Mc Graw Hill Education

Three-Dimensional Learning Guide to iSCIENCE

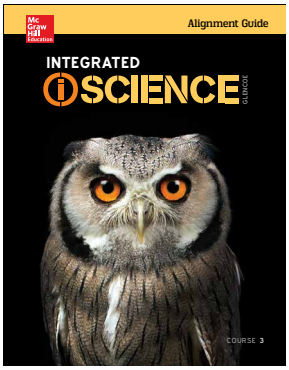
McGraw-Hill Education is your partner in delivering a balanced learning experience to meet the needs of your diverse 21st century classroom and students. This **Three-Dimensional Learning Guide** is your blueprint for a hands-on, student inquiry classroom to meet the new science standards.

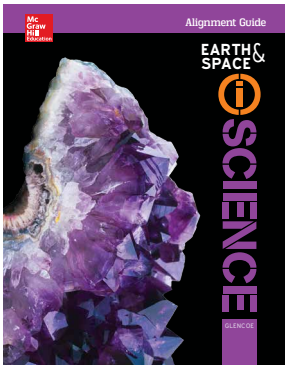
This Guide will take you through the programs by highlighting how to implement **Inquiry** and **Student-led exploration**, disciplinary core ideas, crosscutting concepts, and science and engineering practices.

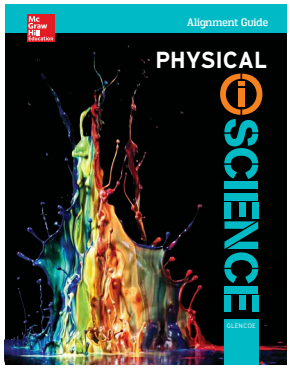
Each chapter starts with a visual phenomenon, online guiding questions in the Phenomenon Bank, and a Launch Lab to spark student inquiry. Multiple opportunities for Student Exploration and Investigation foster collaboration throughout each lesson. Formative assessment and student self-evaluation guide learning.

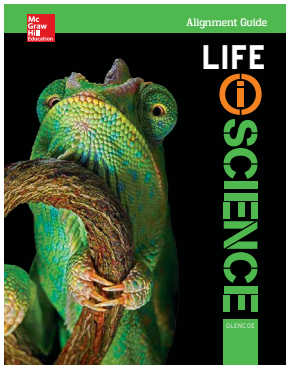
Look for these icons throughout this guide to show where to find the NGSS tools of the *iScience* program.

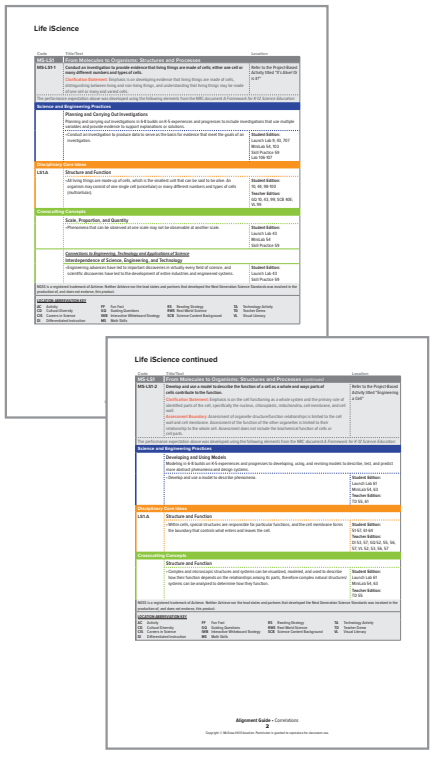
Ease the Transition to Meeting the Next Generation Science Standards











iScience helps ease the transition to **Next Generation Science Standards** (NGSS)*. Our middle school science programs ensure you are fully aligned to:

- Performance Expectations
- Science and Engineering Practices
- Disciplinary Core Ideas
- Cross-cutting Concepts

We are committed to ensuring that you have the tools and resources necessary to meet the expectations for NGSS.

What is NGSS?

The purpose of NGSS is to act as the foundation for science education while describing a vision of what it means to be proficient in science. It emphasizes the importance of the practices of science and engineering to learning critical thinking skills as well as content.

Why NGSS?

NGSS has developed in an effort to create unified standards in science education that consider content, practices, pedagogy, curriculum, and professional development. The standards provide all students with an internationally benchmarked education in science.

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Science and Engineering Practice Handbook

The *Science and Engineering Practices Handbook*, found in the Student Center and Teacher Center online at ConnectEd, introduces students to the skills they will use in science investigations and engineering projects. It explains the Cross-cutting Concepts as well as the eight Science and Engineering Practices defined by *A Framework for K-12 Science Education*.

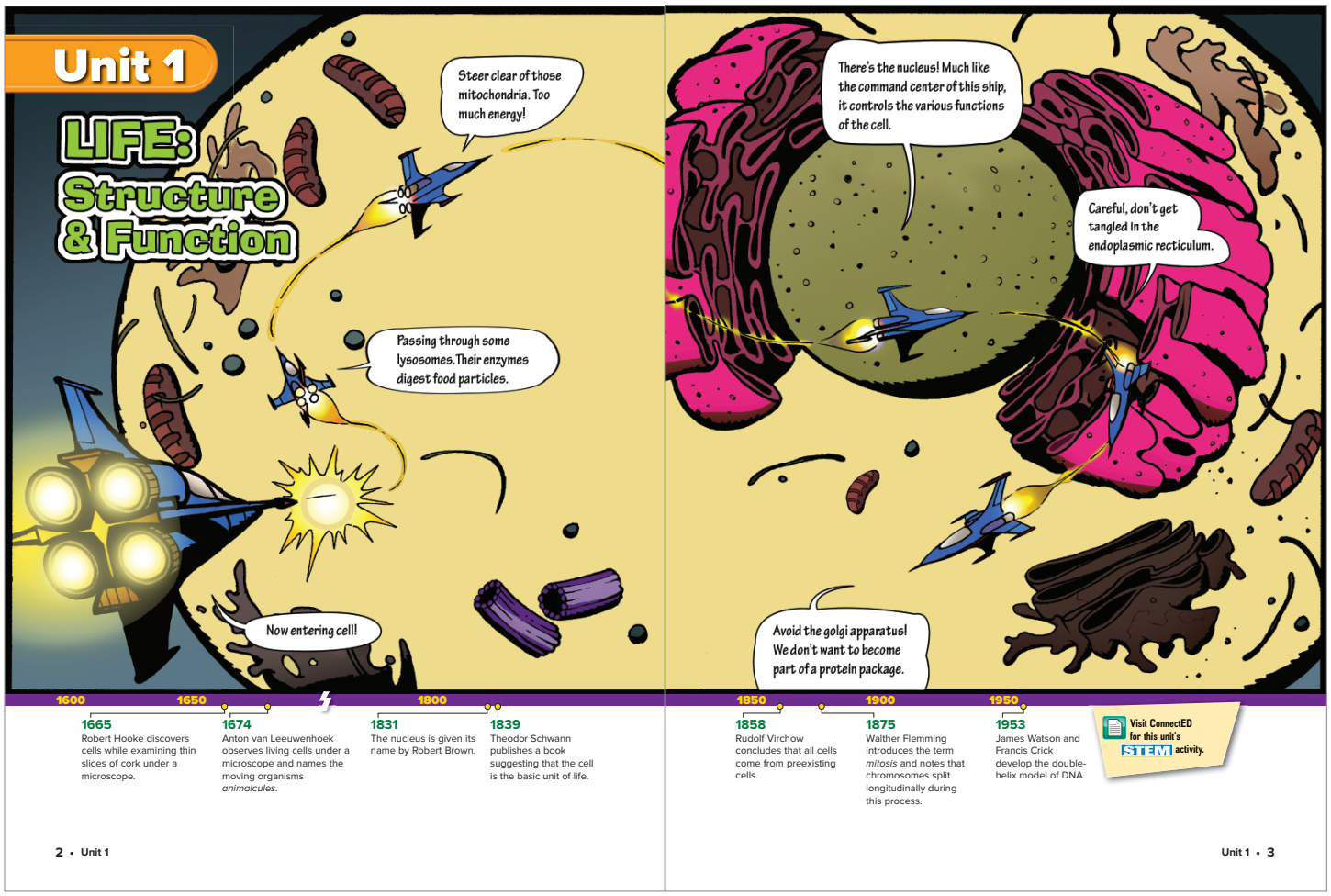
This useful tool eases the transition to the NGSS by providing definitions, examples, and Quick Practice activities to be used as reference while students develop their projects and meet performance expectations.

