Mc Graw Hill

FLORIDA

Science

PROGRAM OVERVIEW

PHYSICS, EARTH SCIENCE, AND
PHYSICAL SCIENCE

Unlimited Potential

McGraw Hill Florida Science was built to empower students to ask questions, pose hypotheses, conduct hands-on investigations, and communicate their findings.

Drawing on feedback from Florida teachers, we set forth to create a program where inquiry lays the foundation for deep understanding of science, where a spirit of discovery improves students' reading and writing skills, and where the ultimate goal is Florida State Academic Standards (FSAS) for Science mastery and a lifelong love of learning.

Guided by Experts

Our author collection is made up of experts committed to engaging students throughout their learning experience:

Dinah Zike

Creator of Foldables and interactive notebooking, Dinah Zike focuses on helping students understand difficult new concepts and facilitating engagement.

Joyce Tugel

Science probes put students at the center of the lesson by starting with their current understandings of the world. Joyce Tugel's probes start lessons with misconceptions to ground students in new concepts.

Dr. Doug Fisher, Ph.D.

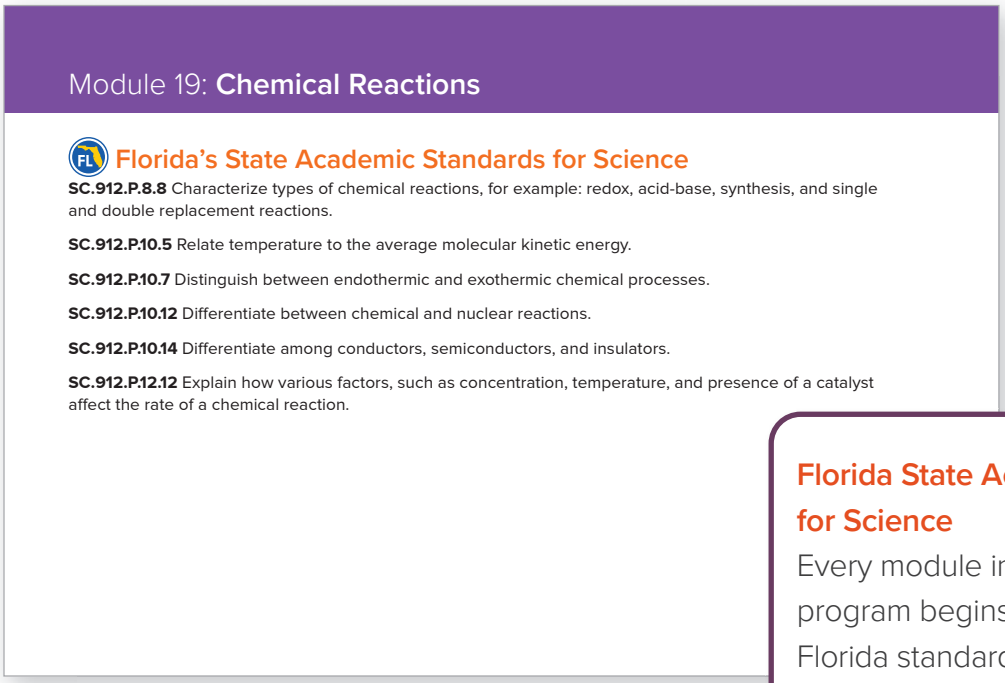
A well-regarded reading expert, Dr. Doug Fisher helped create our Reading Science Literacy Essentials to foster reading comprehension.

A Program Built for the FSAS

Explicitly designed for the FSAS and the modern Florida science classroom, *McGraw Hill Florida Science* combines the FSAS with feedback from our most trusted collaborators—Florida teachers and administrators—and offers the tools to help every student achieve success in science.

Aligned to the Florida State Academic Standards for Science

Every module and lesson is aligned to the FSAS standards. The Teacher's Edition and it's digital resources give the readings, labs, and activities to cover the standards with supports to encourage every student in finding their passion for Science.


Module 19: **Chemical Reactions**

Florida's State Academic Standards for Science

SC.912.P.8.8 Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.

SC.912.P.10.5 Relate temperature to the average molecular kinetic energy.

SC.912.P.10.7 Distinguish between endothermic and exothermic chemical processes.

SC.912.P.10.12 Differentiate between chemical and nuclear reactions.

SC.912.P.10.14 Differentiate among conductors, semiconductors, and insulators.

SC.912.P.12.12 Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.

Florida State Academic Standards for Science

Every module in the *Florida Science* program begins by outlining the Florida standards that are going to be covered in the upcoming module. Teachers can quickly see an overview of the various standards being hit at the lesson level at the start of each section too.

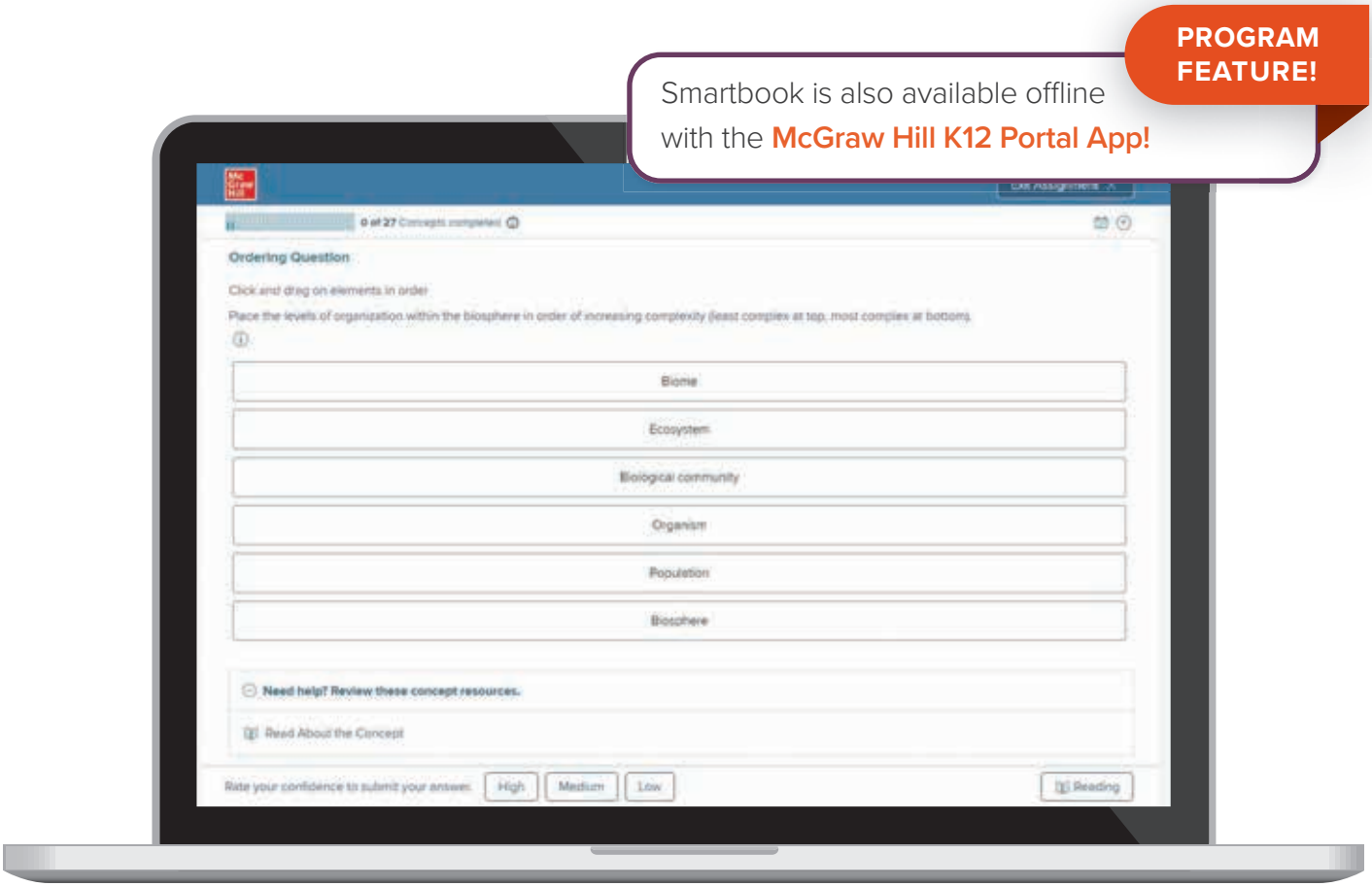
Adaptive Learning with Smartbook

Each student enters the classroom with different strengths, interests, and abilities. Eliminate guesswork and get to the heart of their learning needs with adaptive, comprehensive differentiation.

The secret is SmartBook, the first and only adaptive reading experience designed to change the way students read and learn. As the student progresses, SmartBook highlights the most impactful concepts the student needs to learn.

