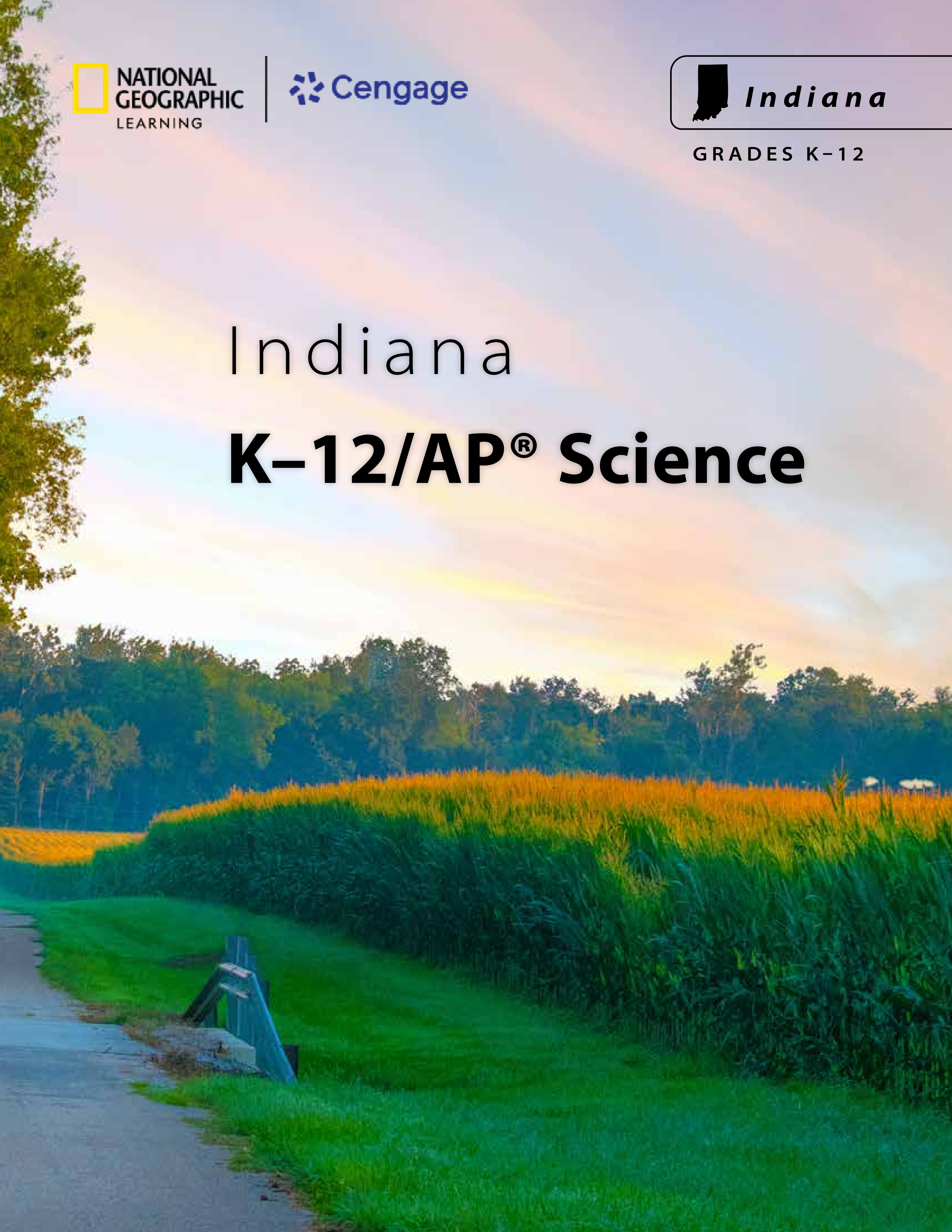

Indiana

GRADES K–12

Indiana

K–12/AP® Science

Table of Contents

National Geographic Learning is pleased to offer Indiana customers the best science programs available, backed by expert support and training. Explore our available science programs for K-12 and contact your sales representative below to request additional information and sample materials.

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Ian Leonard
Northern Indiana Consultant
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ian.leonard@cengage.com

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shylah.brossier@cengage.com

Test Drive the Digital Experience

We have generated review account login access for Indiana educators to access the digital platform for our science programs.

See below for the links.

Grades K-5 Exploring Science

Review URL	Password
nglsync.cengage.com/review/SRJH	123456789

Grades 9-12

Core and Electives Science Titles	Password
tinyurl.com/indianascienceCORE	12345678
AP and Honors Science Titles	**Password**
tinyurl.com/indianascienceELECTIVES	12345678

Streamline Your Instruction With LMS

Create a Seamless Single Sign-On User Experience

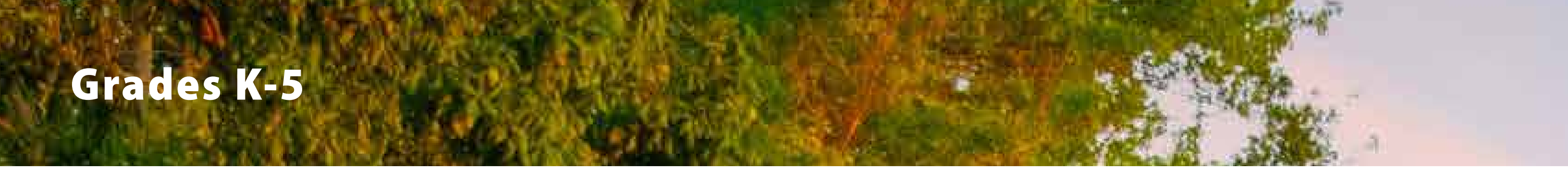
With LMS Integration, your students are ready to learn on the first day of school. In just a few simple steps, both you and your students can access National Geographic Learning/Cengage resources using your district's LMS login.

Customize Content with Assignment Linking

Focus student attention on what matters most. Use our Content Selector to create a unique learning path that blends your content with links to our learning activities, assignments and more.

Synchronize Grades Automatically

Need to have your course grades recorded in your LMS gradebook? No problem. Simply select the activities you want synched!



Exploring Science

Real Science. Real World. Right Now.

Grades K–5

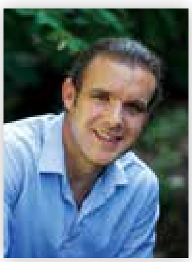
Exploring Science was built specifically for helping teachers to meet the shifting need for phenomena-based, 3-dimensional instruction to help prepare students for hands-on performance tasks.

- Introduce real-world science practices with National Geographic Explorers, scientists, and photographers
- Balance core ideas content with hands-on investigations, STEM projects, citizen science projects, and interactive digital labs

National Geographic Explorers and Scientists

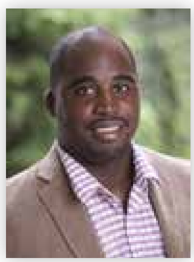
Exclusive features and videos show students how scientists use Science and Engineering Practices and methods in their real-world research. Explorers inspire students to engage in science practices by introducing real-world phenomena. Here are just a few examples of the many Explorers included:

Erin Pettit

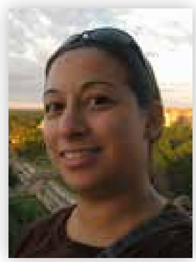


Enric Sala

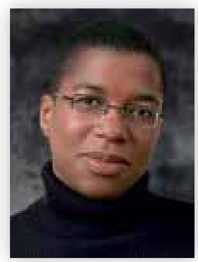
Shafqat Hussain



Barrington Irving



Knicole Colon



Ainissa Ramirez

Interactive Technology

MindTap for Exploring Science is an engaging and interactive student experience and provides teachers with powerful assessment and analytics to help students master core ideas and science practices.

Cengage MindTap

Hands-on STEM Practice

Investigate activities guide students through the steps to prepare for the Science and Engineering Practices part of the Performance Expectations.

STEM Projects provide unique, real-world challenges for students to solve using research and engineering practices.

Think Like a Scientist and Think Like an Engineer are Performance Expectation activities where students apply their knowledge and skills in 3-D, hands-on performances.

Kindergarten

Big Book Set—1 each of Earth, Life, Physical, and Let's Do Science Big Books	**9780357571637**
MindTap (6-years)	**9780357648605**
MindTap (1-year)	**9780357649916**
Teacher's Edition	**9780357648438**

Grade 1

Student Edition + MindTap (6-years)	**9780357571644**
Student Edition	**9780357648384**
MindTap (6-years)	**9780357648490**
MindTap (1-year)	**9780357649961**
Teacher's Edition	**9780357648445**

Grade 2

Student Edition + MindTap (6-years)	**9780357571668**
Student Edition	**9780357648391**
MindTap (6-years)	**9780357648506**
MindTap (1-year)	**9780357649954**
Teacher's Edition	**9780357648452**

Grade 3

Student Edition + MindTap (6-years)	**9780357571682**
Student Edition	**9780357648407**
MindTap (6-years)	**9780357648513**
MindTap (1-year)	**9780357649947**
Teacher's Edition	**9780357648469**

Grade 4

Student Edition + MindTap (6-years)	**9780357571705**
Student Edition	**9780357648421**
MindTap (6-years)	**9780357648520**
MindTap (1-year)	**9780357649930**
Teacher's Edition	**9780357648476**

Grade 5

Student Edition + MindTap (6-years)	**9780357571729**
Student Edition	**9780357648414**
MindTap (6-years)	**9780357648537**
MindTap (1-year)	**9780357649923**
Teacher's Edition	**9780357648483**

Grades 9-12

National Geographic Biology

Grades 9–12 First Edition ©2024 9780357859148

Teach Life Science For Life

National Geographic Biology is the first high school biology program created with National Geographic images, photography, and Explorers.

- Students build fundamental biology knowledge with 3-Dimensional, phenomena-based lessons
- Engage students with authentic biology stories through text, visuals, and hands-on labs and investigations
- The powerful digital platform MindTap includes an interactive eBook with embedded videos featuring National Geographic Explorers, interactive simulations, and Virtual Labs that transport students alongside Explorers to different sites for virtual adventures and biology research
- Prepare students for college and careers with project based labs, critical thinking exercises, and engineering activities to encourage problem-solving

National Geographic Biology

Student Edition	9780357859148
Student Edition + MindTap™ (6-year access)	9780357991343
Student Edition + MindTap™ (1-year access)	9780357991350
MindTap™ (6-year access)	9780357859186
MindTap™ (1-year access)	9780357859179
Teacher's Edition	9780357859155

Includes Cengage Learning Testing, powered by Cognero®

National Geographic Explorers and Photographers

The story of biology is told through the experiences of National Geographic Explorers and the images of National Geographic photographers. This diverse group of groundbreaking biologists, bioengineers, artists, and adventurers tie their work to the biology concepts in each unit and chapter through feature articles, videos, and by hosting the interactive Virtual Investigations in MindTap.