Students practice reading and literacy in science and technical subjects by determining central ideas of the text with the **Big Idea** question that appears at the beginning of each chapter.

Science and Engineering Practices are prevalent throughout *iScience*. Students are presented with the practice of asking questions throughout the program. An **inquiry** question is proposed to students at the beginning of each chapter and lesson, prompting students to ask their own questions.

Starts with the **Big Idea** which encourages students to ask questions.

Cross-cutting Concepts are an integral part of the *iScience* program. This unit discusses the way living organisms are shaped and how that shape determines the properties and functions of that organism and its components.

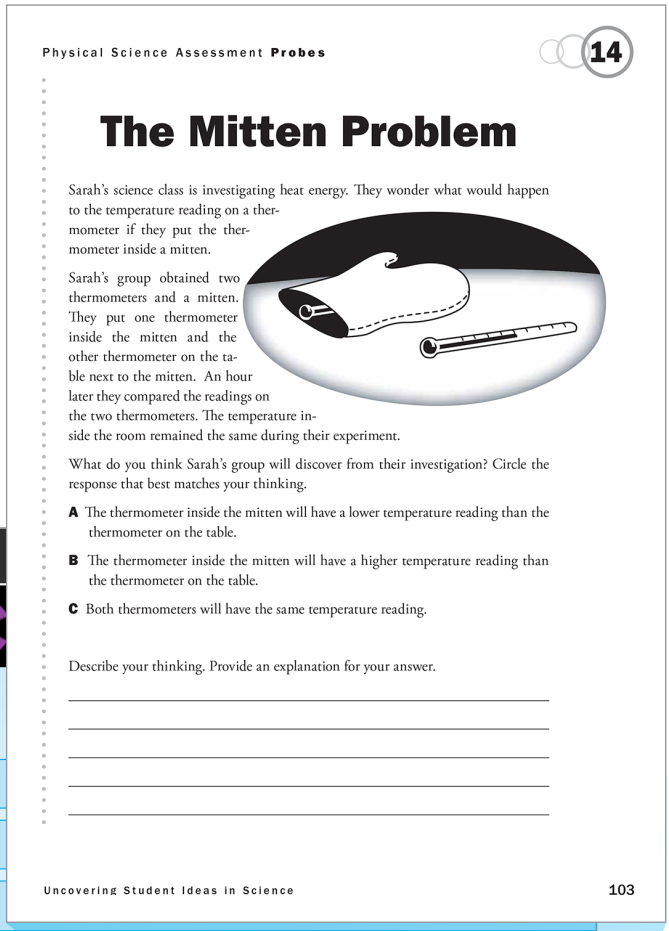


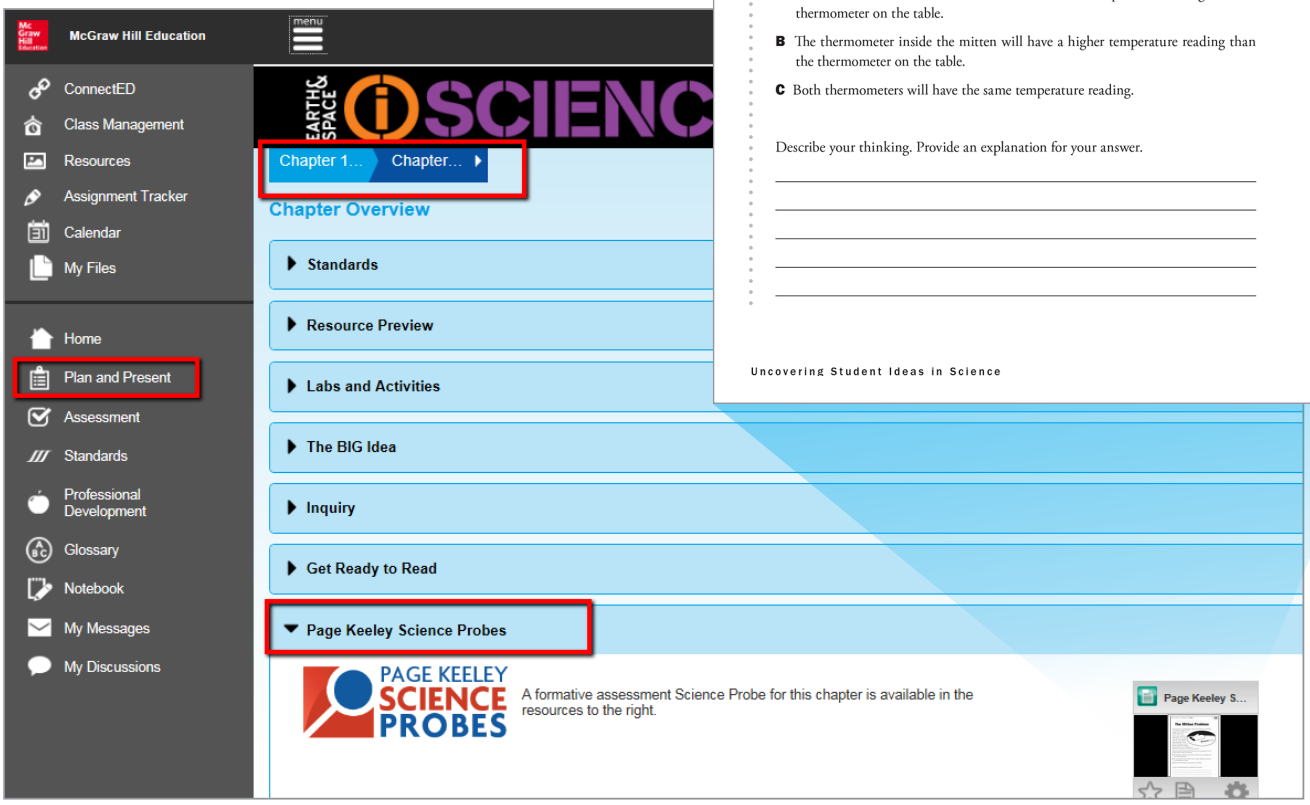
Science, Technology, Engineering and Mathematics are woven throughout the *iScience* program. A STEM activity is available for each unit in the program. This unit's **STEM activity** asks students to compare a cell to a building and then design and construct a three-dimensional model of a building that they will use to illustrate these comparisons.