As students learn concepts, those learned concepts can rotate in and out of the cycle as new ones enter until all concepts have been completed. Incorporating new and familiar concepts together within this rotation strengthens concept retention through the application of spaced practice.

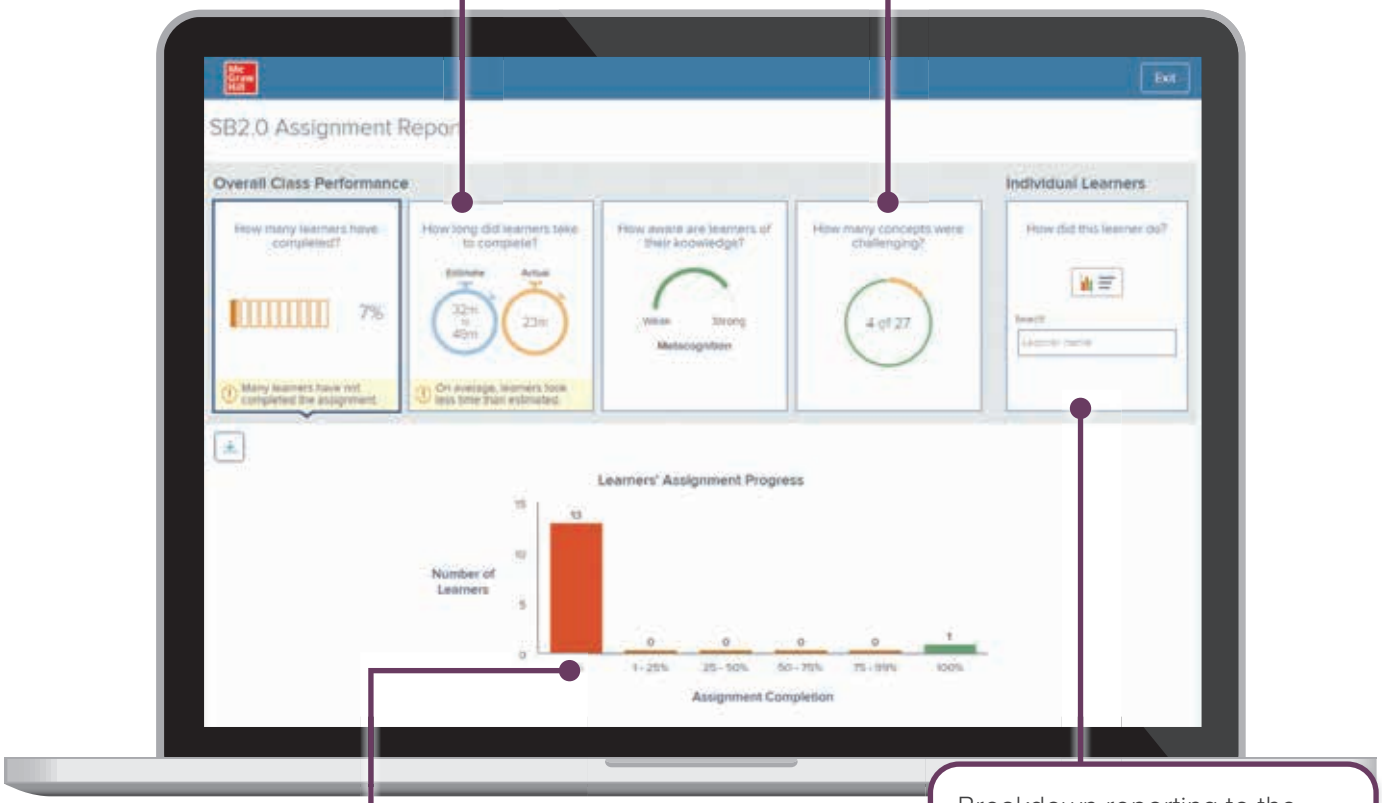
When SmartBook detects what content a student is most likely to forget, that content is presented for review to improve the student's knowledge retention.



Real-time reporting tools allow teachers to use their time more efficiently by managing and tracking individual student progress and the progress of the whole class. Teachers can focus on what students don't understand or still need to learn, rather than what they've already mastered.

See the duration students take to complete the assignment compared to the estimate.

Challenging concepts are revealed as students wrap up assignments, giving teachers the chance to reinforce topics before the next lesson.



Track progress on the assignment as students work through the questions.

Breakdown reporting to the individual student level.

Optimized for Teachers and Supervisors

Structured for flexibility, *Florida Science* allows teachers and supervisors to follow a recommended lesson path or adapt instruction as needed. Whichever you choose, you can feel confident your students are getting a comprehensive science education aligned to the FSAS.

Pacing included for every lesson allow you to plan out modules.

PROGRAM FEATURE!

Resource Overviews in every module and lesson can help curriculum writers recommend specific resources to cover the FSAS.

Module Planner

GO ONLINE to curate your presentations, interactive content, additional resources, and media library, and find answer keys, materials lists, rubrics, differentiated instruction, and more.

Module Resources

	Module Launch	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Module Wrap-Up
Pacing (min)	45	45	45	45	90	45
Claim, Evidence, Reasoning	Encounter the Phenomenon Make Your Claim	Collect Evidence	Collect Evidence	Collect Evidence	Collect Evidence	Revisit the Phenomenon Go Further: Data Analysis Lab
Labs and Investigations	**LL:** Rusting–A Chemical Reaction	**QI:** Design a Team Equation **Laboratory:** Conservation of Mass	**Laboratory:** Chemical Reactions	**Lab:** To Glow or Not to Glow	**QI:** Model Equilibrium **LabA:** Reaction Rates	
Media and OER		**PhET Simulation:** Balancing Chemical Equations; Reactants, Products and Leftovers			**PhET Simulation:** Reversible Reactions; Reactions & Rates	
Assess		Lesson Check	Lesson Check	Lesson Check	Lesson Check	Module Vocabulary Practice Module Test
Applying Practices for FSAS		Conservation of Mass SC.912.P.8.8, SC.912.P.10.12 Electron States and Simple Chemical Reactions SC.912.P.8.8, SC.912.P.10.12		Modeling Energy in Chemical Reactions SC.912.P.10.5, SC.912.P.10.7	Concentration and Reaction Rate Food for Thought	

KEY: **LL:** Launch Lab **QI:** Quick Investigation **VI:** Virtual Investigation

Standard Module Resources

- Interactive Content
- Teacher Presentation (PowerPoint™)
- Science Notebook
- Reading Essentials
- SmartBook®
- Skillbuilder Handbook
- Science and Engineering Practices Handbook

Module 19 • Chemical Reactio

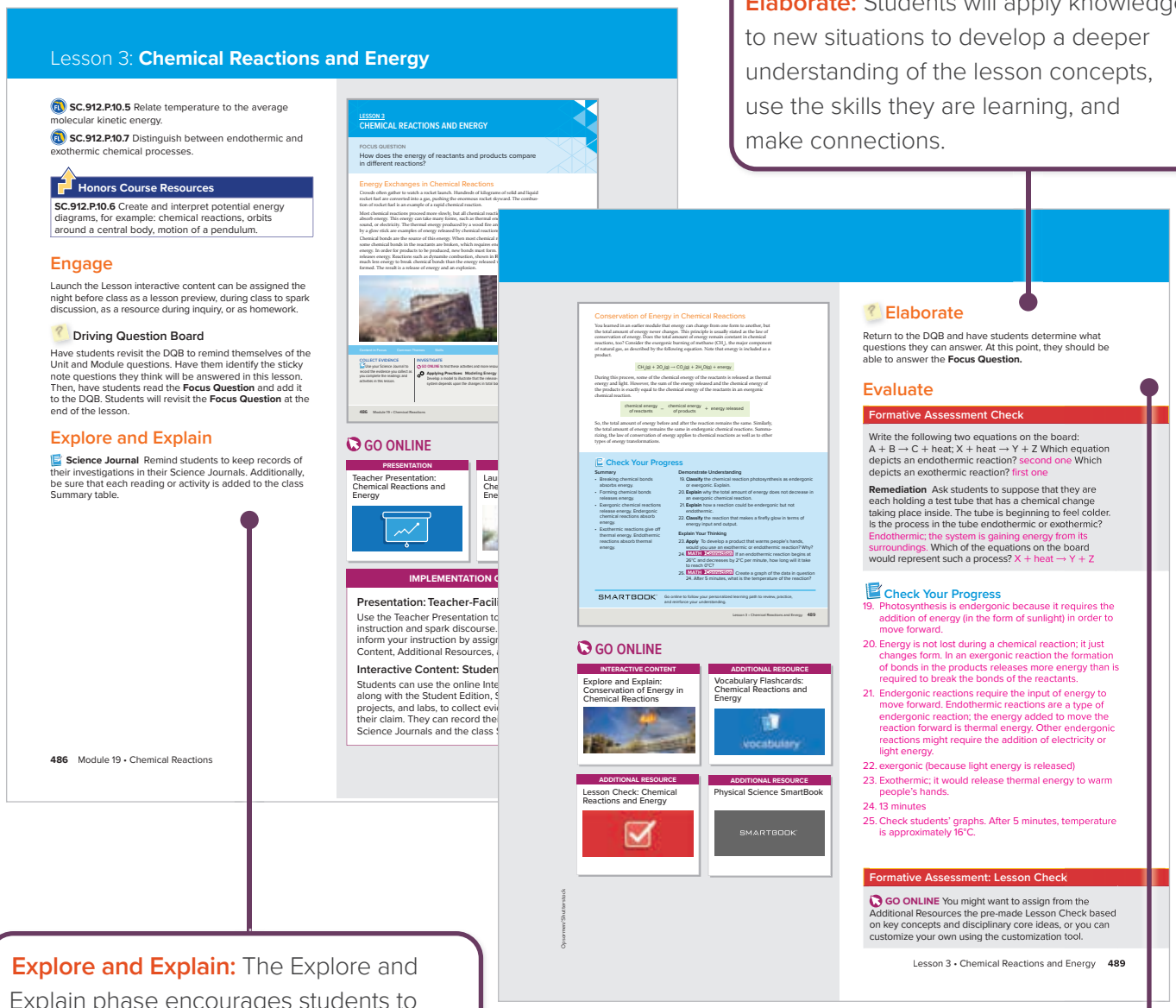
View the **Labs, Investigations, and Media** associated with the module to think through which will most resonate in your classroom.