National Geographic Explorer features

"On Assignment" photography features

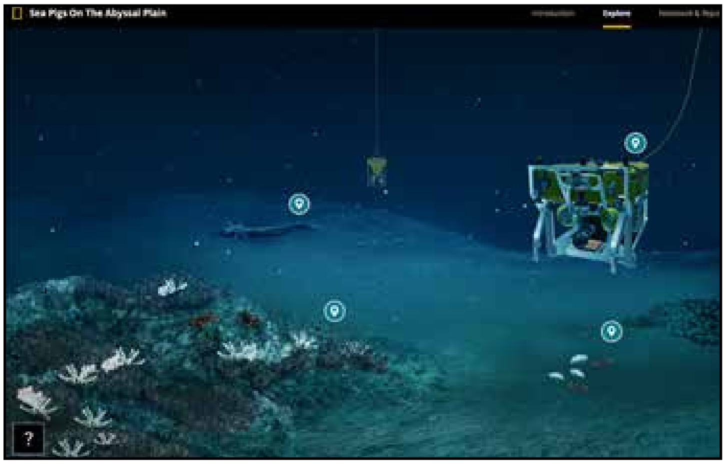
See AP® and honors Biology on pages 18-19

Digital Biology Explorations

Transport students into the field with simulations, engaging videos, and Virtual Labs where a National Geographic Explorer guides students through a virtual biology research project.

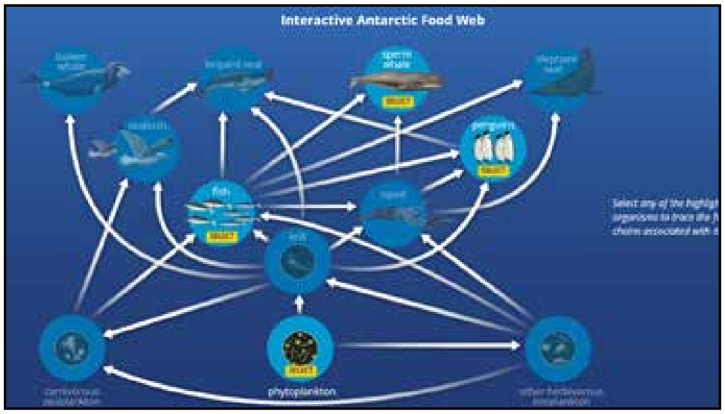
Virtual Investigations

These immersive experiences are guided by a National Geographic Explorer who introduces students to the biology concepts and goals of the lab. Students are then transported virtually to the deepest parts of the ocean, a rainforest canopy, or to a modern biology lab to create vaccines as a few examples.

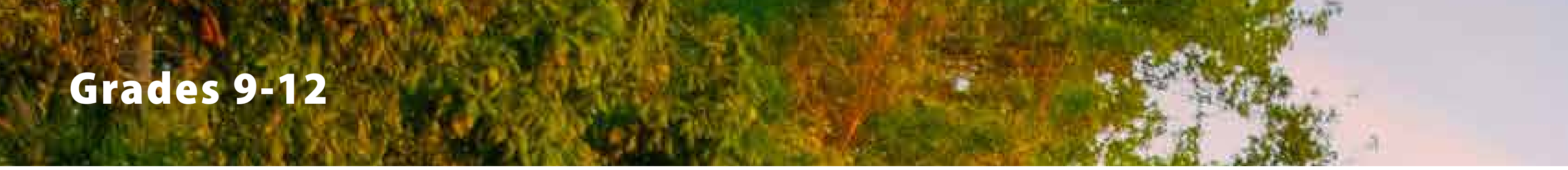


Simulations

Support biology learning with interactive simulations allowing students to change variables, observe unique data and graphs, and build and manipulate models.



Cengage MindTap



Grades 9-12

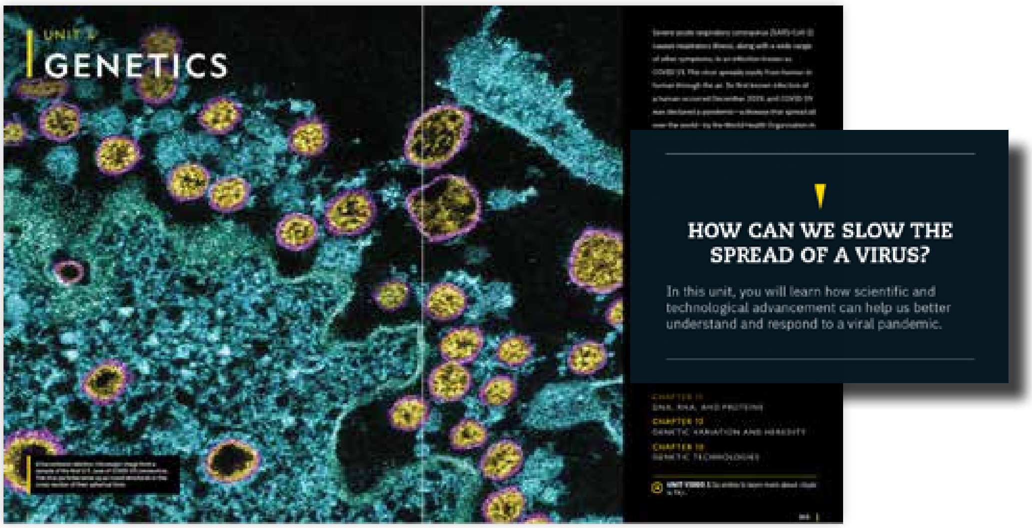
National Geographic Biology

Standards-Based Lessons Built for 3-Dimensional Learning

National Geographic Biology was created specifically to teach with a depth of support for the high school biology standards and science practices and skills.

Authentic Phenomena-Based Learning

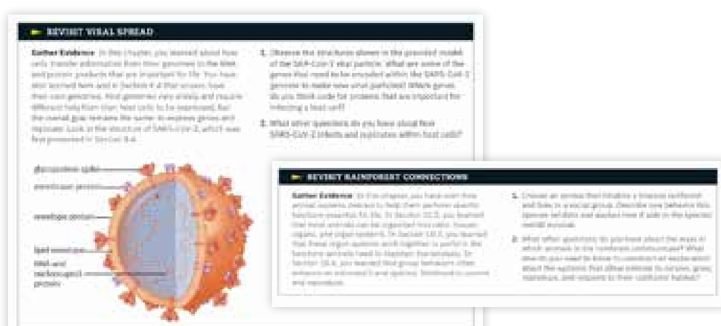
Each unit opens with an Anchoring Phenomenon. A Driving Question frames the phenomenon as something students will investigate and revisit multiple times throughout the unit.



The Driving Question focuses students' observations into a question they can investigate and answer at the end of the unit by using evidence and reasoning to apply biology concepts.

A culminating Unit Activity uses the Claim, Evidence, and Reasoning (CER) model where students use evidence to write a scientifically reasoned argument in response to the Anchoring Phenomenon's Driving Question.

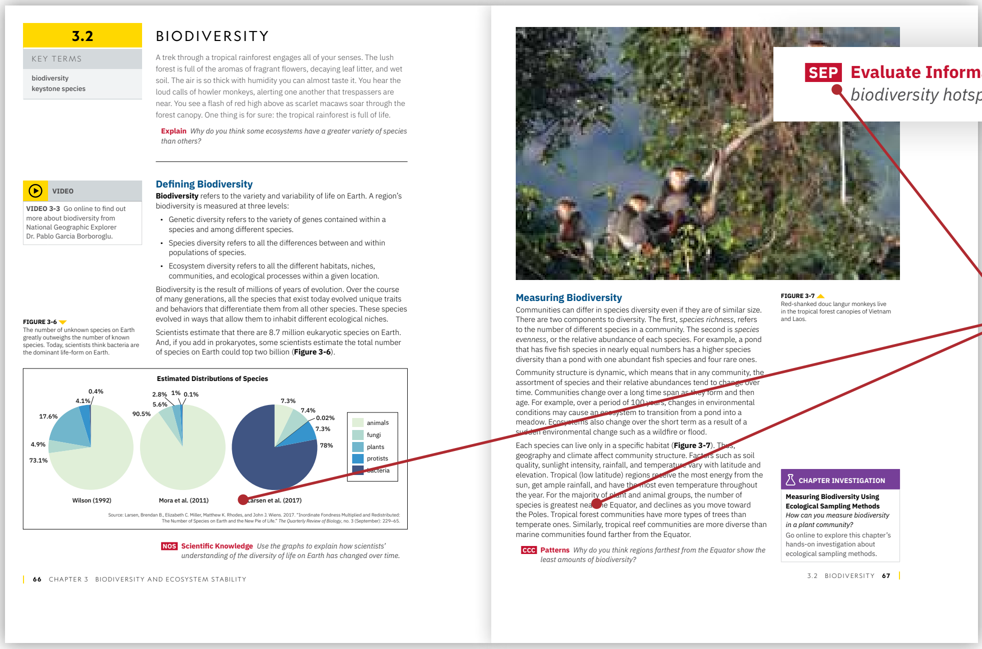
At multiple points throughout the units, students can look for evidence and connect concepts back to the Driving Question.



Each Chapter Review includes a section to revisit the unit Anchoring Phenomenon, giving students an opportunity to apply scientific and engineering practices.

3-Dimensional Lessons Prepare Students for Success

Lessons and activities are constructed around 3-dimensional learning to ensure students are prepared for the Biology end of course exam. These include callouts in the student edition and thorough support in the Teacher's Edition lessons and assessments.



3.2

KEY TERMS

biodiversity
keystone species

BIODIVERSITY

A trek through a tropical rainforest engages all of your senses. The lush forest is full of the aromas of fragrant flowers, decaying leaf litter, and wet soil. The air is so thick with humidity you can almost taste it. You hear the loud calls of howler monkeys, alerting one another that trespassers are near. You see a flash of red high above as scarlet macaws soar through the forest canopy. One thing is for sure: the tropical rainforest is full of life.

Explain *Why do you think some ecosystems have a greater variety of species than others?*

VIDEO

VIDEO 3-3 Go online to find out more about biodiversity from National Geographic Explorer Dr. Pablo Garcia Borboroglu.