Brings Cross-cutting Concepts to life.

Page Keeley Science Probes

The *iScience* program presents abundant opportunities for student engagement, meaningful discourse, and reflection. This process begins with Page Keeley formative assessment probes at the beginning of every chapter.





This Formative Assessment is found online and correlated to each chapter in the Plan and Present tab.

The **Big Idea** question is the overarching question for this chapter. This provides the framework for understanding the details that follow. The inquiry questions generate student interest in the image, prompting them to ask their own questions.

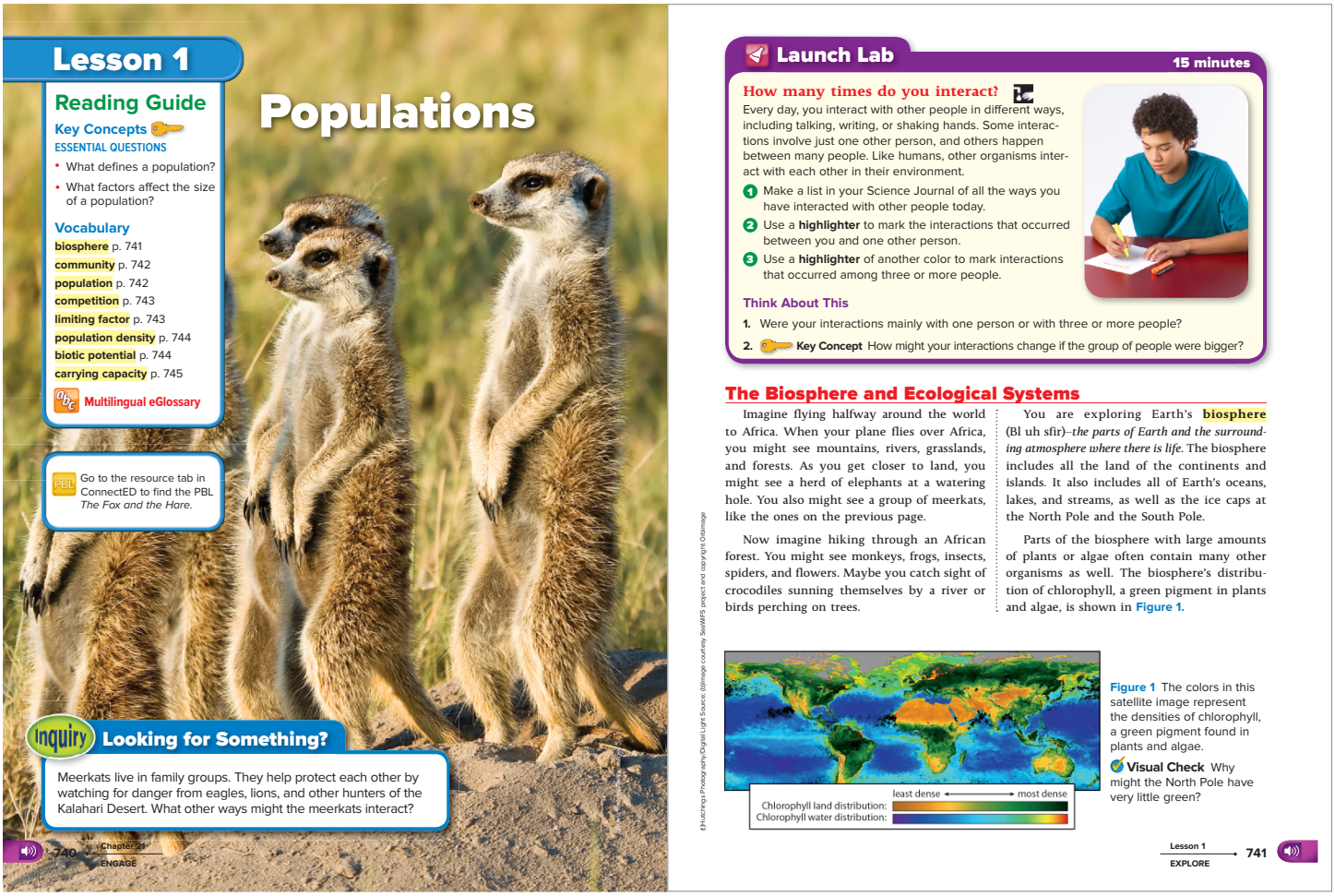
An anticipartory set of statements help prepare students for reading.

Starts with an engaging image that will spark questions for students to collaborate and investigate.

Lesson Opener

The **Reading Guide** helps students practice reading and literacy in science and technical subjects by asking **Essential Questions** to simulate student thought.