Applying Practices are tied to every standard to ensure mastery throughout the module.

Inspiring New Teacher Confidence

Built to support the influx of new teachers across the state, *Florida Science* provides a clear path to cover the FSAS. Supports throughout the Teacher's Edition deliver additional tools to ensure teacher success and student content mastery.

Elaborate: Students will apply knowledge to new situations to develop a deeper understanding of the lesson concepts, use the skills they are learning, and make connections.



Lesson 3: **Chemical Reactions and Energy**

SC.912.P.10.5 Relate temperature to the average molecular kinetic energy.

SC.912.P.10.7 Distinguish between endothermic and exothermic chemical processes.

Honors Course Resources

SC.912.P.10.6 Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.

Engage

Launch the Lesson interactive content can be assigned the night before class as a lesson preview, during class to spark discussion, as a resource during inquiry, or as homework.

Driving Question Board

Have students revisit the DQB to remind themselves of the Unit and Module questions. Have them identify the sticky note questions they think will be answered in this lesson. Then, have students read the **Focus Question** and add it to the DQB. Students will revisit the **Focus Question** at the end of the lesson.

Explore and Explain

Science Journal Remind students to keep records of their investigations in their Science Journals. Additionally, be sure that each reading or activity is added to the class Summary table.

LESSON 3
CHEMICAL REACTIONS AND ENERGY

FOCUS QUESTION
How does the energy of reactants and products compare in different reactions?

Energy Exchanges in Chemical Reactions

GO ONLINE

PRESENTATION
Teacher Presentation: Chemical Reactions and Energy

IMPLEMENTATION

Presentation: Teacher-Facili

Use the Teacher Presentation to instruction and spark discourse. inform your instruction by assign Content, Additional Resources,

Interactive Content: Studen

Students can use the online Inte along with the Student Edition, S projects, and labs, to collect evi their claim. They can record the Science Journals and the class

486 Module 19 • Chemical Reactions

Conservation of Energy in Chemical Reactions

Check Your Progress

Summary
- Breaking chemical bonds absorbs energy.
- Forming chemical bonds releases energy.
- Exergonic chemical reactions release energy. Endergonic chemical reactions absorb energy.
- Exothermic reactions give off thermal energy. Endothermic reactions absorb thermal energy.

Demonstrate Understanding
18. **Classify** the chemical reaction photosynthesis as endergonic or exergonic. Explain.
20. **Explain** why the total amount of energy does not decrease in an exergonic chemical reaction.
21. **Explain** how a reaction could be endergonic but not endothermic.
22. **Classify** the reaction that makes a firefly glow in terms of energy input and output.

Explain Your Thinking
23. **Apply** To develop a product that warms people's hands, would you use an exothermic or endothermic reaction? Why?
24. MATH Connection If an endothermic reaction begins at 28°C and decreases by 2°C per minute, how long will it take to reach 0°C?
25. MATH Connection Create a graph of the data in question 24. After 5 minutes, what is the temperature of the reaction?

SMARTBOOK Go online to follow your personalized learning path to review, practice, and reinforce your understanding.

Lesson 3 • Chemical Reactions and Energy 489

GO ONLINE

INTERACTIVE CONTENT
Explore and Explain: Conservation of Energy in Chemical Reactions

ADDITIONAL RESOURCE
Vocabulary Flashcards: Chemical Reactions and Energy

ADDITIONAL RESOURCE
Lesson Check: Chemical Reactions and Energy

ADDITIONAL RESOURCE
Physical Science SmartBook

Elaborate

Return to the DQB and have students determine what questions they can answer. At this point, they should be able to answer the **Focus Question.**

Evaluate

Formative Assessment Check

Write the following two equations on the board: A + B → C + heat; X + heat → Y + Z Which equation depicts an endothermic reaction? second one Which depicts an exothermic reaction? first one

Remediation Ask students to suppose that they are each holding a test tube that has a chemical change taking place inside. The tube is beginning to feel colder. Is the process in the tube endothermic or exothermic? Endothermic; the system is gaining energy from its surroundings. Which of the equations on the board would represent such a process? X + heat → Y + Z

Check Your Progress

19. Photosynthesis is endergonic because it requires the addition of energy (in the form of sunlight) in order to move forward.
20. Energy is not lost during a chemical reaction; it just changes form. In an exergonic reaction the formation of bonds in the products releases more energy than is required to break the bonds of the reactants.
21. Endergonic reactions require the input of energy to move forward. Endothermic reactions are a type of endergonic reaction; the energy added to move the reaction forward is thermal energy. Other endergonic reactions might require the addition of electricity or light energy.
22. exergonic (because light energy is released)
23. Exothermic; it would release thermal energy to warm people's hands.
24. 13 minutes
25. Check students' graphs. After 5 minutes, temperature is approximately 16°C.

Formative Assessment: Lesson Check

GO ONLINE You might want to assign from the Additional Resources the pre-made Lesson Check based on key concepts and disciplinary core ideas, or you can customize your own using the customization tool.

Lesson 3 • Chemical Reactions and Energy 489

Explore and Explain: The Explore and Explain phase encourages students to get involved and investigate through a related, common experience. Students will carry out an investigation and collect and interpret data as they reveal answers to their questions to build understanding using different types of inquiry activities.

Evaluate: In the Evaluate phase, teachers gauge student progress. A question is provided to assess students knowledge and offer remediation suggestions if additional help is needed.

Hands-On Labs, Real-World Investigations

Investigate questions and solve problems from a variety of angles. Inquiry-driven instruction gives students the practice they need to succeed in developing solutions to whatever challenges they may encounter.

- **Types of Inquiry Activities** in each High School program of *Florida Science* are more than hands-on activities. With *Florida Science*, students will investigate phenomena through several techniques reflective of the way science and engineering are done in the real world.

Hands-On Inquiry

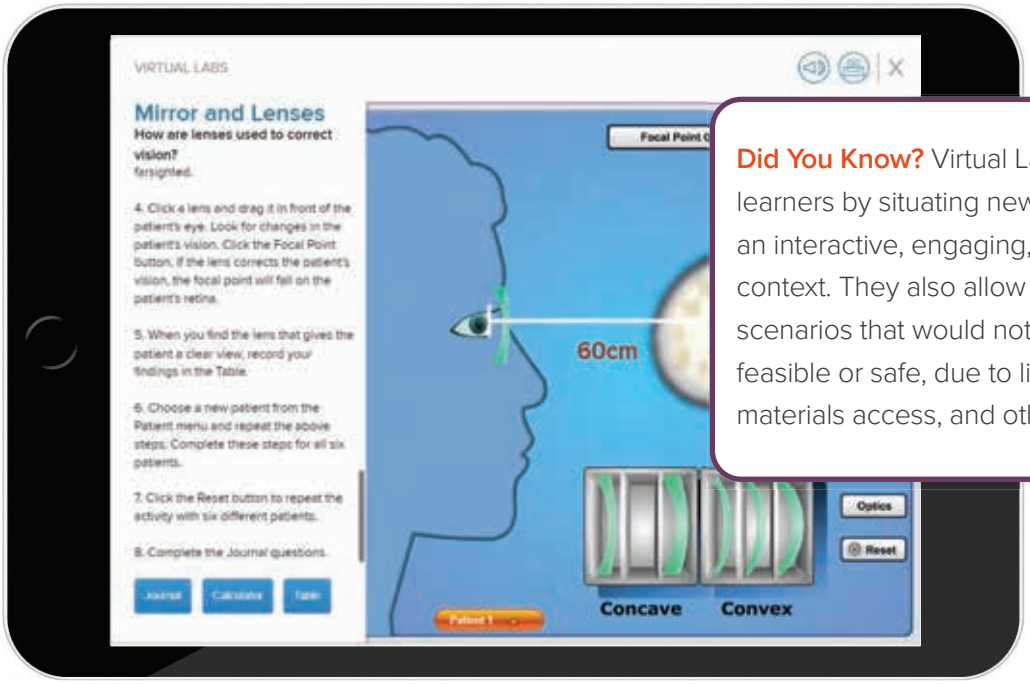
Florida Science is centered around inquiry through which the program provides several opportunities in each module for student exploration.