Defining Biodiversity

Biodiversity refers to the variety and variability of life on Earth. A region's biodiversity is measured at three levels:

- Genetic diversity refers to the variety of genes contained within a species and among different species.
- Species diversity refers to all the differences between and within populations of species.
- Ecosystem diversity refers to all the different habitats, niches, communities, and ecological processes within a given location.

Biodiversity is the result of millions of years of evolution. Over the course of many generations, all the species that exist today evolved unique traits and behaviors that differentiate them from all other species. These species evolved in ways that allow them to inhabit different ecological niches.

Scientists estimate that there are 8.7 million eukaryotic species on Earth. And, if you add in prokaryotes, some scientists estimate the total number of species on Earth could top two billion (**Figure 3-6**).

FIGURE 3-6 The number of unknown species on Earth greatly outweighs the number of known species. Today, scientists think bacteria are the dominant life-form on Earth.

Source: Larsen, Brendan B., Elizabeth C. Miller, Matthew K. Rhodes, and John J. Wiens. 2017. "Inordinate Fondness Multiplied and Redistributed: The Number of Species on Earth and the New Pie of Life." *The Quarterly Review of Biology*, no. 3 (September): 229–65.

NOS Scientific Knowledge *Use the graphs to explain how scientists' understanding of the diversity of life on Earth has changed over time.*

66 CHAPTER 3 BIODIVERSITY AND ECOSYSTEM STABILITY

FIGURE 3-7 Red-shanked douc langur monkeys live in the tropical forest canopies of Vietnam and Laos.

Measuring Biodiversity

Communities can differ in species diversity even if they are of similar size. There are two components to diversity. The first, *species richness*, refers to the number of different species in a community. The second is *species evenness*, or the relative abundance of each species. For example, a pond that has five fish species in nearly equal numbers has a higher species diversity than a pond with one abundant fish species and four rare ones.

Community structure is dynamic, which means that in any community, the assortment of species and their relative abundances tend to change over time. Communities change over a long time span as they form and then age. For example, over a period of 100 years, changes in environmental conditions may cause an ecosystem to transition from a pond into a meadow. Ecosystems also change over the short term as a result of a sudden environmental change such as a wildfire or flood.

Each species can live only in a specific habitat (**Figure 3-7**). Thus, geography and climate affect community structure. Factors such as soil quality, sunlight intensity, rainfall, and temperature vary with latitude and elevation. Tropical (low latitude) regions receive the most energy from the sun, get ample rainfall, and have the most even temperature throughout the year. For the majority of plant and animal groups, the number of species is greatest near the Equator, and declines as you move toward the Poles. Tropical forest communities have more types of trees than temperate ones. Similarly, tropical reef communities are more diverse than marine communities found farther from the Equator.

CCC Patterns *Why do you think regions farthest from the Equator show the least amounts of biodiversity?*

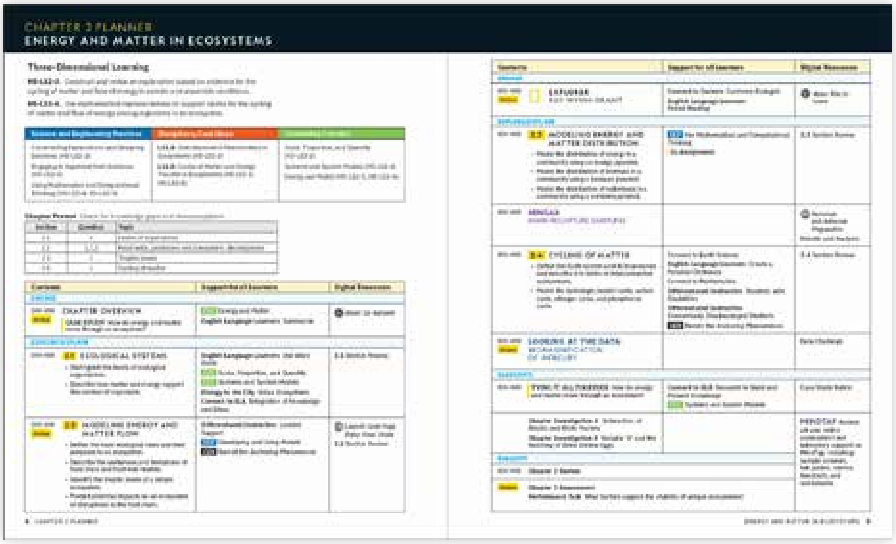
CHAPTER INVESTIGATION

Measuring Biodiversity Using Ecological Sampling Methods
How can you measure biodiversity in a plant community?
Go online to explore this chapter's hands-on investigation about ecological sampling methods.

3.2 BIODIVERSITY 67

SEP Evaluate Information *What is a key characteristic of a biodiversity hotspot?*

Questions and prompts throughout each chapter serve as 3D checkpoints, prompting students to engage with Crosscutting Concepts and Science and Engineering Practices.



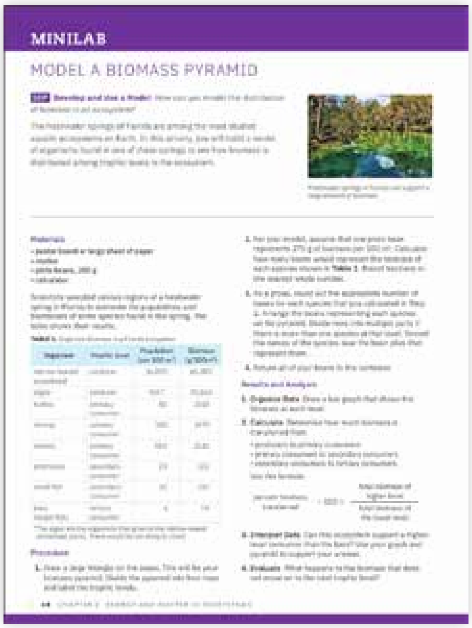
The Chapter Planner pages in the Teacher's Edition overview connections to 3D instruction at the lesson level with color-coded indicators in the "Support for all Learners" column.

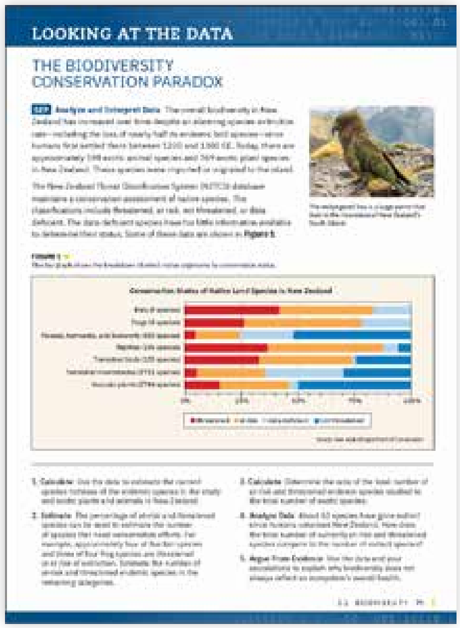
Grades 9-12

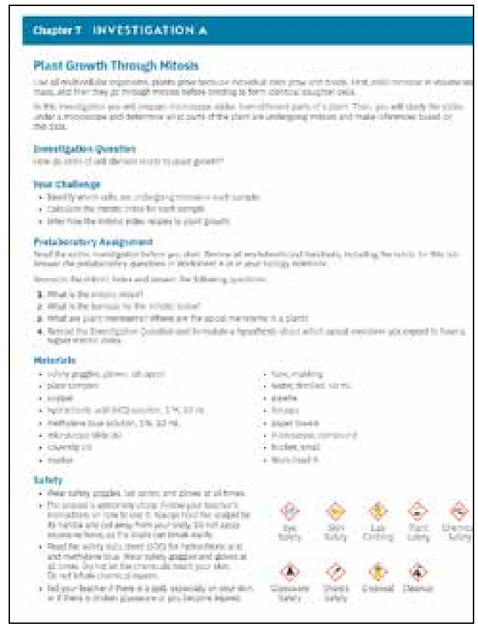
National Geographic Biology

Applying Biology with Hands-on Science and Data Activities

Each chapter provides multiple opportunities for hands-on learning. Quick minilabs and full laboratory investigations give students practice with lab equipment and lab safety procedures. Data analysis activities give students practice reading data and identifying patterns in data sets.

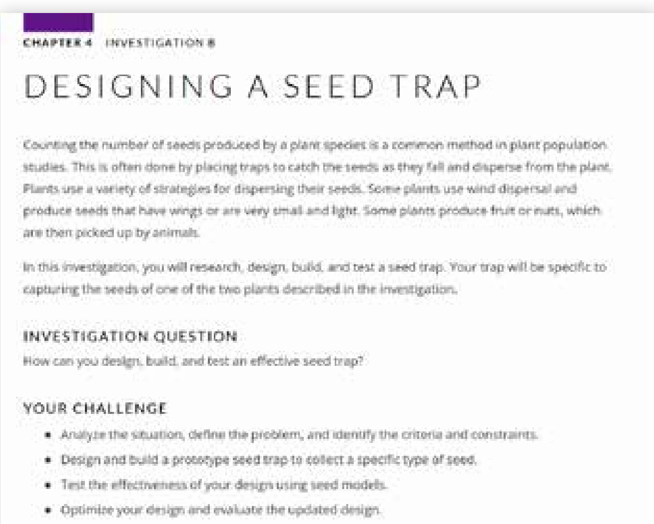






Labs, Engineering Activities, and Research Projects

Chapter Investigations provide more in-depth laboratory experiences with Guided Inquiry, Open Inquiry, and Design-Your-Own approaches. Also included are Engineering Design activities, research and writing activities in the "Tying It All Together" lesson for each chapter, and Claims, Evidence, Reasoning (CER) activities for each unit. Lab guides, worksheets, and rubrics are available in the MindTap digital platform.


CHAPTER 4 INVESTIGATION B

DESIGNING A SEED TRAP

Counting the number of seeds produced by a plant species is a common method in plant population studies. This is often done by placing traps to catch the seeds as they fall and disperse from the plant. Plants use a variety of strategies for dispersing their seeds. Some plants use wind dispersal and produce seeds that have wings or are very small and light. Some plants produce fruit or nuts, which are then picked up by animals.