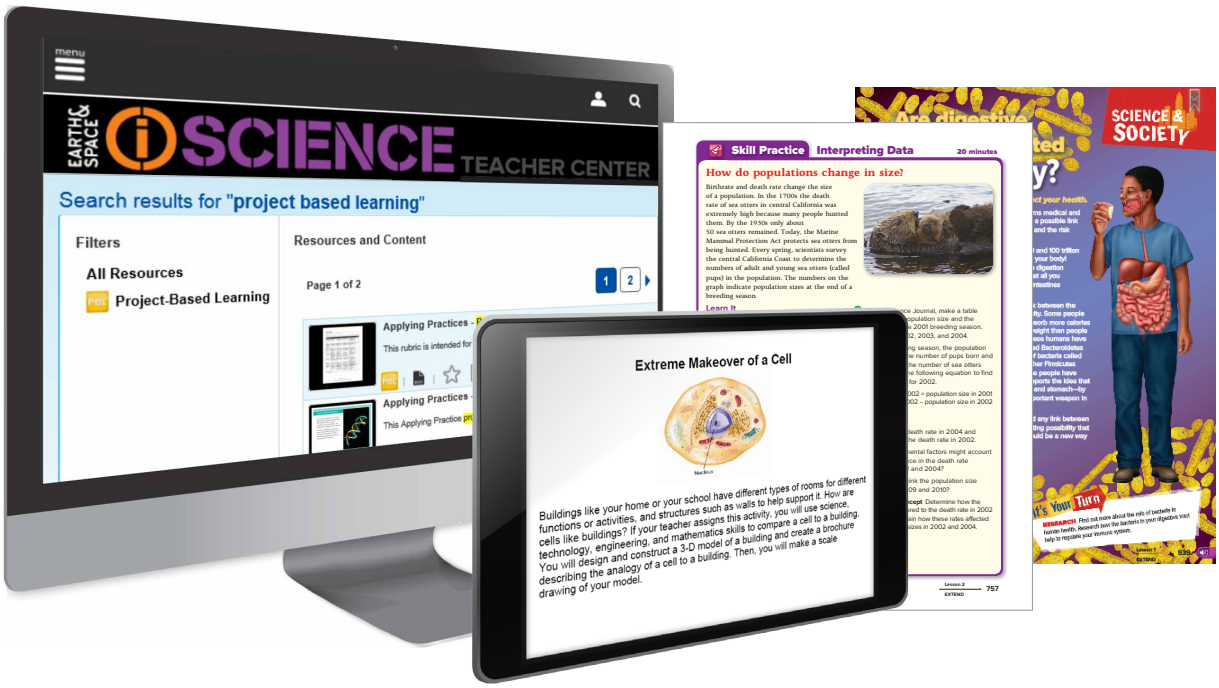
Launch Labs are found at the beginning of lessons and help students to explore using a hands-on approach to what the lesson content will be teaching.



Each lesson starts with one of two potential phenomenon: the visual phenomenon with inquiry questions or a launch lab.

Each lesson opens with a visual phenomenon with an inquiry question and a Launch Lab.

Student Exploration/Investigation



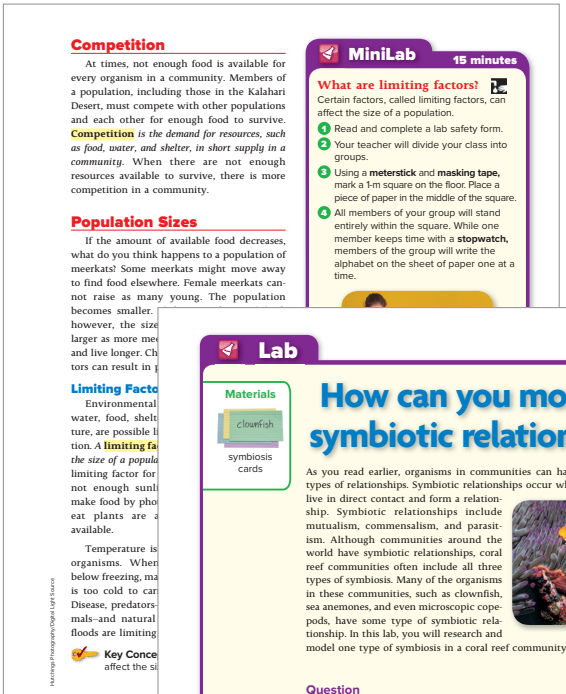
There are several Collaborative options within the chapter and lesson:

1. Inquiry
2. Project-Based Learning
3. Webquests
4. Other Optional Student Activities that are designed to further understanding of the Phenomenon and Essential Questions:
   - Enrichment Resource
   - Challenge Resource
   - Real World Extension with Student Response

Labs

MiniLabs are found within the lesson and focus on reenforcing specific key concepts explained in the reading.

Full **Chapter Labs** are found at the end of each chapter and are tied back to the **Essential Question** from the beginning of the Chapter.



Competition

At times, not enough food is available for every organism in a community. Members of a population, including those in the Kalahari Desert, must compete with other populations and each other for enough food to survive. **Competition** *is the demand for resources, such as food, water, and shelter, in short supply in a community.* When there are not enough resources available to survive, there is more competition in a community.

Population Sizes

If the amount of available food decreases, what do you think happens to a population of meerkats? Some meerkats might move away to find food elsewhere. Female meerkats cannot raise as many young. The population becomes smaller. however, the size larger as more me and live longer. Ch tors can result in

Limiting Facto

Environmental water, food, shelt ture, are possible li tion. A **limiting fa** *the size of a popula* limiting factor for not enough sunli make food by pho eat plants are available.

Temperature is organisms. When below freezing, ma is too cold to car Disease, predators- mals–and natural floods are limiting

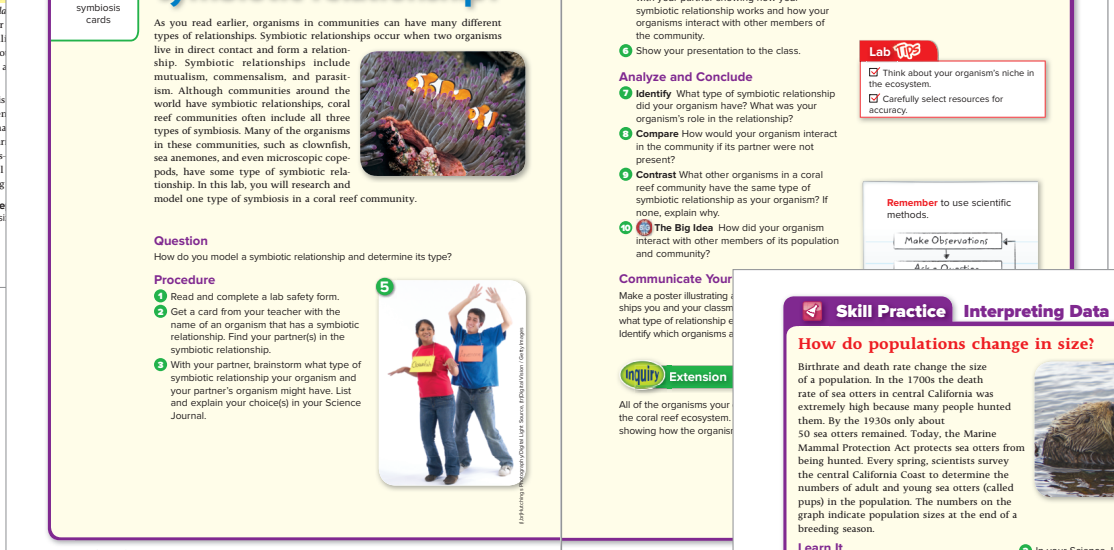
Key Conce affect the si

MiniLab 15 minutes

What are limiting factors?