All inquiry activities in *Florida Science* promote student engagement and allow each student to develop inquiry, science, and engineering skills. Activities range from simple investigations to more complex lab explorations, and cover the full range of the inquiry spectrum.

Investigations offer students the ability to quickly dive into a topic with simple questions in single or group settings. Lab activities provide more complex explorations with hands-on approaches to learning.

The *Florida Science* Inquiry Spectrum

Not all inquiry activities are the same. Depending upon the available time and student readiness, structured inquiry might be perfect, or your class may be ready for open inquiry. The *Florida Science* Inquiry Spectrum provides flexible options to adjust the inquiry level to align with the learning needs of each student



LEARNING SCIENCE!

Did You Know? Virtual Labs support science learners by situating new concepts and skills in an interactive, engaging, and student-centered context. They also allow for experimentation with scenarios that would not otherwise be practically feasible or safe, due to limitations of time scale, materials access, and other factors.

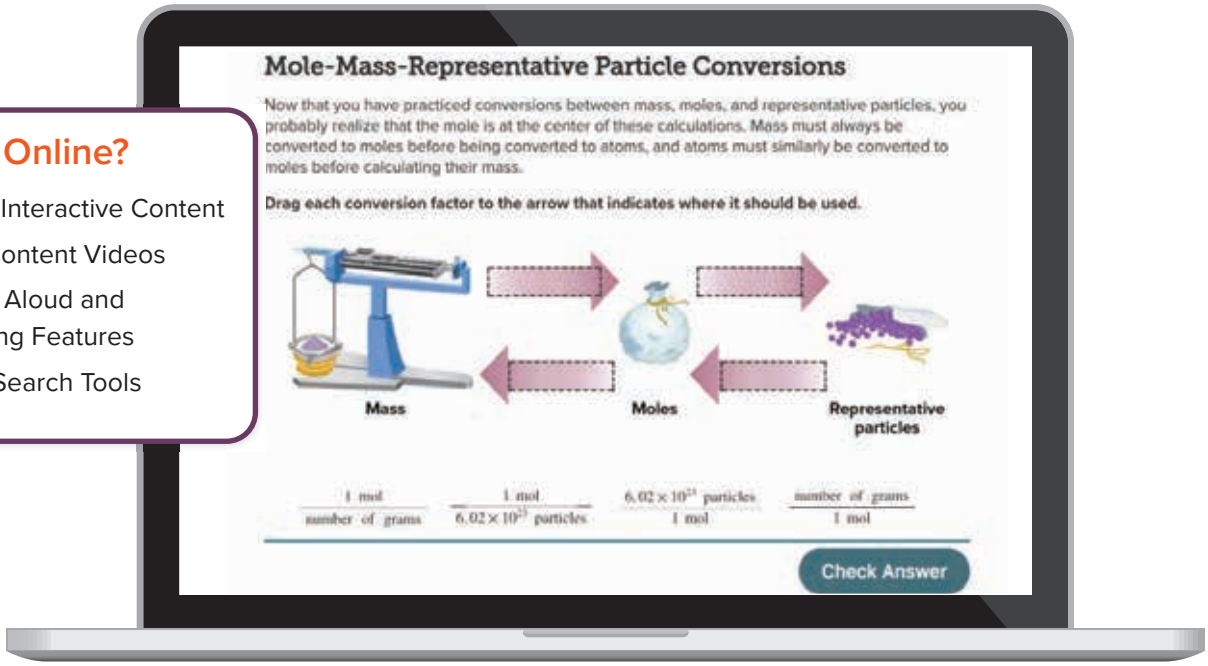
Virtual Labs

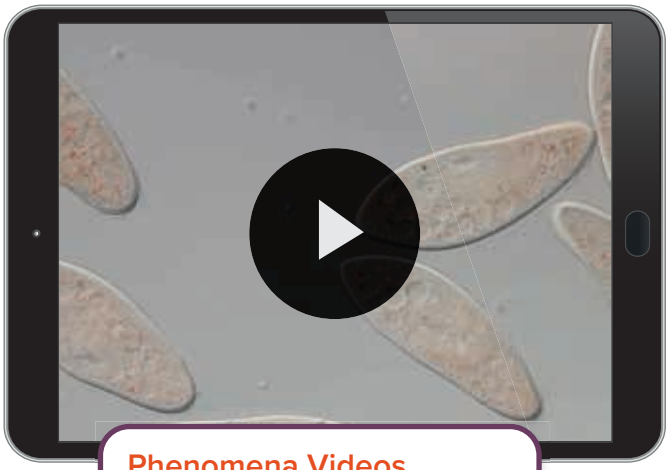
Boundless Science Learning

Transport students beyond the walls of your classroom with cutting-edge digital content, including interactives, simulations, videos, and more. Fun and easy-to-use, these features align with lesson topics to spark scientific curiosity, support discussion, enhance review, and deepen understanding.

Why Go Online?

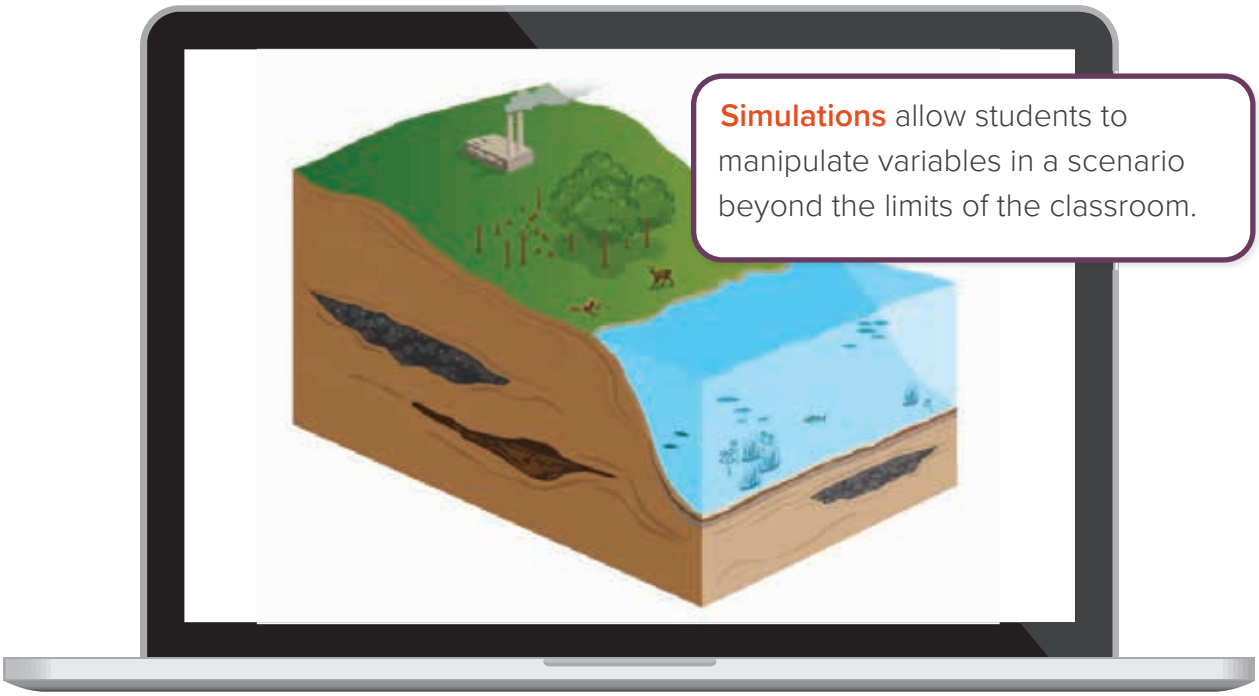
- Engaging Interactive Content
- Science Content Videos
- Text Read Aloud and Highlighting Features
- Dynamic Search Tools