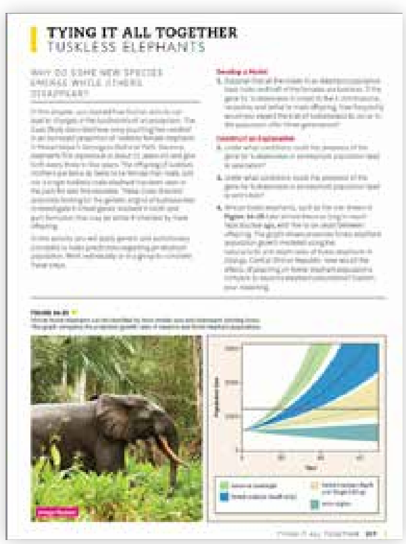
In this investigation, you will research, design, build, and test a seed trap. Your trap will be specific to capturing the seeds of one of the two plants described in the investigation.

INVESTIGATION QUESTION

How can you design, build, and test an effective seed trap?

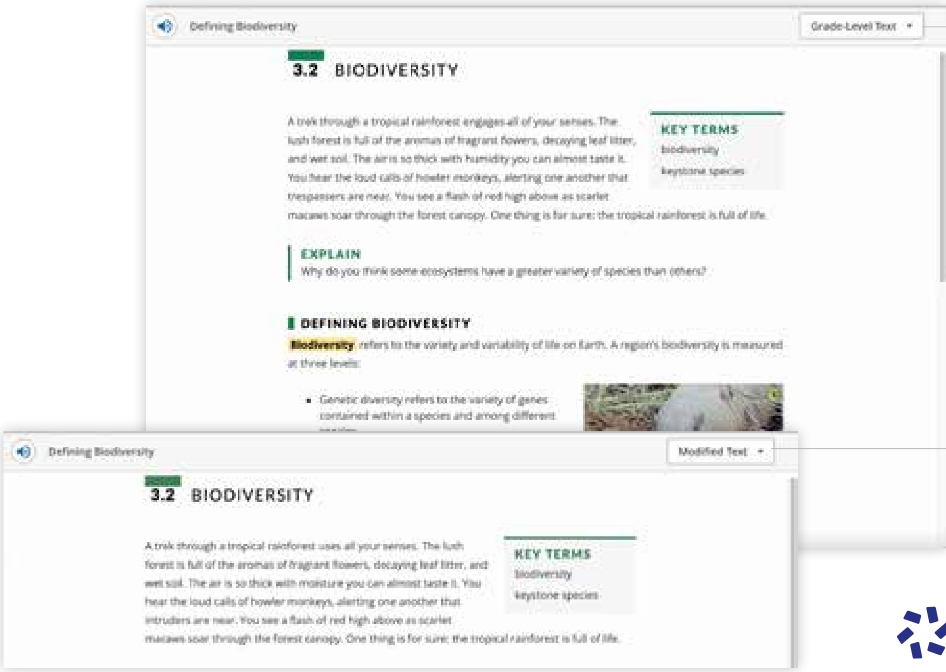
YOUR CHALLENGE

- Analyze the situation, define the problem, and identify the criteria and constraints.
- Design and build a prototype seed trap to collect a specific type of seed.
- Test the effectiveness of your design using seed models.
- Optimize your design and evaluate the updated design.



Support for All Learners

Student and teacher resources provide tools and strategies allowing all students to access the text, experience biology concepts through various media, review where needed, and be challenged when ready.



Grade-Level Text

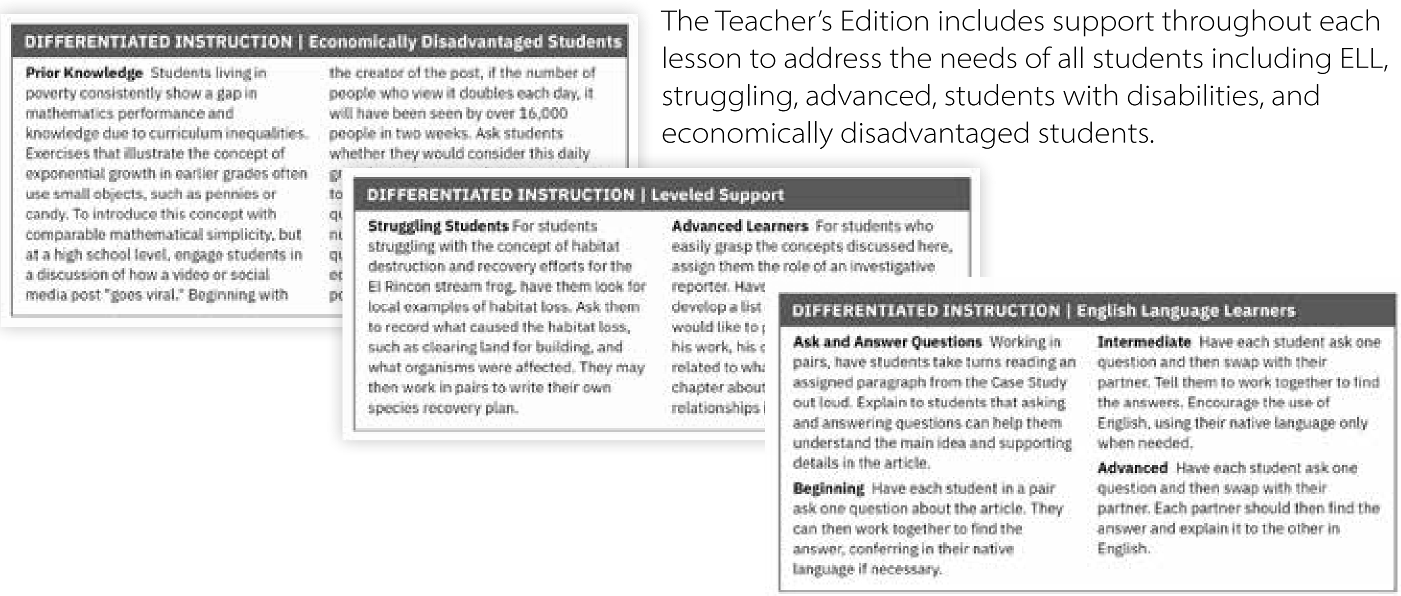
The text can be changed in the MindTap platform from text presented at grade level and at two grades below to provide access for striving readers without sacrificing content or academic vocabulary.

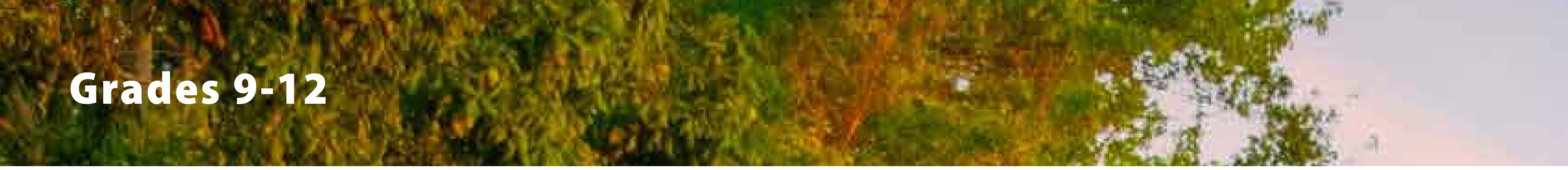
Below-Level Text

Cengage MindTap

Teacher Support for All Levels

The Teacher's Edition includes support throughout each lesson to address the needs of all students including ELL, struggling, advanced, students with disabilities, and economically disadvantaged students.





Grades 9-12

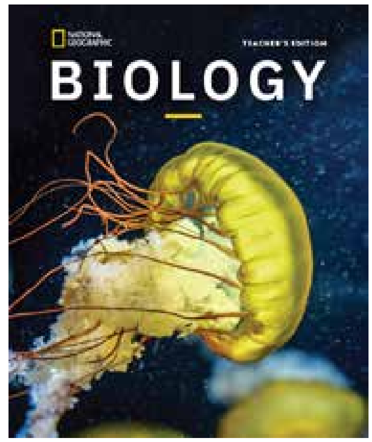
National Geographic Biology

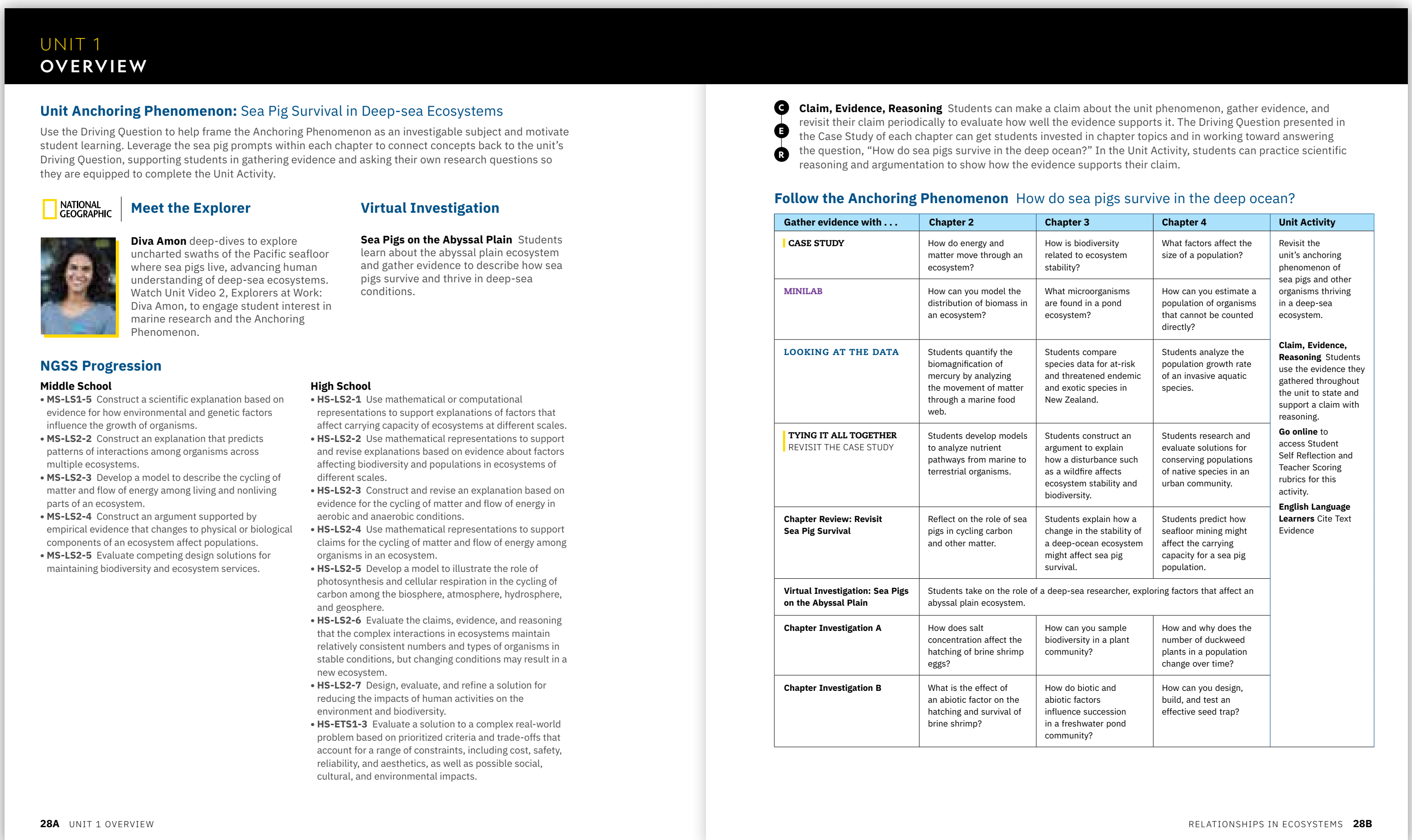
Course Support and Teacher Tools

National Geographic Biology supports teachers in the classroom with a thoughtfully designed Teacher's Edition and a wealth of teacher resources and assessments built in to the MindTap digital platform.