Certain factors, called limiting factors, can affect the size of a population.

1. Read and complete a lab safety form.
2. Your teacher will divide your class into groups.
3. Using a **meterstick** and **masking tape,** mark a 1-m square on the floor. Place a piece of paper in the middle of the square.
4. All members of your group will stand entirely within the square. While one member keeps time with a **stopwatch,** members of the group will write the alphabet on the sheet of paper one at a time.



Lab 40 minutes

Materials

symbiosis cards

How can you model a symbiotic relationship?

As you read earlier, organisms in communities can have many different types of relationships. Symbiotic relationships occur when two organisms live in direct contact and form a relationship. Symbiotic relationships include mutualism, commensalism, and parasitism. Although communities around the world have symbiotic relationships, coral reef communities often include all three types of symbiosis. Many of the organisms in these communities, such as clownfish, sea anemones, and even microscopic copepods, have some type of symbiotic relationship. In this lab, you will research and model one type of symbiosis in a coral reef community.

Question

How do you model a symbiotic relationship and determine its type?

Procedure

1. Read and complete a lab safety form.
2. Get a card from your teacher with the name of an organism that has a symbiotic relationship. Find your partner(s) in the symbiotic relationship.
3. With your partner, brainstorm what type of symbiotic relationship your organism and your partner's organism might have. List and explain your choice(s) in your Science Journal.

5

4. Using your library and reference books, research your organism with your partner.
5. Develop a visual presentation, such as a skit, a slide presentation, or a series of posters with your partner showing how your symbiotic relationship works and how your organisms interact with other members of the community.
6. Show your presentation to the class.

Analyze and Conclude

7. **Identify** What type of symbiotic relationship did your organism have? What was your organism's role in the relationship?
8. **Compare** How would your organism interact in the community if its partner were not present?
9. **Contrast** What other organisms in a coral reef community have the same type of symbiotic relationship as your organism? If none, explain why.
10. **The Big Idea** How did your organism interact with other members of its population and community?

Communicate Your

Make a poster illustrating ships you and your classm what type of relationship e Identify which organisms a

Inquiry Extension

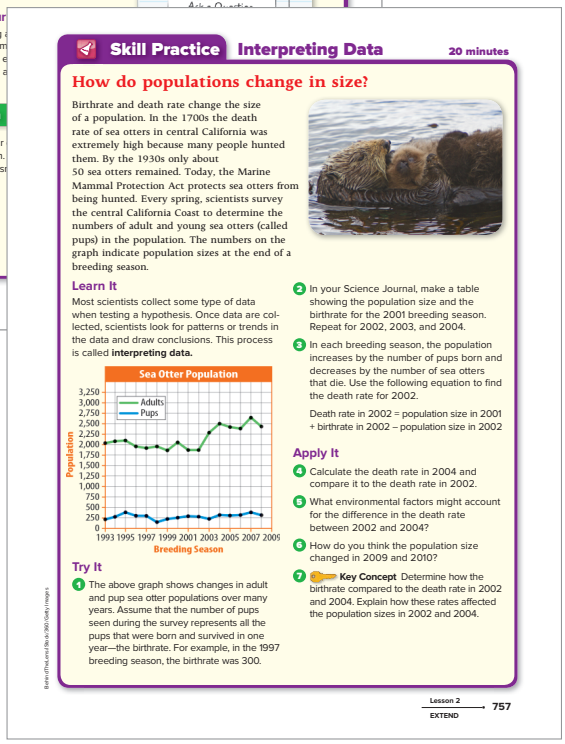
All of the organisms your the coral reef ecosystem. showing how the organis

Lab TIPS

- Think about your organism's niche in the ecosystem.
- Carefully select resources for accuracy.

Remember to use scientific methods.

766 Chapter 21 EXTEND



Skill Practice Interpreting Data 20 minutes

How do populations change in size?

Birthrate and death rate change the size of a population. In the 1700s the death rate of sea otters in central California was extremely high because many people hunted them. By the 1930s only about 50 sea otters remained. Today, the Marine Mammal Protection Act protects sea otters from being hunted. Every spring, scientists survey the central California Coast to determine the numbers of adult and young sea otters (called pups) in the population. The numbers on the graph indicate population sizes at the end of a breeding season.

Learn It

Most scientists collect some type of data when testing a hypothesis. Once data are collected, scientists look for patterns or trends in the data and draw conclusions. This process is called **interpreting data.**

Try It

1. The above graph shows changes in adult and pup sea otter populations over many years. Assume that the number of pups seen during the survey represents all the pups that were born and survived in one year—the birthrate. For example, in the 1997 breeding season, the birthrate was 300.
2. In your Science Journal, make a table showing the population size and the birthrate for the 2001 breeding season. Repeat for 2002, 2003, and 2004.
3. In each breeding season, the population increases by the number of pups born and decreases by the number of sea otters that die. Use the following equation to find the death rate for 2002.

   Death rate in 2002 = population size in 2001 + birthrate in 2002 – population size in 2002

Apply It

4. Calculate the death rate in 2004 and compare it to the death rate in 2002.
5. What environmental factors might account for the difference in the death rate between 2002 and 2004?
6. How do you think the population size changed in 2009 and 2010?
7. **Key Concept** Determine how the birthrate compared to the death rate in 2002 and 2004. Explain how these rates affected the population sizes in 2002 and 2004.