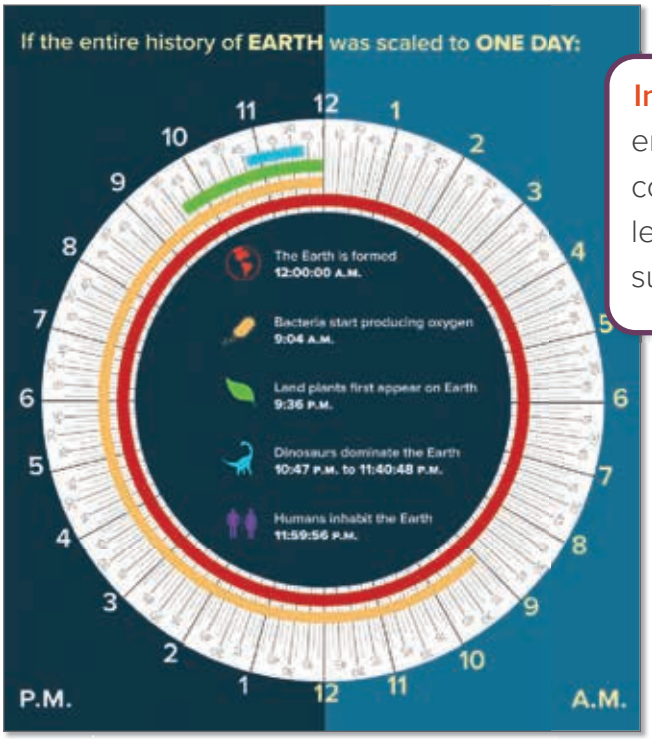


Phenomena Videos showcase ultra-engaging, content-related examples of science in real life.

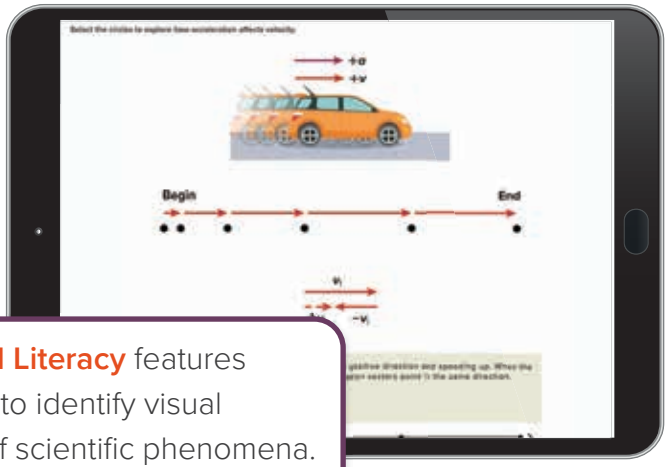
Vocabulary flashcards deliver focused support for key words.



Simulations allow students to manipulate variables in a scenario beyond the limits of the classroom.



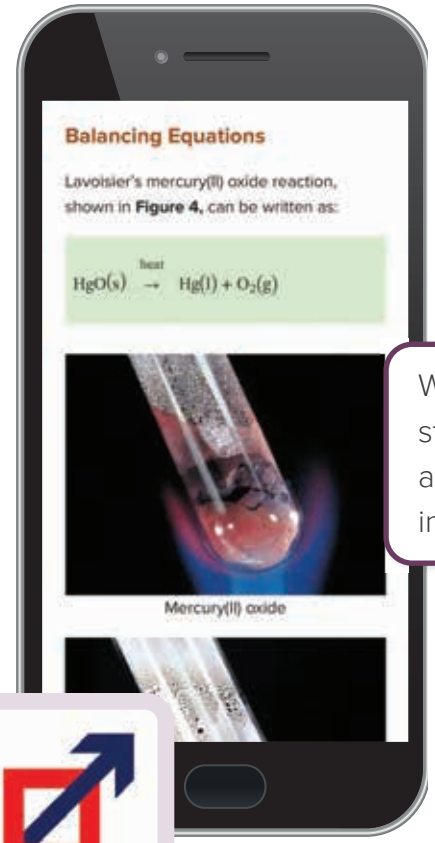
Infographics provide an engaging graphic to foster collaborative and hands-on learning in the world surrounding them.



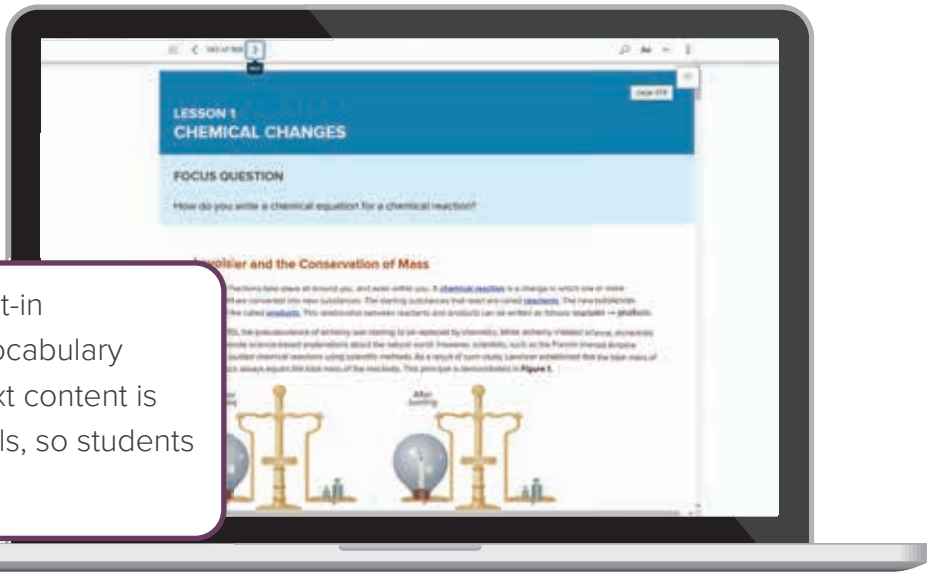
Interactive Visual Literacy features prepare students to identify visual representations of scientific phenomena.

Boundless Science Learning

Kahoot! uses fun, game show-like quizzes to help students review important material in an engaging way.



With the **McGraw Hill K12 Portal App** students can access their content anywhere, any time, on any device, with or without internet access.

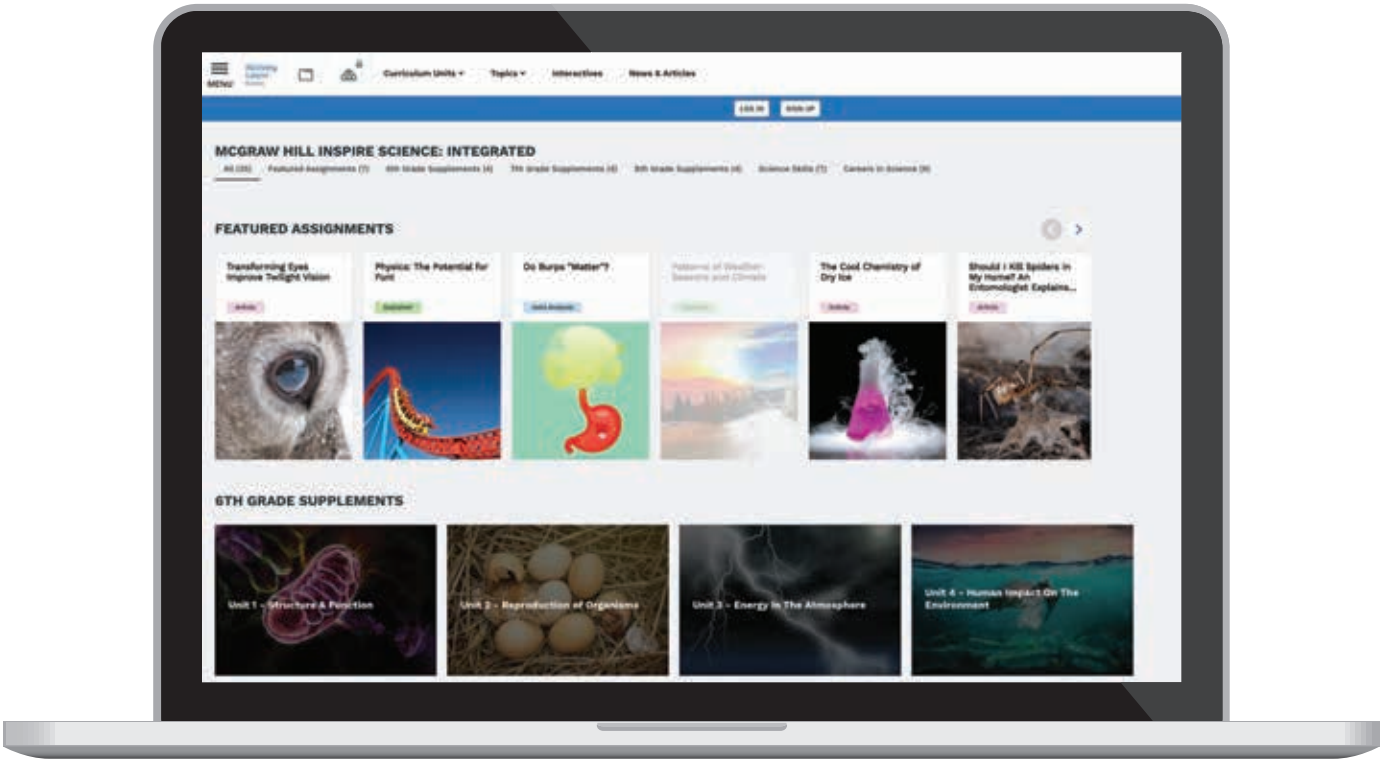


The Student eBook includes built-in comprehension questions and vocabulary definitions at the point of use. Text content is available at multiple reading levels, so students can adjust as needed.