Teacher's Edition

The print and online resources in MindTap guide teachers through each unit and chapter to prepare students for Indiana skills and knowledge including 3-Dimensional lessons in the 5E lesson model, background information, connections to math and English language, and differentiation for all students.





UNIT 1
OVERVIEW

Unit Anchoring Phenomenon: Sea Pig Survival in Deep-sea Ecosystems

Use the Driving Question to help frame the Anchoring Phenomenon as an investigable subject and motivate student learning. Leverage the sea pig prompts within each chapter to connect concepts back to the unit's Driving Question, supporting students in gathering evidence and asking their own research questions so they are equipped to complete the Unit Activity.

NATIONAL GEOGRAPHIC | **Meet the Explorer**

Diva Amon deep-dives to explore uncharted swaths of the Pacific seafloor where sea pigs live, advancing human understanding of deep-sea ecosystems. Watch Unit Video 2, Explorers at Work: Diva Amon, to engage student interest in marine research and the Anchoring Phenomenon.

Virtual Investigation

Sea Pigs on the Abyssal Plain Students learn about the abyssal plain ecosystem and gather evidence to describe how sea pigs survive and thrive in deep-sea conditions.

NGSS Progression

Middle School
- **MS-LS1-5** Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
- **MS-LS2-2** Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
- **MS-LS2-3** Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
- **MS-LS2-4** Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- **MS-LS2-5** Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

High School
- **HS-LS2-1** Use mathematical or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
- **HS-LS2-2** Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
- **HS-LS2-3** Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
- **HS-LS2-4** Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
- **HS-LS2-5** Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
- **HS-LS2-6** Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
- **HS-LS2-7** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- **HS-ETS1-3** Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

28A UNIT 1 OVERVIEW

C E R **Claim, Evidence, Reasoning** Students can make a claim about the unit phenomenon, gather evidence, and revisit their claim periodically to evaluate how well the evidence supports it. The Driving Question presented in the Case Study of each chapter can get students invested in chapter topics and in working toward answering the question, "How do sea pigs survive in the deep ocean?" In the Unit Activity, students can practice scientific reasoning and argumentation to show how the evidence supports their claim.

Follow the Anchoring Phenomenon How do sea pigs survive in the deep ocean?

Gather evidence with . . .	Chapter 2	Chapter 3	Chapter 4	Unit Activity
CASE STUDY	How do energy and matter move through an ecosystem?	How is biodiversity related to ecosystem stability?	What factors affect the size of a population?	Revisit the unit's anchoring phenomenon of sea pigs and other organisms thriving in a deep-sea ecosystem. **Claim, Evidence, Reasoning** Students use the evidence they gathered throughout the unit to state and support a claim with reasoning. **Go online** to access Student Self Reflection and Teacher Scoring rubrics for this activity. **English Language Learners** Cite Text Evidence
MINILAB	How can you model the distribution of biomass in an ecosystem?	What microorganisms are found in a pond ecosystem?	How can you estimate a population of organisms that cannot be counted directly?	
LOOKING AT THE DATA	Students quantify the biomagnification of mercury by analyzing the movement of matter through a marine food web.	Students compare species data for at-risk and threatened endemic and exotic species in New Zealand.	Students analyze the population growth rate of an invasive aquatic species.	
TYING IT ALL TOGETHER REVISIT THE CASE STUDY	Students develop models to analyze nutrient pathways from marine to terrestrial organisms.	Students construct an argument to explain how a disturbance such as a wildfire affects ecosystem stability and biodiversity.	Students research and evaluate solutions for conserving populations of native species in an urban community.	
Chapter Review: Revisit Sea Pig Survival	Reflect on the role of sea pigs in cycling carbon and other matter.	Students explain how a change in the stability of a deep-ocean ecosystem might affect sea pig survival.	Students predict how seafloor mining might affect the carrying capacity for a sea pig population.	
Virtual Investigation: Sea Pigs on the Abyssal Plain	Students take on the role of a deep-sea researcher, exploring factors that affect an abyssal plain ecosystem.			
Chapter Investigation A	How does salt concentration affect the hatching of brine shrimp eggs?	How can you sample biodiversity in a plant community?	How and why does the number of duckweed plants in a population change over time?	
Chapter Investigation B	What is the effect of an abiotic factor on the hatching and survival of brine shrimp?	How do biotic and abiotic factors influence succession in a freshwater pond community?	How can you design, build, and test an effective seed trap?	

RELATIONSHIPS IN ECOSYSTEMS 28B

Unit Overviews introduce the Unit Explorers, and the Unit Phenomenon.

CROSSCUTTING CONCEPTS | Energy and Matter

Modeling at Varied Scales This chapter focuses on modeling energy and matter transfer at ecological scales: between organisms in a community, between organisms and their environment, and among the biosphere, atmosphere, hydrosphere, and geosphere. Some fields of biology, such as physiology, cell biology, molecular biology, and biochemistry, essentially study how energy and matter enable life processes at various scales. Chapters 5 and 6 in Unit 2 addresses transformations of energy and matter at the molecular and cellular levels. Further reinforce this crosscutting concept throughout Unit 3 by having students organize information about living systems in terms of how they enable an organism to obtain energy and matter from its surroundings, transfer energy and matter within its body, and use energy and matter to survive.

SCIENCE AND ENGINEERING PRACTICES
Developing and Using Models

Limits of Models Students should recognize that food chains generally do not represent all members of a community and that they are subsets of food webs that can be constructed to represent the whole community (with more than one species at each trophic level). Students may notice that detritivores and decomposers are not represented in **Figure 2-8**. Ask students how they would refine the food web model shown here to include these types of organisms. You may wish to draw students' attention back to the Anchoring Phenomenon by encouraging them to build a food web based on the sea pig's deep-sea ecosystem.

Students can do a similar analysis of the limitations of the pyramid models presented in the next section.

Connect to English Language Arts

Integration of Knowledge and Ideas
System models introduced in Chapter 2, such as the food webs, ecological pyramids, and matter cycles, typically depict specific ecosystems as illustrative examples. When reading to understand how energy flows and matter transfers through ecosystems, students should be able to apply information from the model illustrations to apply the same concepts to different ecosystems.

Have students translate between specific visual information and general text by writing a label for each arrow in **Figures 2-2, 2-5, 2-7**, or **2-8**. Their labels should describe each transfer or transformation in terms of energy and matter.

Crosscurricular Connections

Chemistry Remind students of endo- and exothermic reactions, ones that absorb or release thermal energy. Show an instant hot pack, sealed in its package. When the package is opened and the pouch removed, the chemical inside, often iron, reacts with oxygen in the air to form iron (III) oxide, a reaction that releases heat. A simple demonstration of an endothermic reaction can be done by stirring baking soda into vinegar and measuring the temperature before and after.

Connect to Mathematics

Define Quantities for Modeling Have students return to **Figure 2-8** and apply estimated quantities to a pyramid of biomass and a pyramid of numbers for an Antarctic food web. For example, students can research the average mass of an elephant seal and the number of elephant seals in an average Antarctic colony. They can then work backwards to estimate the average mass and numbers of squid, krill, and phytoplankton to support that food chain.

Teachers are provided with targeted support for 3D instruction and cross-curricular connections to Math, English Language Arts, and other science disciplines

CHAPTER 2 PLANNER
ENERGY AND MATTER IN ECOSYSTEMS

Three-Dimensional Learning

The practices, core ideas, and crosscutting concepts presented in this chapter's text, investigations, and resources provide support to address the following Performance Expectations: **HS-LS2-2, HS-LS2-3, HS-LS2-4, HS-LS2-5, and HS-LS2-6.**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems Developing and Using Models (HS-LS2-5) Using Mathematics and Computational Thinking (HS-LS2-2, HS-LS2-4) Constructing Explanations and Designing Solutions (HS-LS2-3)	**LS2.A:** Interdependent Relationships in Ecosystems (HS-LS2-2) **LS2.B:** Cycles of Matter and Energy Transfer in Ecosystems (HS-LS2-3, HS-LS2-4, HS-LS2-5) **LS2.C:** Ecosystem Dynamics, Functioning, and Resilience (HS-LS2-2, HS-LS2-6)	Patterns Cause and Effect Scale, Proportion, and Quantity (HS-LS2-2) Systems and System Models (HS-LS2-5) Energy and Matter (HS-LS2-3, HS-LS2-4) Stability and Change (HS-LS2-6)