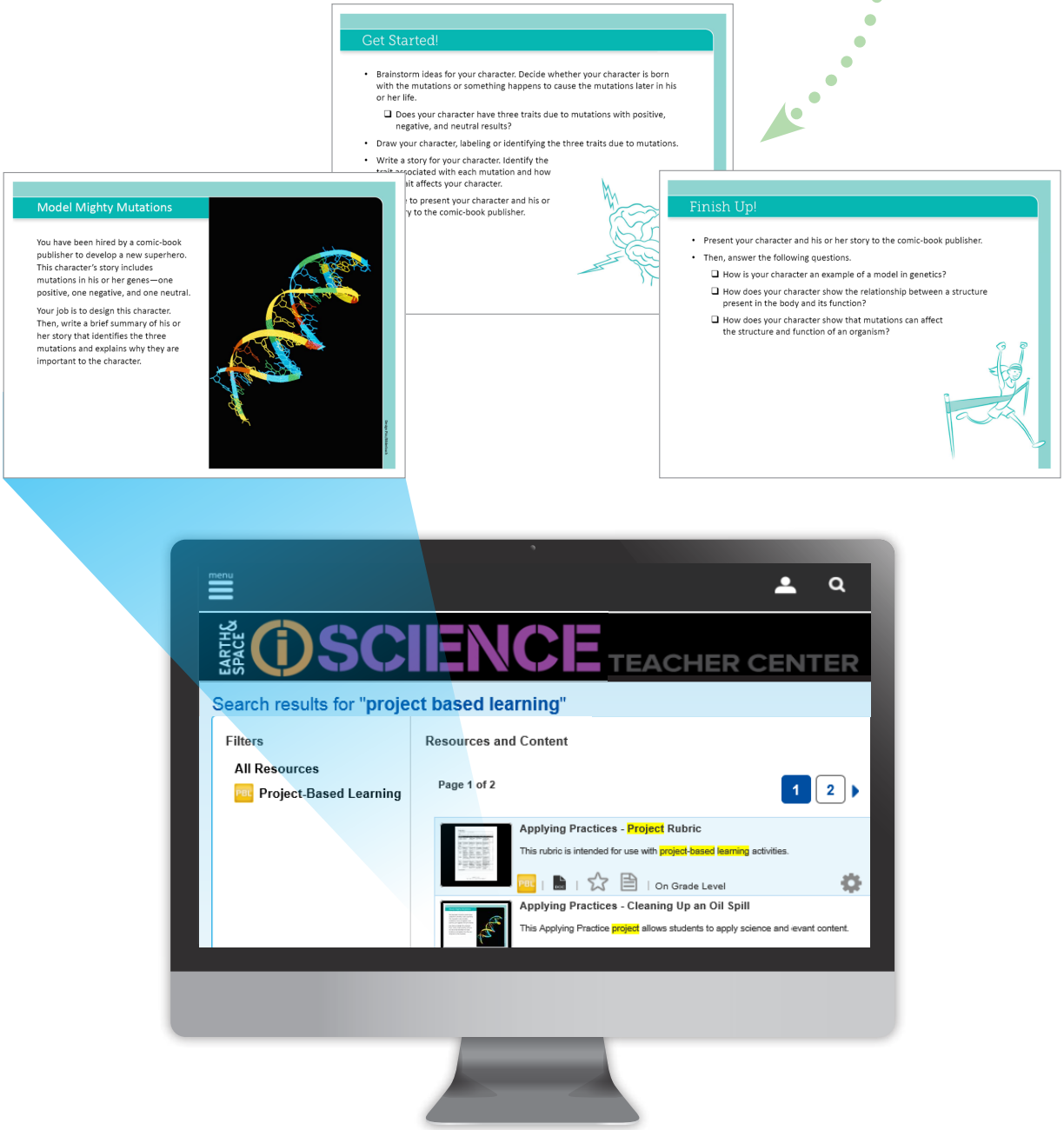
Lesson 2 EXTEND 757

Skill Practice Labs are found within the lesson and often focus on a **Science and Engineering Practice** or a **Cross-cutting Concept** along with a Disciplinary Core Idea.

Labs play a fundamental role in developing students' understanding of the key concepts.

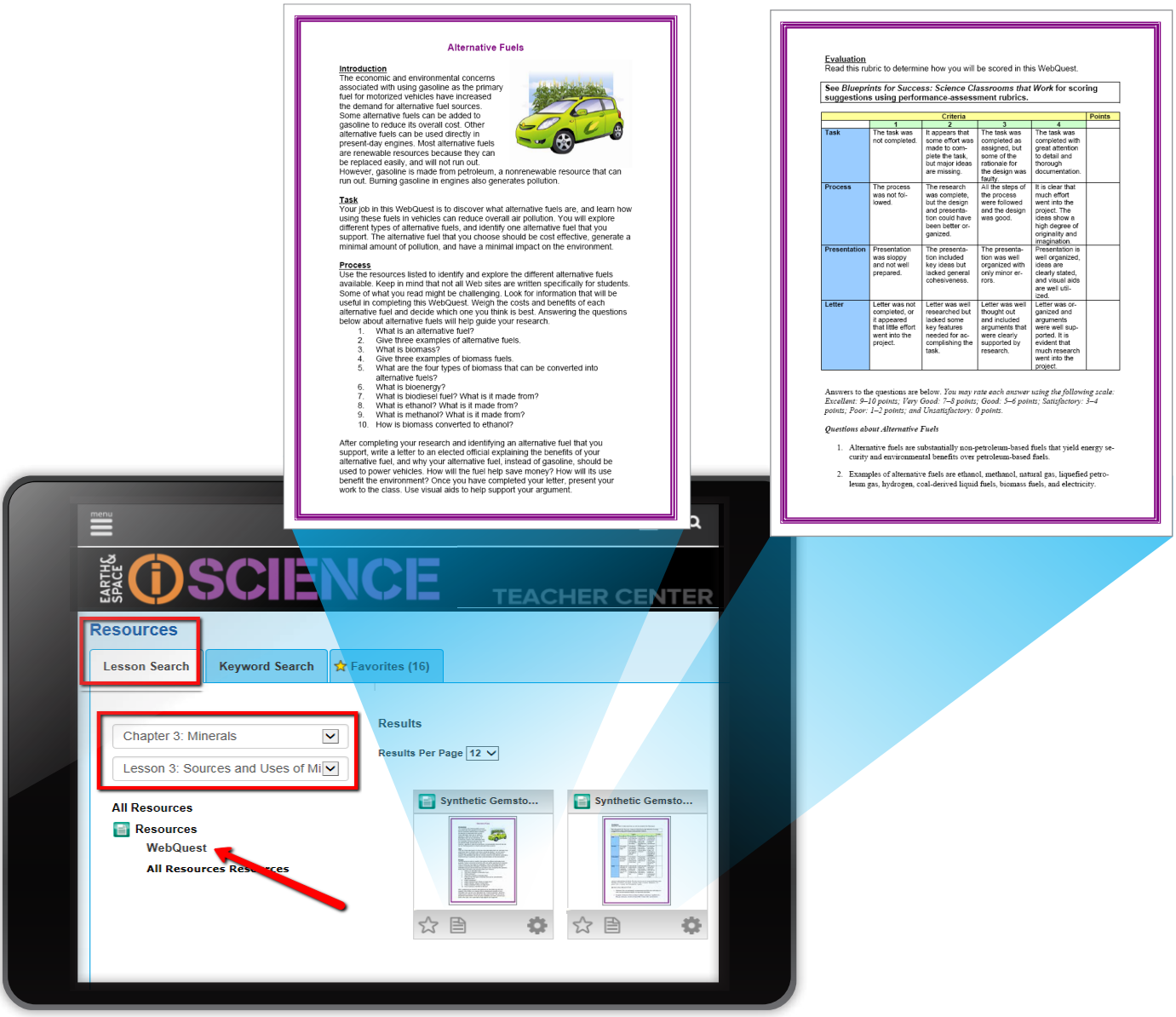
Student Exploration: Project-Based Learning (PBL)

Real-World projects, such as the PBLs that are found online and are correlated to the chapters, engage students as they apply three-dimensional learning. Project rubrics and the NGSS Alignment Guide provide key information for assessing students projects.