Actively Learn

As educators, we know how important it is to keep students engaged. That's why each *Florida Science* module and lesson is designed to tap into students' natural curiosity about the world around them through the investigation of real-world phenomena. Student engagement is further fueled through an innovative digital experience, and connections to real-world applications.

- **Engaging, relevant, standards-based content** for all learners
- **Science texts, articles, and videos** at each student's level
- **Inquiry-driven science simulations** that bring natural phenomena to life
- **Interactive reading and study aids** that promote active collaboration
- **Rich, cross-curricular connections** to literature and history
- **Powerful tools** that let teachers customize content or upload their own
- **Access to student data** to inform instructional decisions

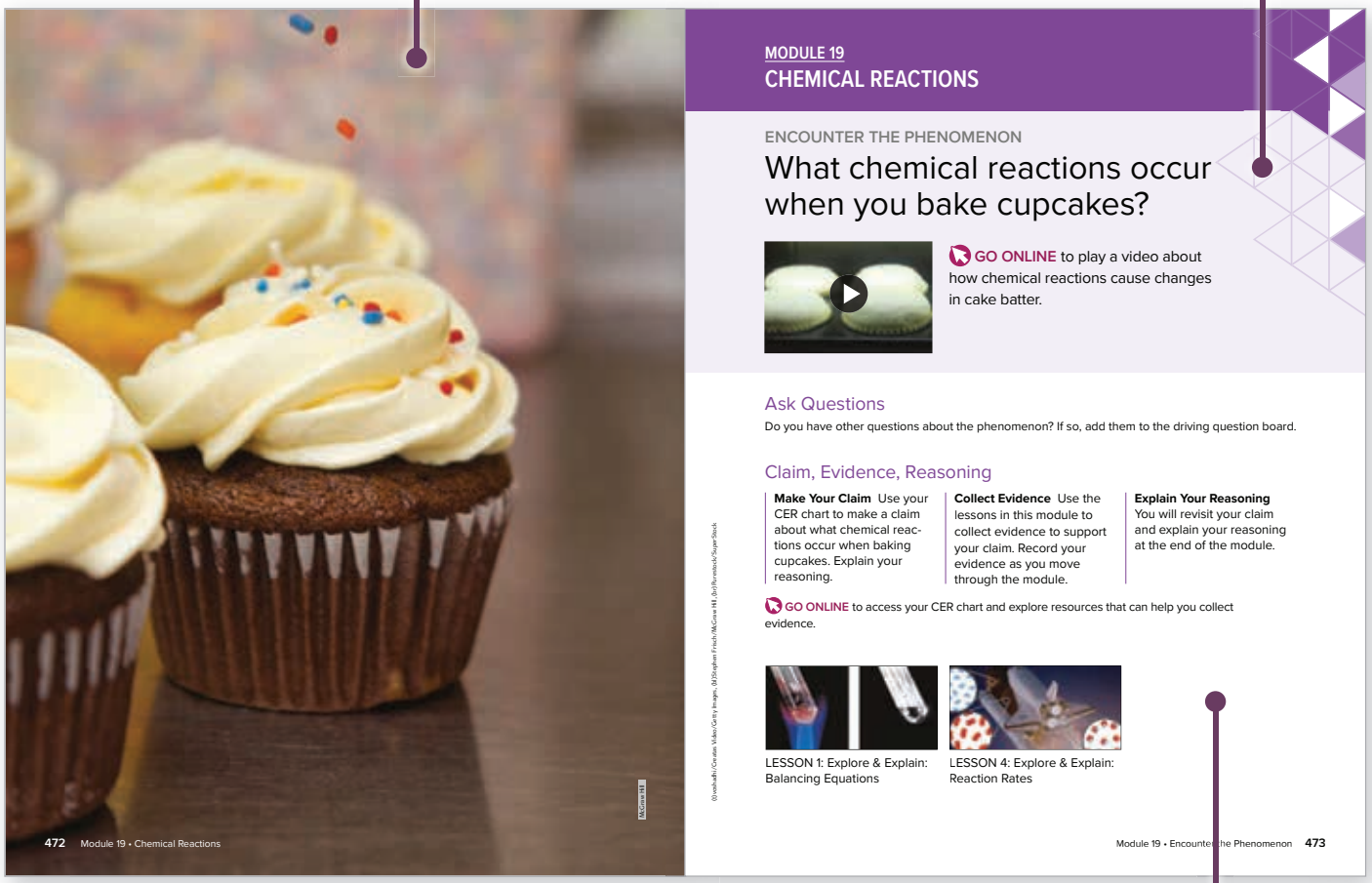


Fuel Innate Curiosity: The Print Student Experience

Grounded in powerful visuals of phenomena, *Florida Science* print materials connect scientific concepts to everyday life and individual experience. Interwoven with hands-on, inquiry-based activities, the program encourages students to launch investigations and explore science right outside their door.

Phenomena images help students see STEM reflected in the world around them.

Encounter the Phenomenon Questions at the start of every module put students into a scientific mindset and introduce an overarching problem for them to consider throughout the lessons.



472 Module 19 • Chemical Reactions

MODULE 19
CHEMICAL REACTIONS

ENCOUNTER THE PHENOMENON

What chemical reactions occur when you bake cupcakes?

GO ONLINE to play a video about how chemical reactions cause changes in cake batter.

Ask Questions

Do you have other questions about the phenomenon? If so, add them to the driving question board.

Claim, Evidence, Reasoning

Make Your Claim Use your CER chart to make a claim about what chemical reactions occur when baking cupcakes. Explain your reasoning.

Collect Evidence Use the lessons in this module to collect evidence to support your claim. Record your evidence as you move through the module.

Explain Your Reasoning You will revisit your claim and explain your reasoning at the end of the module.

GO ONLINE to access your CER chart and explore resources that can help you collect evidence.

LESSON 1: Explore & Explain: Balancing Equations

LESSON 4: Explore & Explain: Reaction Rates

Module 19 • Encounter the Phenomenon 473

Digital learning options allow students to kick off the chapter with engaging videos.

PROGRAM FEATURE!

Reading Essentials are also available in print!

As shown in **Figure 5** on the previous page, sodium has only one electron in its outer energy level, which it loses to combine with chlorine in sodium chloride. Sodium now has an outer energy level that is stable with eight electrons. When the outer electron of sodium is removed, a complete inner energy level is revealed and becomes the outer energy level. Sodium and chlorine are now stable because of the exchange of an electron.

Sharing electrons A hydrogen atom has one electron in its outer energy level. So, it needs one electron to fill its outer energy level. An oxygen atom has six electrons in its outer energy level. It needs two electrons for its outer level to be stable, with eight electrons. Hydrogen and oxygen become stable and form bonds in a different way than do sodium and chlorine. Hydrogen and oxygen share electrons instead of gaining or losing them. **Figure 6** shows how hydrogen and oxygen share electrons to achieve a more stable arrangement and to form water.

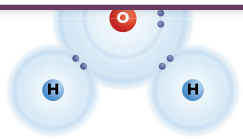


Figure 6 In water, hydrogen contributes one electron and oxygen contributes the other in each hydrogen-oxygen bond. The atoms share the electrons, instead of giving them up, to achieve a complete outer energy level for each atom in the compound.

Chemical bond formation When atoms gain, lose, or share electrons, an attraction forms between the atoms, pulling them together to form a compound. This attraction is called a chemical bond. A **chemical bond** is the force that holds atoms together in a compound.

Check Your Progress

Summary

- A chemical formula describes the number and type of atoms in a compound.
- The elements of group 18, the noble gases, rarely combine with other elements.
- Most atoms need eight electrons to complete their outer energy levels.
- Electron dot diagrams show the electrons in the outer energy level of an atom.
- A chemical bond is the force that holds atoms together in a compound.

Demonstrate Understanding

1. **Explain** why some elements are stable on their own, while others are more stable in compounds.
2. **Compare and contrast** the properties of potassium (K) and iodine (I) with the compound KI.
3. **Identify** what the electron dot diagram tells you about bonding.
4. **Explain** why electric forces are essential to forming compounds.
5. **Describe** why chemical bonding occurs. Give two examples of how bonds can form.