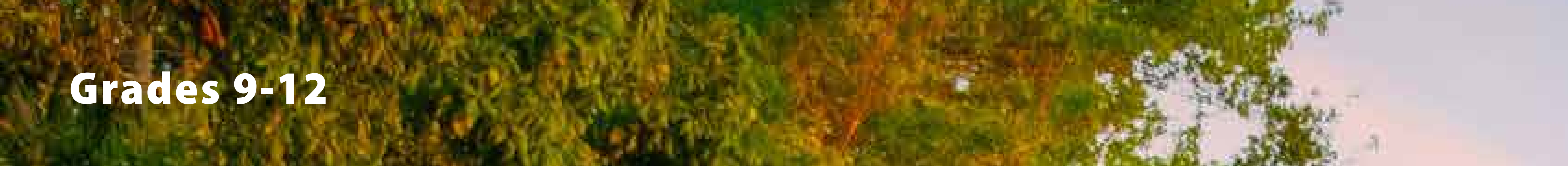
Contents		Instructional Support for All Learners	Digital Resources
ENGAGE			
32–33	CHAPTER OVERVIEW **CASE STUDY** How do energy and matter move through an ecosystem?	**Social-Emotional Learning** CCC Energy and Matter **On the Map** Tongass National Forest **English Language Learners** Summarize	
EXPLORE/EXPLAIN			
34–37 DCI LS2.A LS2.B	**2.1** ECOLOGICAL SYSTEMS • Distinguish between the levels of ecological organization. • Describe how matter and energy support the survival of organisms.	**Vocabulary Strategy** Word Families **English Language Learners** Use Word Roots **Connect to English Language Arts** Integration of Knowledge and Ideas CCC Scale, Proportion, and Quantity **In Your Community** Urban Ecosystems CCC Systems and System Models **Crosscurricular Connections** Chemistry	*Video 2-1* **Investigation A** Salinity and Brine Shrimp Survival (130 minutes over 3 days)
38–41 DCI LS2.B LS2.C	**2.2** MODELING THE TRANSFER OF ENERGY AND MATTER • Define the main ecological roles in an ecosystem and identify their functions. • Identify the trophic levels of a simple ecosystem. • Predict potential impacts on an ecosystem resulting from food-chain disruptions.	**Vocabulary Strategy** Latin Roots CER Revisit the Anchoring Phenomenon **CASE STUDY** Ask Questions **In Your Community** Local Food Chains SEP Developing and Using Models **Connect to English Language Arts** Integration of Knowledge and Ideas	**Interactive Figure** Antarctic Food Web *Video 2-2*
42	EXPLORER RAE WYNN-GRANT	**Connect to Careers** Carnivore Ecologist **English Language Learners** Paired Reading	*Video 2-3*

32A CHAPTER 2 PLANNER

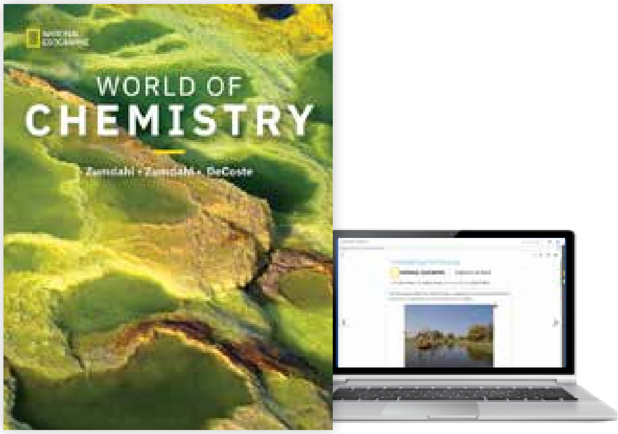
Contents		Instructional Support for All Learners	Digital Resources
EXPLORE/EXPLAIN			
43–47 DCI LS2.B	**2.3** MODELING ENERGY AND MATTER DISTRIBUTION • Model the distribution of energy in a community using an energy pyramid. • Model the distribution of biomass in a community using a biomass pyramid. • Model the distribution of individuals in a community using a pyramid of numbers.	**Address Misconceptions** Conservation of Energy SEP Using Mathematical and Computational Thinking CONNECTIONS Social-Emotional Learning **Connect to Mathematics** Define Quantities for Modeling **On Assignment** Documenting Biodiversity	
48	**MINILAB** MODEL A BIOMASS PYRAMID		
49–55 DCI LS2.A LS2.B LS2.C	**2.4** CYCLING OF MATTER • Define the Earth system and its boundaries, and describe it in terms of interconnected subsystems. • Model the hydrologic (water) cycle, carbon cycle, nitrogen cycle, and phosphorus cycle.	**Crosscurricular Connections** Earth Science **English Language Learners** Create a Personal Dictionary **Visual Support** Cycling Through the Spheres CER Revisit the Anchoring Phenomenon **Differentiated Instruction** Leveled Support **Differentiated Instruction** Students with Disabilities **Connect to Mathematics** Reason Quantitatively **Differentiated Instruction** Economically Disadvantaged Students **On the Map** Lake Erie **In Your Community** Phosphate Pollution	**Investigation B** Exploring Brine Shrimp Survival (180 minutes over 5 days)
56	**LOOKING AT THE DATA** BIOMAGNIFICATION OF MERCURY		
ELABORATE			
57	**TYING IT ALL TOGETHER** How do energy and matter move through an ecosystem?	CCC Systems and System Models	Self-Reflection and Scoring Rubrics
Online	**Investigation A** Salinity and Brine Shrimp Survival **Investigation B** Exploring Brine Shrimp Survival	Guided Inquiry (130 minutes) Open Inquiry (180 minutes)	MINDTAP Access all your online assessment and laboratory support on MindTap, including: sample answers, lab guides, rubrics, and worksheets. PDFs are available from the Course Companion Site.
EVALUATE			
58–59	**Chapter 2 Review**		
Online	**Chapter 2 Assessment** **Performance Task 1** *Why Should We Preserve Wetland Ecosystems?* (HS-LS2-4, HS-LS2-5) **Performance Task 2** *How Do Seasonal Changes Affect Organisms in a Freshwater Ecosystem?* (HS-LS2-3, HS-LS2-4)		

ENERGY AND MATTER IN ECOSYSTEMS 32B

The Chapter Planner summarizes the 3-Dimensional learning progression, chapter activities, differentiation support, and digital resources available in MindTap.



Chemistry



World of Chemistry

Zumdahl, Zumdahl, DeCoste

Grades 9–12 Fourth Edition ©2021 9781337916127

- Designed for on-level chemistry courses to meet the needs of students with little or no prior chemistry experience
- The 4th edition has been completely redesigned to include National Geographic photography and graphics
- Explorers at Work features profile the research and problem-solving work of National Geographic Explorers
- Problem-solving support for students includes examples in the text paired with worked out solutions that demonstrate the reasoning used to solve the problem
- Case Studies for every chapter describe real-world scenarios related to the chapter contents
- Engineering design is integrated through Exploring Engineering and Chemical Engineering features
- Differentiated learning support includes leveled practice problems, team-learning worksheets, and Meeting Individual Needs resources

Hardcover, 926 pages

World of Chemistry

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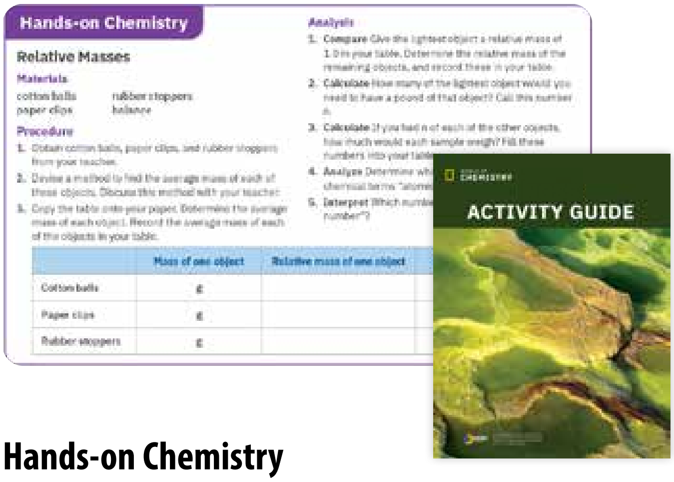
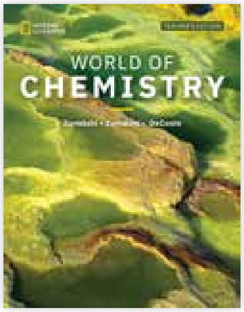
Activity Guide	**9780357422366**
Teacher's Edition	**9780357422342**

Includes Cengage Learning Testing, powered by Cognero®



Hands-on Chemistry

Hands-on investigations are included at the end of every Chapter while Hands-on Chemistry Minilabs are embedded throughout each chapter. A downloadable Lab Manual is available with additional labs aligned to the program and a print Activity Guide includes hands-on, 3-Dimensional lessons.



Teacher Support

The wraparound Teacher's Edition includes Chapter Planning Guides summarizing chapter resources, support for differentiation, hands-on lessons, interdisciplinary and career connections, and OWLv2 online learning resources.

See AP® and honors Chemistry on page 20

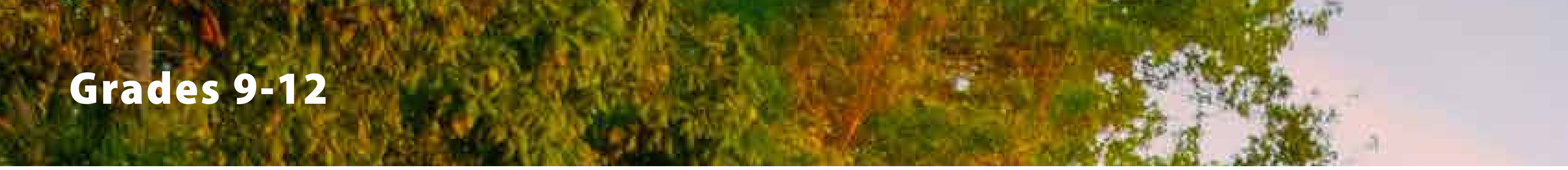
Authentic Student Engagement

Engage students with National Geographic images and stories of National Geographic Explorers who use chemistry to solve real-world problems. "Case Studies" and "Chemistry in Your World" features highlight real-world applications of chemistry.