PBLs are correlated to the lesson content and focus on bringing the content being taught to life.

Student Exploration: WebQuests



WebQuests are tied to the **Disciplinary Core Ideas** and require students to engage in **Science and Engineering Practices**. These are correlated to the chapter and are found online within ConnectED.

connectED

WebQuests can be found correlated to our online content in ConnectED.

Student Exploration: Student Activities

Name _____ Date _____ Class _____

Enrichment LESSON 2

The Muscular System

When a person dies, the respiratory and circulatory systems stop delivering oxygen to the muscles. Muscles use oxygen to produce ATP, an energy molecule that helps them relax after contracting. Without ATP, the muscles stiffen. About 10 to 12 hours after death, the muscles and joints are locked into place. This condition is called rigor mortis.

Rigor Mortis

The term *rigor mortis* comes from the Latin words *rigor,* meaning "stiff," and *mort,* meaning "death." Rigor mortis usually affects the facial muscles first, sometimes within minutes after death. It then moves to other parts of the upper body and finally to the lower body. Several factors affect rates of rigor mortis, including temperature. Cold temperatures slow rates of rigor mortis. In contrast, warm temperatures increase rates of rigor mortis. A person who exercises shortly before death will have a warm body temperature, increasing the rate of rigor mortis.

Fat distribution and age also affect how quickly rigor mortis sets in.

Rigor mortis usually lasts about one to two days. A body found outside during the winter, however, might be locked in rigor mortis for days. During this period, tissues in the body begin to decay. This causes the muscles to relax. The muscles generally relax in the same order in which they stiffened—that is, relaxation begins in the face first and then moves to other parts of the body.

Forensics

Rigor mortis can provide useful information in forensic studies. Forensics is the science of gathering and analyzing evidence for legal purposes. This work sometimes involves crime-scene investigations. Rigor mortis can help forensic scientists determine the time of death. Because a body tends to stiffen in the position it held at the moment of death, rigor mortis can also help scientists determine whether a body was moved.

Applying Critical-Thinking Skills

Directions: *Answer each question or respond to each statement.*

1. **Evaluate** The upper body of a corpse is stiff, but the lower body is relaxed. When might death have occurred? Explain your answer.
2. **Infer** On Friday, police find the body of a person who they know died on Tuesday. The body exhibits full rigor mortis. What can you infer about the conditions in which the body was found?

Enrichment Resources challenge students to go beyond the norm and apply knowledge to new situations.

Challenge Resources provide additional ways to engage beyond-level learners with scenario-based activities.

Name _____ Date _____ Class _____

Challenge LESSON 2

Exercise Video

You are a personal trainer who wants to help people understand the importance of physical fitness. You decide to create an exercise video. In your video, you will describe different types of muscles and how these muscles work. You will also explain how exercise benefits muscles and suggest specific exercises for muscle fitness.

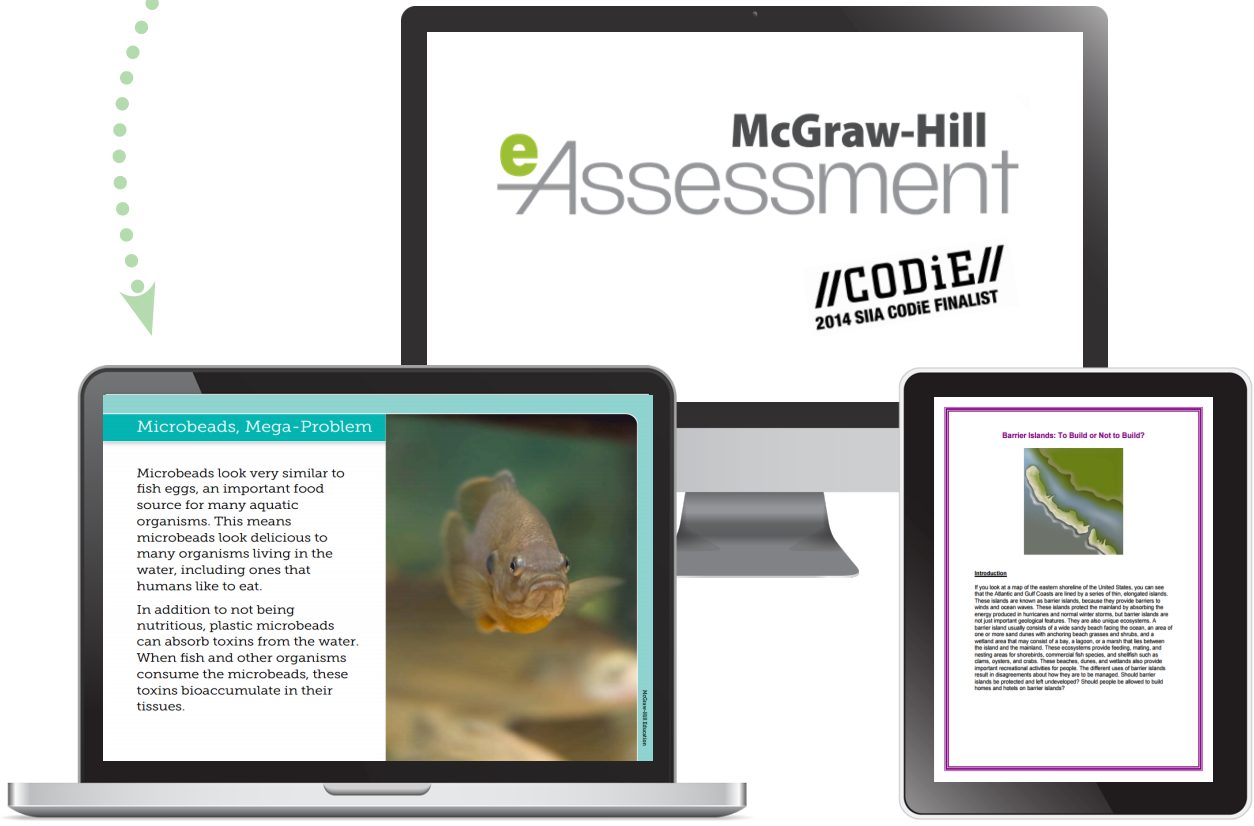
On the lines below, write the script for your video.

