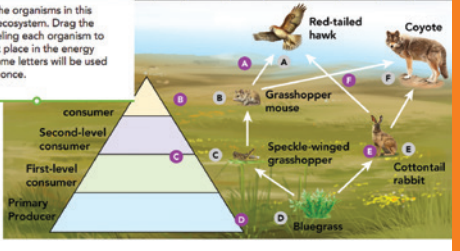
Problem How does meiosis change a diploid cell into haploid gametes?

In this lab, you will plan and develop a model of meiosis. You will choose materials to represent the cell and chromosomes, assemble and manipulate the materials to represent the stages of meiosis, and use the model to explain the process.

You can find this lab in your digital course.

Exit
Interactivity: Ecological Pyramids

Ecological Pyramids
Instructions
Consider the organisms in this grassland ecosystem. Drag the letters labeling each organism to the correct place in the energy pyramid. Some letters will be used more than once.



Go Online to access your digital course.

VIDEO
AUDIO
INTERACTIVITY
ETEXT
ANIMATION
VIRTUAL LAB
ASSESSMENT

◀ Interactive Virtual Simulations

- Students manipulate visuals and interactive content to deepen understanding
- Variety of options, including digital art, drag and drop, art review, videos, and vocabulary cards
- Located throughout the narrative to enhance explanations

ACCESSIBLE

biology for all students.

Authors Ken Miller and Joe Levine are active scientists and passionate storytellers who want *Virginia Miller & Levine Biology* to inspire students to study biology. They combine an engaging narrative with inquiry activities, visual supports, teacher tools, and other reading aids so all students can reach success and demonstrate mastery of the Virginia Standards of Learning.

Reach All Students ►

Modify instruction with point-of-use resources in the Teacher Edition to provide access for all students. Support for:

- English learners
- Special needs students
- Less proficient readers
- Struggling students
- Advanced students

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.

ENGLISH LANGUAGE DEVELOPMENT

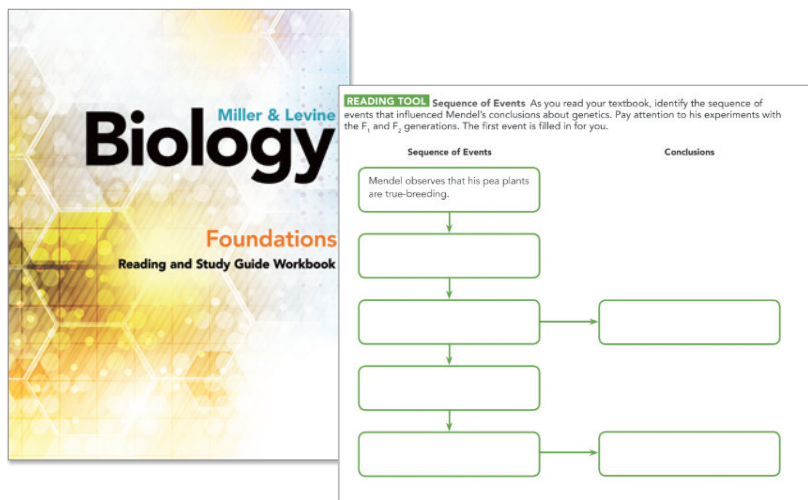
Writing Students work in pairs to explain primary and secondary succession.

Entering Have students draw and add general labels to the illustrations in **Figure 6-8**.

Emerging Have one partner write sentences that combine successive steps in primary succession. The other partner completes the exercise for secondary succession.

Developing Have one partner write a one or two sentence precise and clear description of what primary succession is. Have the other partner do the same for secondary succession. Peer edit.

descrip-
ter at the



Reinforce Learning with the Foundations Reading and Study Guide

- **Reading Tools** target strategies to support reading comprehension.
- **Visual Reading Tools** support difficult concepts with interactive visuals and alternative practice opportunities.
- **Science Vocabulary** boxes put the spotlight on new words and pronunciation to help students learn the language of biology.

3-D Assessment Tasks

Complete Assessment Suite

- **"Assess on the Spot"** prompts in the Teacher Edition provide quick **Formative Assessment** opportunities that assist teachers in clarifying and adjusting instruction as necessary.
- **Reading Checks** in the Student Edition provide self-assessment pause points for students.
- **Summative Assessments** at the end of every chapter include customizable interactive online quizzes and assessments with automatic grading.
- Students **"Make Their Case"** by constructing arguments, evaluating and working with their peers, and presenting solutions to the chapter case study.
- **Performance-Based Assessments** measure students' mastery of the Science and Engineering Practices.
- **Virginia Standards of Learning Test Prep** prepares students for high-stakes exams. This interactive workbook is available in print and on the Realize platform.
- **ExamView® Assessment Bank** provides more opportunities to customize and administer assessments.



Meet the Authors

Active scientists, passionate storytellers



"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."

– Ken Miller

"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."

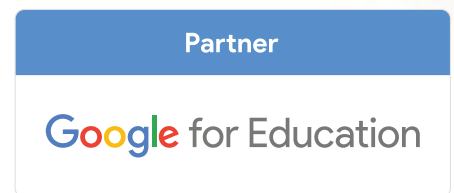
– Joe Levine



Try It Online!

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