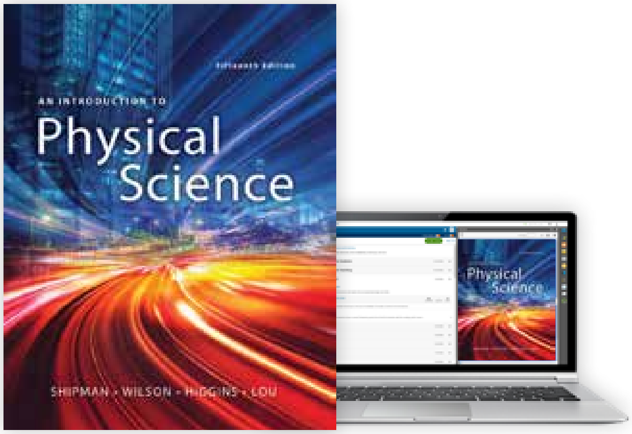
Cengage OWLv2

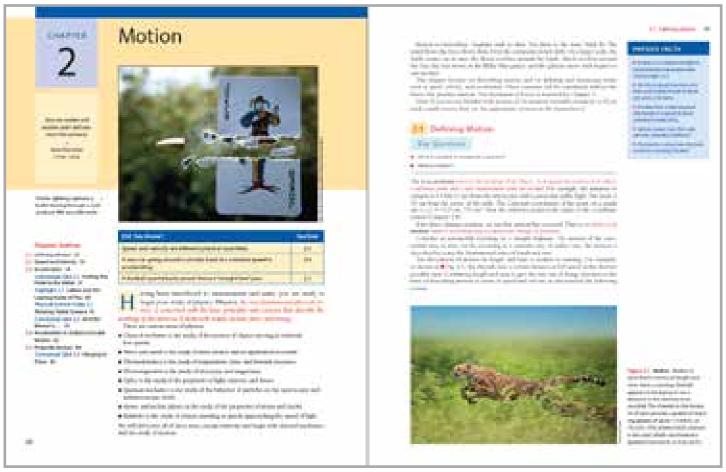
Master Chemistry with OWLv2

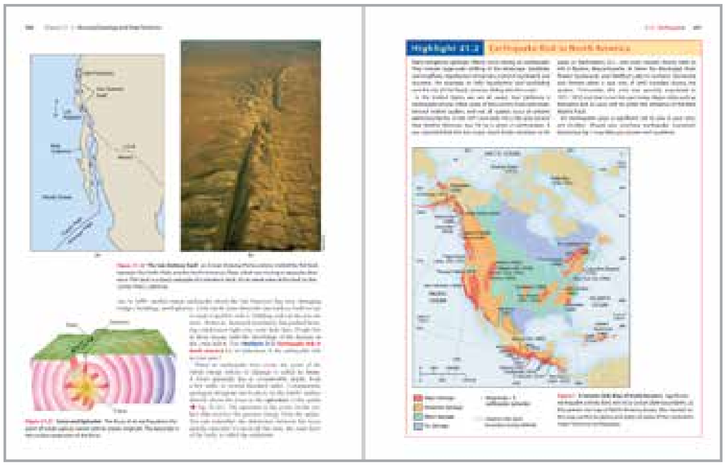
- OWLv2 is a digital platform designed specifically for chemistry with special chemistry notation tools and the ChemDoodle molecule and bond sketcher
- Engage students with videos, simulations, and visualizations to help apply chemistry concepts to real-world scenarios
- Teachers have complete control and flexibility to design the course and assignments to fit their exact needs
- Includes a highly interactive eBook with embedded videos, 3D molecules, simulations, and digital flashcards



Integrated Chemistry & Physics







An Introduction to Physical Science

Shipman, Wilson, Higgins, Lou

Grades 9–12 Fifteenth Edition ©2021 9780357021453

- Presents content in such a way that students develop the critical reasoning and problem-solving skills needed in an ever-changing technological world
- Features a new Digital Workbook in WebAssign including active-learning modules with videos, simulations, readings, and experiment-based examples followed by a wide variety of questions for student response
- Emphasizes fundamental concepts as students progress through the five divisions of physical sciences: physics, chemistry, astronomy, meteorology, and geology
- Provides regular opportunities for practice and review, with features that support visualization, basic math, and problem solving
- Incorporates timely "Physical Science Today" (PST) articles in nearly all chapters present fascinating, high-interest topics, emphasizing biomedical and technical applications

Hardcover, 792 pages

Cengage WebAssign

Inspire mastery with this powerful math-centered homework solution with eBook

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WebAssign™ (6-year access)	**9780357968987**
WebAssign™ (1-year access)	**9780357438640**

Includes Cengage Learning Testing, powered by Cognero®

Earth and Space Science

Earth and Space Science

Hendrix, Thompson, Turk

Grades 9–12 First Edition ©2022 9780357113622

- Take Earth and Space Science instruction higher with the first ever high school program built with National Geographic content, images, and Explorers
- Address current science skills and practices by integrating 3-Dimensional learning
- Explorers at Work features profile the research and problem-solving work of National Geographic Explorers, each accompanied by an Explorer video in MindTap
- The MindTap online platform provides an interactive eBook with concept videos and animations, and digital assessments including performance tasks and data analysis activities with downloadable datasets
- Presents a rich overview of Earth- and Space-related disciplines: exploring the physical attributes of planet Earth and its environment, emphasizing the human choices we have made, and discussing the physical consequences of those choices in the context of Earth systems

Hardcover, 864 pages

Cengage MindTap

This personal learning environment combines the eBook and resources into a singular Learning Path

National Geographic Explorers and earth scientists introduce the content of each chapter in the print book and through videos in MindTap. These stories of real-world research and discoveries inspire students and frame the learning for each chapter.

The MindTap digital platform creates a completely unique learning experience with interactive assignments including videos, animations, and map resources.

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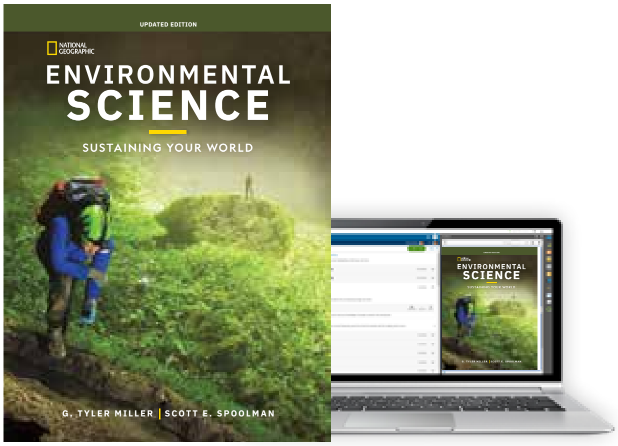
MindTap™ (1-year access)	**9780357435304**
Teacher's Edition	**9780357431511**

Includes Cengage Learning Testing, powered by Cognero®

Environmental Science



Environmental Science: Sustaining Your World, Update

Miller, Spoolman

Grades 9–12 First Edition Update ©2024 9780357541845

- Completely revised with updated content and data, plus a new Lab Manual for hands-on support of environmental science concepts
- Redesigned digital platform now includes interactive storymaps to reveal our changing planet in immersive detail to tell the story of environmental issues
- Promote scientific understanding of environmental issues and show how science and engineering practices are used to solve real-world environmental problems
- With a central theme of sustainability, the content focuses on the core environmental issues of today with case studies and current research
- Comprehensive unit projects include hands-on engineering design activities
- Special National Geographic features introduce students to unique projects and partnerships including a live-data biodiversity survey in Africa, citizen science projects, and the contributions of nature museums and preserves

Hardcover, 633 pages

Cengage MindTap

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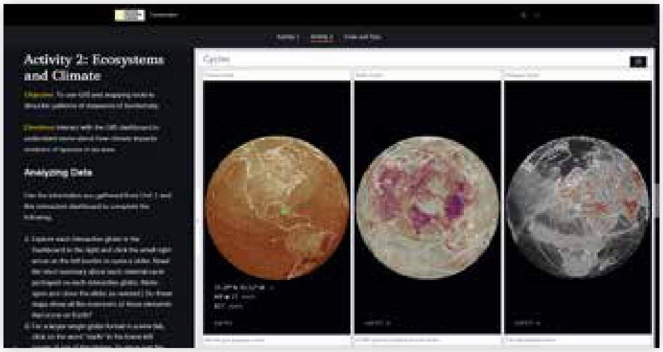
Increase student engagement with a personalized learning path including media-rich eBook, online assessments, and study tools.

- Personalize the course to meet your needs
- Track student progress and success with powerful analytics
- Easily create assignments and reminders for students



Interactive MindTap Digital Platform

A redesigned MindTap platform includes improved assessments and new ESRI storymap activities to immerse students in real climate and environmental data in a narrative format with built-in assessments

See AP® Environmental Science on page 19

Expert content and National Geographic imagery for Environmental Science

Impactful National Geographic images

Frequent in-chapter and end-of-chapter questions support student understanding

Reader-friendly content and scientific vocabulary

Encourage critical thinking skills

Table of Contents

Environmental Science: Sustaining Your World, Update

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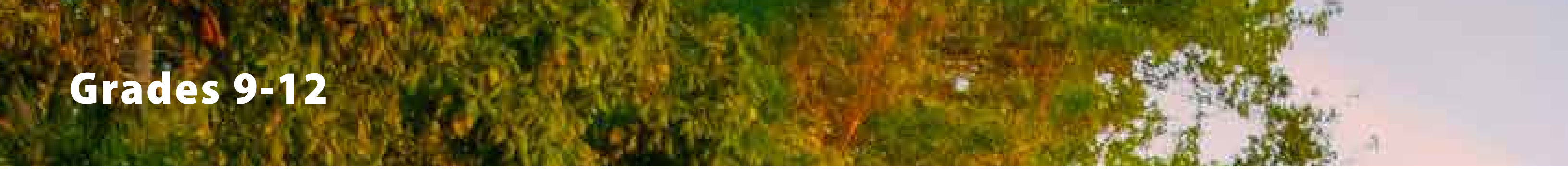
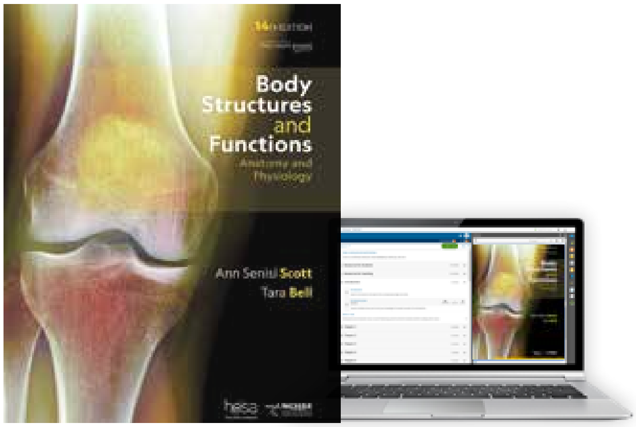


Anatomy & Physiology



Body Structures and Functions

Scott, Bell

Fourteenth Edition ©2022 9780357457542

- Introduces students to the basic concepts and skills required for the study of the human body, and how it functions, in a clear and concise manner
- Guides students through an overall review of human development and body processes, starting with a general introduction to life functions, and with the terminology used to describe body parts and their locations
- Integrates diseases and disorders within each body-system chapter to link physiology with anatomy
- MindTap offers a complete learning experience with an interactive ebook, assessment, study tools, matching exercises, and Anatomy and Physiology Learning Labs