Explain Your Thinking

6. **Interpret** The label on a box of cleanser states that it contains CH_3COOH. What elements are in this compound? How many atoms of each element can be found in a unit of CH_3COOH?
7. **MATH Connection** Given that the molecular mass of magnesium hydroxide ($Mg(OH)_2$) is 58.32 amu and the atomic mass of an atom of oxygen is 15.999 amu, what percentage of this compound is oxygen?

SMARTBOOK® Go online to follow your personalized learning path to review, practice, and reinforce your understanding.

454 Module 18 • Chemical Bonds

Check Your Progress Questions at the end of every lesson allow students to provide evidence of their individual learning progression.

Get It? Questions allow students a chance to reflect on the readings and ensure they internalize new content.

Transfer of electrons

What happens when potassium and iodine atoms come together? A neutral atom of potassium has one electron in its outer energy level. This is not a stable outer energy level. Recall that, for most elements, a stable outer energy level contains eight electrons. When it forms a compound with iodine, potassium loses the one electron from its fourth level. With the fourth level gone, the third level is a complete outer energy level.

Although the complete outer energy level means the atom is now stable, because it has lost an electron, it is no longer neutral. The potassium atom has become an ion. When a potassium atom loses an electron, the atom becomes a positively charged ion because there is one electron fewer in the atom than there are protons in the nucleus. The 1+ charge of the potassium cation is shown as a superscript written after the element's symbol, K^+, to indicate its charge. *Superscript* means "written above."

Get It?

Explain What part of an ion's symbol indicates its charge?

Science Literacy Expertise

A well-regarded reading expert, Dr. Doug Fisher helped create our Reading Essentials to foster reading comprehension.

Dr. Doug Fisher, Ph.D.

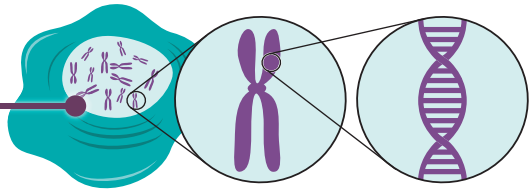
Florida Science empowers all students to succeed in science—no matter their starting point. The new Science Literacy Essentials provide reading and writing support for students in need of a little extra help, including:

- **Content written two Lexile levels lower** than the on-level content
- **Teacher tips** to provide ample student support
- **Print, digital, and Spanish-language versions** of the text

Tips and questions throughout the margins of the lesson provide support for students at point of use.

Reading Essentials include visual supports to enhance learning for all types of students.

Over time, scientists learned that chromosomes contain genetic information that controls traits. We now know that Mendel's "factors" are part of chromosomes. And, each cell in offspring contains chromosomes from both parents. These exist as pairs, one chromosome from each parent.



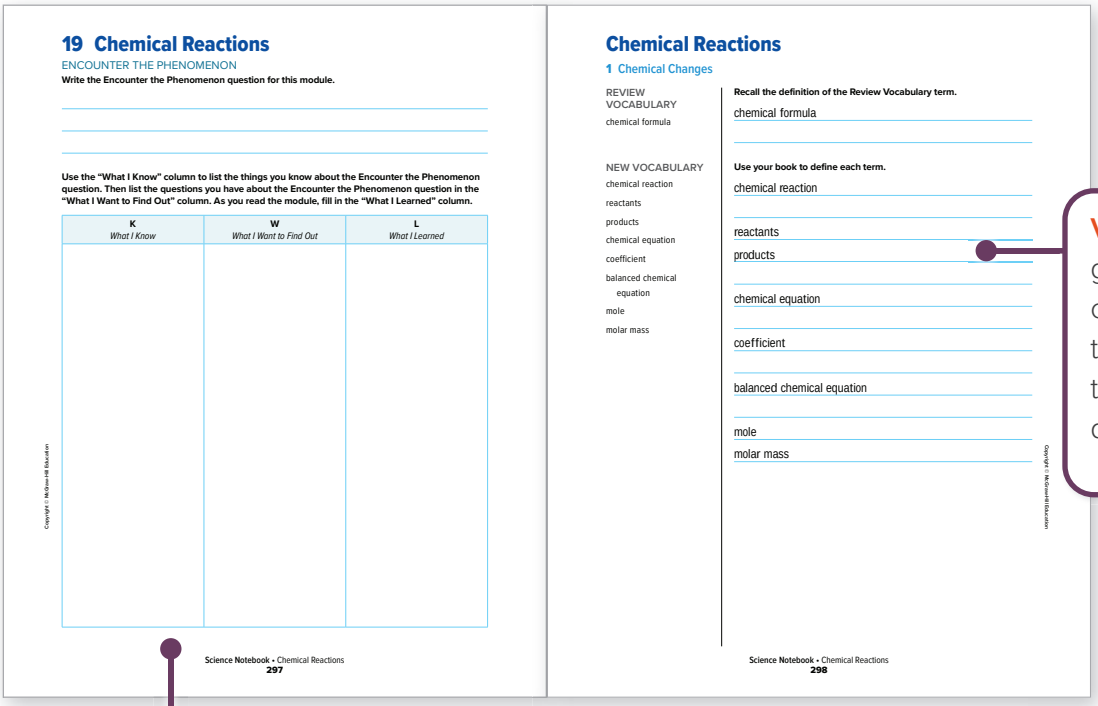
TIP Note that the lines to the chromosome show that this is one of many chromosomes in the nucleus of a cell. The lines to the gene show that a gene is part of a chromosome.

story Connection How did scientists discover DNA? Rosalind anklin and Maurice Wilkins were scientists who used X-rays to study DNA. James Watson visited Franklin and Wilkins. He saw one of the X-rays. He realized that the X-ray gave clues about DNA's structure. Watson worked with scientist Francis Crick to build a model of DNA based on Franklin's and Wilkins' X-rays. The model showed how the smaller molecules of DNA bond together and form a double helix.

Science Literacy Essentials

Science Notetaking Support

Notebooking is vital to success in the science classroom. The Science Notebook is your students' Cornell Notetaking Guide, ensuring they are writing down and keeping track of the important vocabulary, new ideas, and all of the progress along the way!



19 Chemical Reactions

ENCOUNTER THE PHENOMENON

Write the Encounter the Phenomenon question for this module.

Use the "What I Know" column to list the things you know about the Encounter the Phenomenon question. Then list the questions you have about the Encounter the Phenomenon question in the "What I Want to Find Out" column. As you read the module, fill in the "What I Learned" column.

K *What I Know*	W *What I Want to Find Out*	L *What I Learned*

Chemical Reactions

1 Chemical Changes

REVIEW VOCABULARY

chemical formula

Recall the definition of the Review Vocabulary term.

chemical formula

NEW VOCABULARY

chemical reaction
reactants
products
chemical equation
coefficient
balanced chemical equation
mole
molar mass

Use your book to define each term.

chemical reaction

reactants

products

chemical equation

coefficient

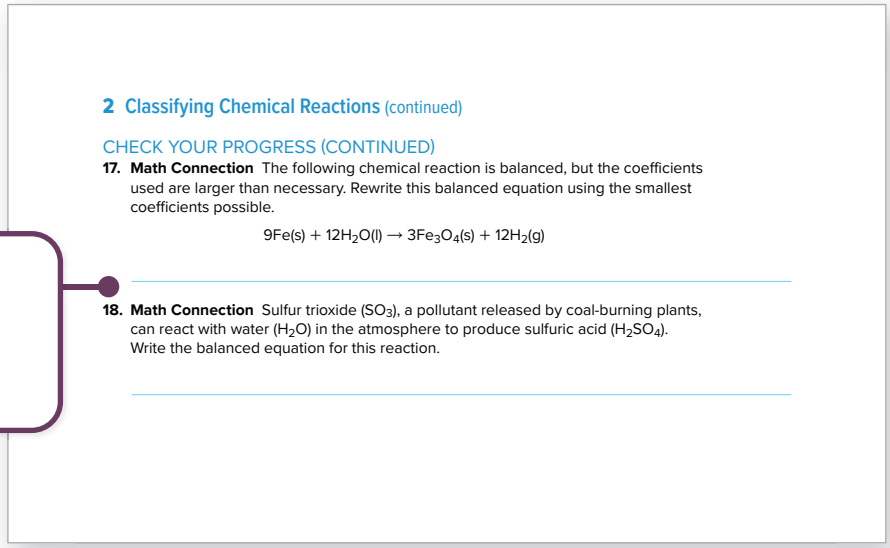
balanced chemical equation

mole

molar mass

Vocabulary support gives students the opportunity to find the new words in the text and write the definitions themselves.

Every module starts out with a **KWL chart** tied to the new module phenomena.