Student Exploration activities allow students to go above and beyond and expand their knowledge base.

Student Activities found in print and online help students explore through hands-on activities and self-engagement.

Assessment Throughout

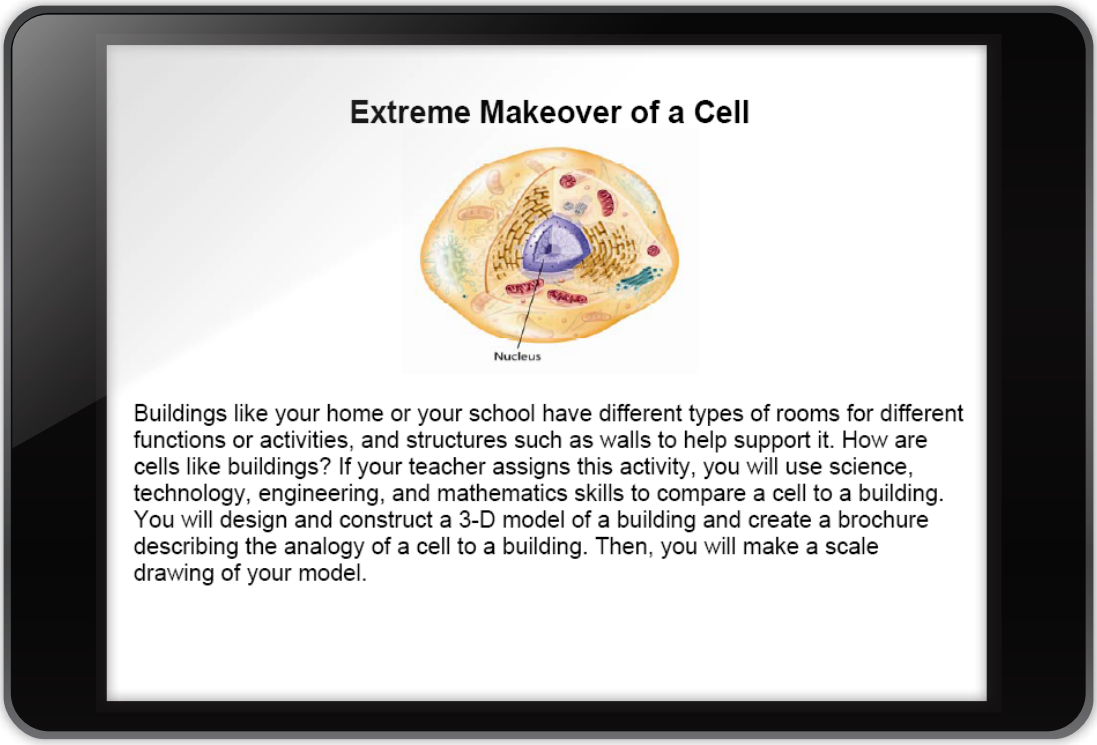
A variety of assessment types offer “pen and paper” assessment, technology-enhanced questions, and performance task assessment.



Numerous options for formative and summative assessment help provide comprehensive insight into student learning.

Built-in assessment strands throughout *iScience* will help students stay on track.

Complete STEM Project



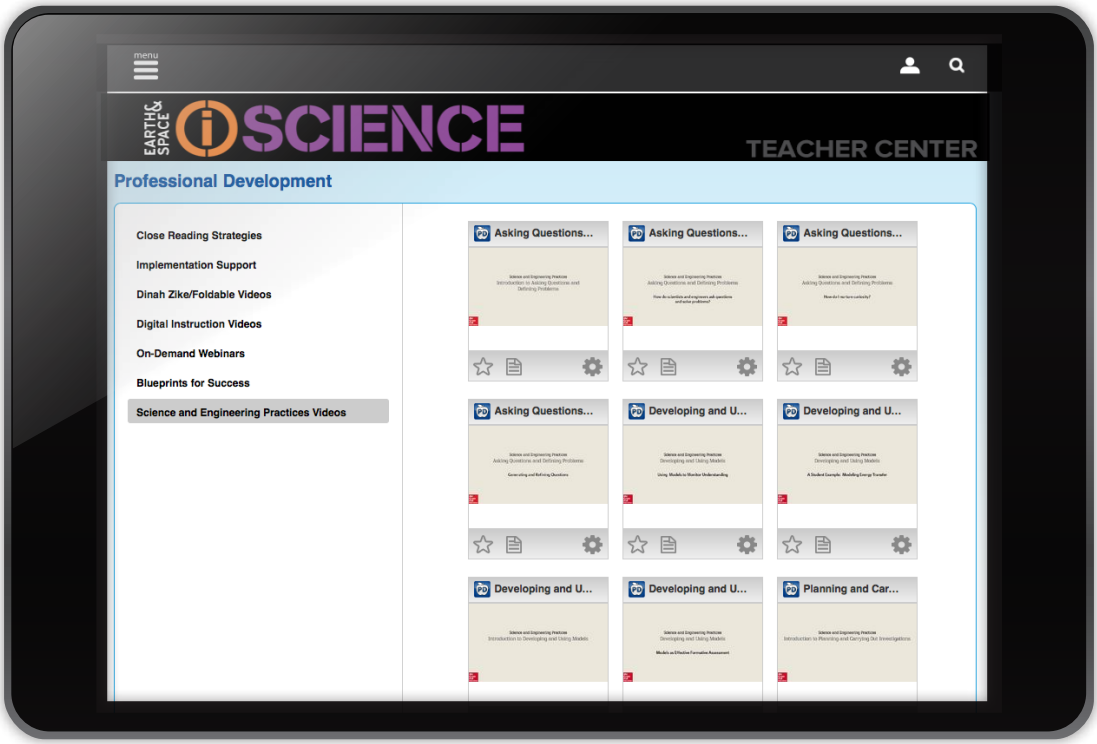
STEM projects enable students to gain knowledge and skills by investigating and designing an authentic, real-world problem or challenge. Sustained inquiry extends the process of asking questions, finding answers, and applying information.

Information within the student text provides the foundation for answering questions and the STEM project pulls all of the student's learning into an application of that learning.

connectED

Unit Projects build throughout the unit.

Professional Development around NGSS can be found under the Professional Development menu item in ConnectED.



NGSS Implmentation videos provide guidance for teaching **Science and Engineering** Practices. These valuable videos are found online within the Professional Development menu in ConnectED.

Resources provide teaching strategies and content support help teachers develop better skills and content knowledge.

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