Hardcover, 544 pages

Cengage MindTap

This personal learning environment combines the eBook and resources into a singular Learning Path

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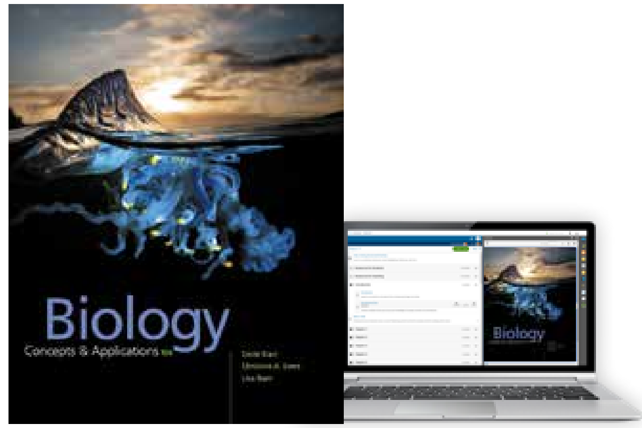
Biology



Biology: Concepts and Applications

Starr, Evers, Starr

Grades 9–12 Tenth Edition ©2018 9781337094825

- Perfect for an Honors Biology course, this text provides an introductory, issues-oriented approach that focuses on teaching the process of science and basic biological principles
- Includes features to help visual learners including "Figure It Out" questions, accompanied by many illustrations, to ensure students understand the concepts, and new "Data Analysis Activities" at the end of each chapter to help students strengthen their analytical skills
- New "Take Home Messages" that ensure students grasp key concepts, with special features like the chapter-opening case studies and "How Would You Vote?" questions to enliven the subject matter and make relevant connections between biology and real-life concerns

Hardcover, 864 pages

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Student Edition + MindTap™ (1-year access)	**9781337426985**
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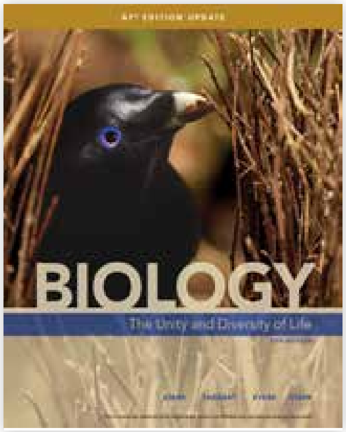
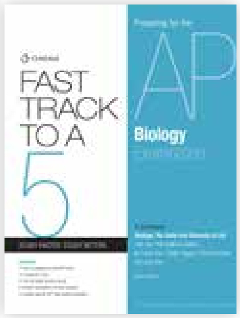
Includes Cengage Learning Testing, powered by Cognero®

AP Environmental Science





Biology: The Unity and Diversity of Life, AP® Edition Update

Starr, Taggart, Evers, Starr

Grades 10–12 Fifteenth Edition © 2023 9780357872697

- Updated with new content and AP®-style questions to meet the 2019 course updates
- Known for its approach, writing style, current coverage of the breadth of biology topics, and unique illustrations
- Fulfills the standards of the new AP® Biology course and provides a lively, engaging writing style that conveys the central concepts and applications of human biology succinctly and accurately
- Issues-oriented approach that engages students in current, motivating biological topics; a built-in cross-referencing system for key topics; and helpful media resources for teachers and students

Hardcover, 1,024 pages

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This personal learning environment combines the eBook and resources into a singular Learning Path

Biology: The Unity and Diversity of Life, AP® Edition

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Student Edition + MindTap™ (1-year access)	**9780357926567**
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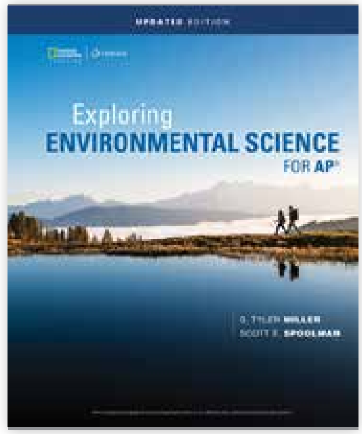
AP® Lab Manual	**9781337408615**
Laboratory Manual	**9780840053800**

Includes Cengage Learning Testing, powered by Cognero®



Exploring Environmental Science for AP®, Updated

Miller, Spoolman

Grades 9–12 First Edition Updated ©2021 9780357436325

- Updated with new content and AP®-style questions to meet the 2019 course updates
- AP® Multiple Choice and Free-Response review questions appear at the end of each Chapter and each Unit, and a full AP® Practice Test is included at the end of the book, all updated to the 2019 course framework updates
- Themes of economics, politics, ethics, policy, and sustainability are woven throughout, emphasizing the interconnectedness of human activity and the environment
- *Critical Concepts in Sustainability* features focus on the interconnectedness of people, policy, economics, science and environment; each has a free-response question to help students develop good FRQ writing skills
- *Math Connection* are FRQ-style analysis features that appear in each chapter to build quantitative literacy and provide math skills practice in real-world situations

Hardcover, 677 pages

Cengage MindTap

This personal learning environment combines the eBook and resources into a singular Learning Path

Exploring Environmental Science for AP® (Updated)

Student Edition	**9780357436325**
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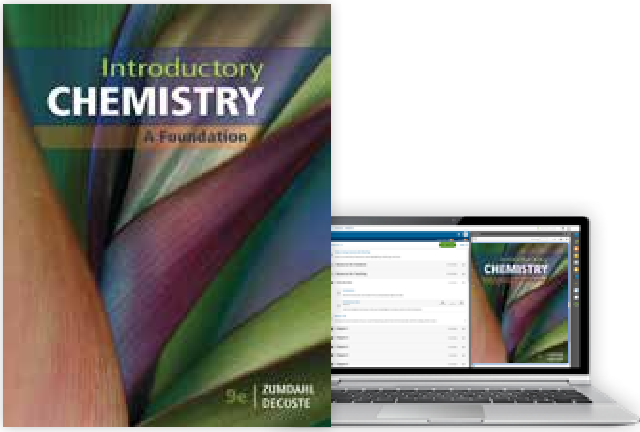
AP® Teacher's Resource Guide	**9781337705691**

Includes Cengage Learning Testing, powered by Cognero®

Chemistry



Introductory Chemistry: A Foundation

Zumdahl, DeCoste

Grades 10–12 Ninth Edition ©2019 9781337399449

- Offers a superior problem-solving pedagogy, an engaging writing style, and a strong emphasis on everyday applications, as well as a robust teaching and learning package and helpful digital solutions
- Chemical reactions are covered early-on to capture student interest, leaving more abstract material for later chapters
- Explains chemical concepts by starting with the basics—using symbols or diagrams—and concludes by encouraging students to test their own comprehension of the solution

Hardcover, 800 pages

Cengage OWLv2

A chemist-developed homework solution with eBook that develops problem solving mastery

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Student Solutions Manual	**9781337399470**
Annotated Instructor's Edition	**9781337399432**

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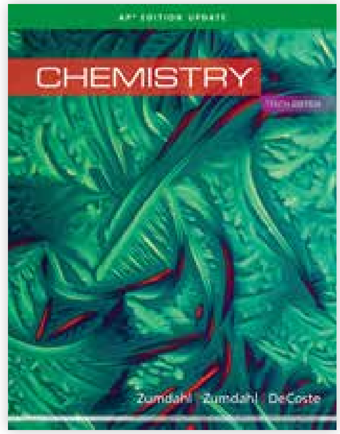

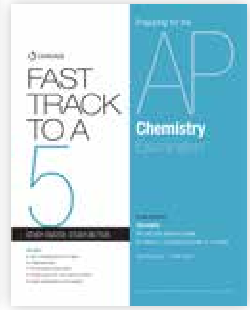

Chemistry, AP® Edition, Update

Zumdahl, Zumdahl, DeCoste

Grades 11–12 Tenth Edition ©2023 9780357872680

- Updated with new content and AP®-style questions to meet the 2019 course updates
- Renowned for its problem-solving approach and focus on conceptual development
- Emphasizes a qualitative approach to chemistry in both the text and the digital program before quantitative problems are considered, helping build comprehension
- Focuses on modeling throughout the narrative to address the problem of rote memorization by helping students better understand and appreciate the process of scientific development
- New "Critical Thinking Questions" have been added throughout the text to emphasize the importance of conceptual learning

Hardcover, 1,200 pages

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A chemist-developed homework solution with eBook that develops problem solving mastery

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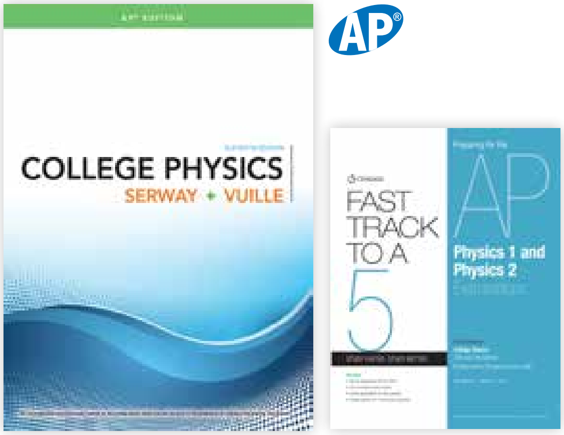
Includes Cengage Learning Testing, powered by Cognero®

Physics



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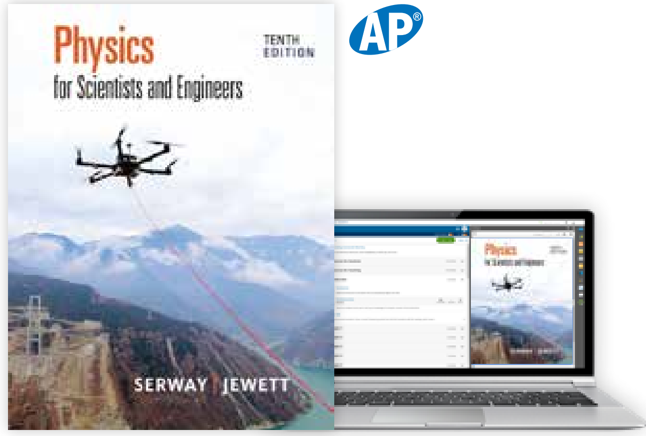

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