2 Classifying Chemical Reactions (continued)

CHECK YOUR PROGRESS (CONTINUED)

17. Math Connection The following chemical reaction is balanced, but the coefficients used are larger than necessary. Rewrite this balanced equation using the smallest coefficients possible.

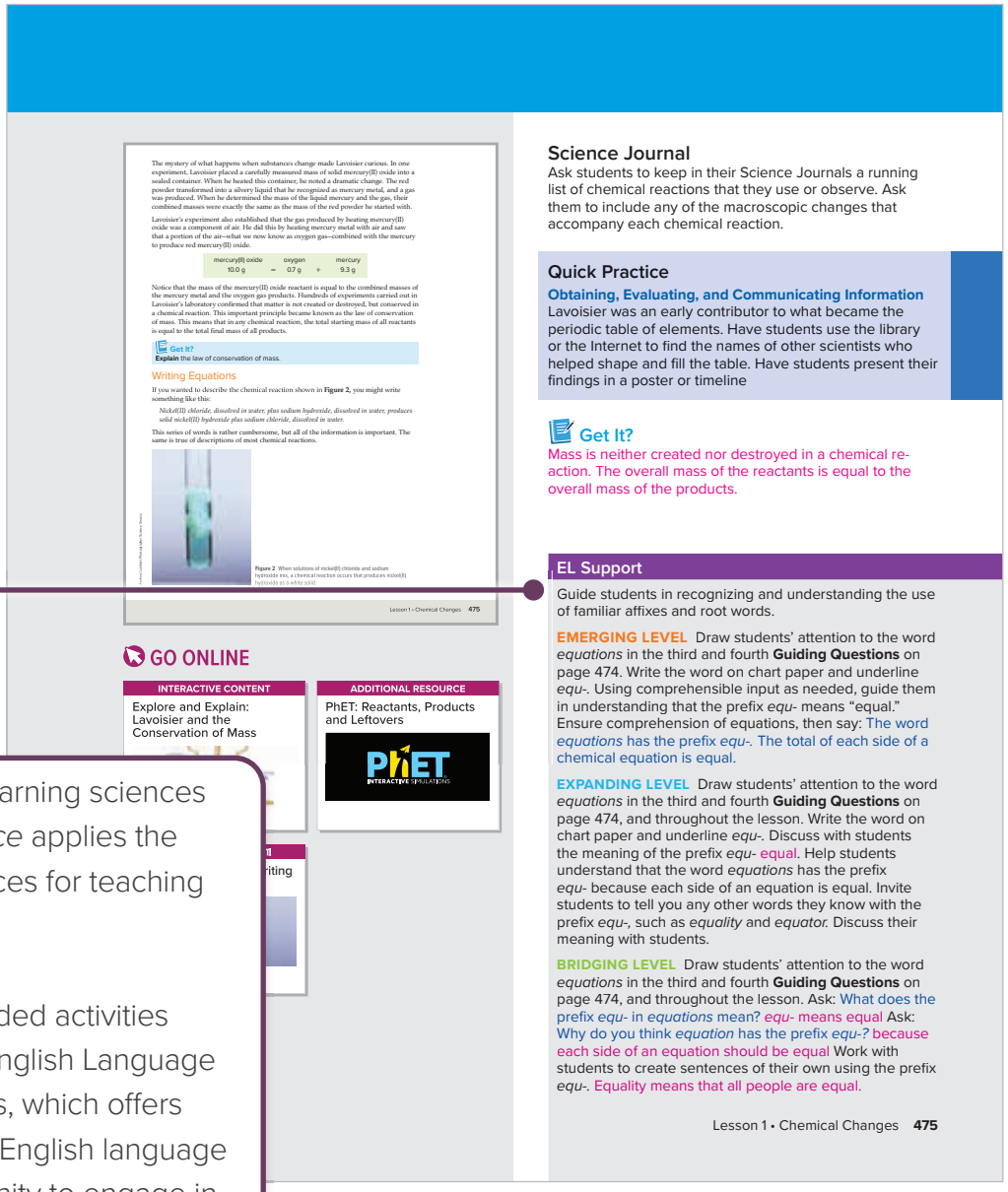
$$9Fe(s) + 12H_2O(l) \rightarrow 3Fe_3O_4(s) + 12H_2(g)$$

18. Math Connection Sulfur trioxide (SO_3), a pollutant released by coal-burning plants, can react with water (H_2O) in the atmosphere to produce sulfuric acid (H_2SO_4). Write the balanced equation for this reaction.

Check Your Progress asks questions reflecting on the new content covered in the lesson.

Foster Multilingual Connections

Every student deserves access to a rich, robust, and challenging science curriculum leveled to their needs and abilities. *Florida Science* applies the best pedagogical practices for teaching emergent bilingual students, complete with authentically translated print and digital texts and an array of diverse scaffolding tools.



The mystery of what happens when substances change made Lavoisier curious. In one experiment, Lavoisier placed a carefully measured mass of solid mercury(II) oxide into a sealed container. When he heated this container, he noted a dramatic change. The red powder transformed into a silvery liquid that he recognized as mercury metal, and a gas was produced. When he determined the mass of the liquid mercury and the gas, their combined masses were exactly the same as the mass of the red powder he started with.

Lavoisier's experiment also established that the gas produced by heating mercury(II) oxide was a component of air. He did this by heating mercury metal with air and saw that a portion of the air—what we now know as oxygen gas—combined with the mercury to produce red mercury(II) oxide.

mercury(II) oxide		oxygen		mercury
10.0 g	–	0.7 g	+	9.3 g

Notice that the mass of the mercury(II) oxide reactant is equal to the combined masses of the mercury metal and the oxygen gas products. Hundreds of experiments carried out in Lavoisier's laboratory confirmed that matter is not created or destroyed, but conserved in a chemical reaction. This important principle became known as the law of conservation of mass. This means that in any chemical reaction, the total starting mass of all reactants is equal to the total final mass of all products.

Get It?
Explain the law of conservation of mass.

Writing Equations

If you wanted to describe the chemical reaction shown in **Figure 2**, you might write something like this:

Nickel(II) chloride, dissolved in water, plus sodium hydroxide, dissolved in water, produces solid nickel(II) hydroxide plus sodium chloride, dissolved in water.

This series of words is rather cumbersome, but all of the information is important. The same is true of descriptions of most chemical reactions.

Figure 2 When solutions of nickel(II) chloride and sodium hydroxide mix, a chemical reaction occurs that produces nickel(II) hydroxide as a white solid.

Lesson 1 • Chemical Changes 475

GO ONLINE

INTERACTIVE CONTENT
Explore and Explain: Lavoisier and the Conservation of Mass

ADDITIONAL RESOURCE
PhET: Reactants, Products and Leftovers

Science Journal
Ask students to keep in their Science Journals a running list of chemical reactions that they use or observe. Ask them to include any of the macroscopic changes that accompany each chemical reaction.

Quick Practice
Obtaining, Evaluating, and Communicating Information
Lavoisier was an early contributor to what became the periodic table of elements. Have students use the library or the Internet to find the names of other scientists who helped shape and fill the table. Have students present their findings in a poster or timeline

Get It?
Mass is neither created nor destroyed in a chemical reaction. The overall mass of the reactants is equal to the overall mass of the products.

EL Support

Guide students in recognizing and understanding the use of familiar affixes and root words.

EMERGING LEVEL Draw students' attention to the word *equations* in the third and fourth **Guiding Questions** on page 474. Write the word on chart paper and underline *equ-*. Using comprehensible input as needed, guide them in understanding that the prefix *equ-* means "equal." Ensure comprehension of equations, then say: The word *equations* has the prefix *equ-*. The total of each side of a chemical equation is equal.

EXPANDING LEVEL Draw students' attention to the word *equations* in the third and fourth **Guiding Questions** on page 474, and throughout the lesson. Write the word on chart paper and underline *equ-*. Discuss with students the meaning of the prefix *equ-* equal. Help students understand that the word *equations* has the prefix *equ-* because each side of an equation is equal. Invite students to tell you any other words they know with the prefix *equ-*, such as *equality* and *equator.* Discuss their meaning with students.

BRIDGING LEVEL Draw students' attention to the word *equations* in the third and fourth **Guiding Questions** on page 474, and throughout the lesson. Ask: What does the prefix *equ-* in *equations* mean? *equ-* means equal Ask: Why do you think *equation* has the prefix *equ-?* because each side of an equation should be equal Work with students to create sentences of their own using the prefix *equ-*. Equality means that all people are equal.

Lesson 1 • Chemical Changes **475**

EL Support Rooted in learning sciences research, *Florida Science* applies the best instructional practices for teaching EL students.

Each lesson has scaffolded activities designed to meet the English Language Development Standards, which offers students at any level of English language proficiency the opportunity to engage in academically challenging science and engineering content. Students will grow content knowledge and will receive support in language acquisition.

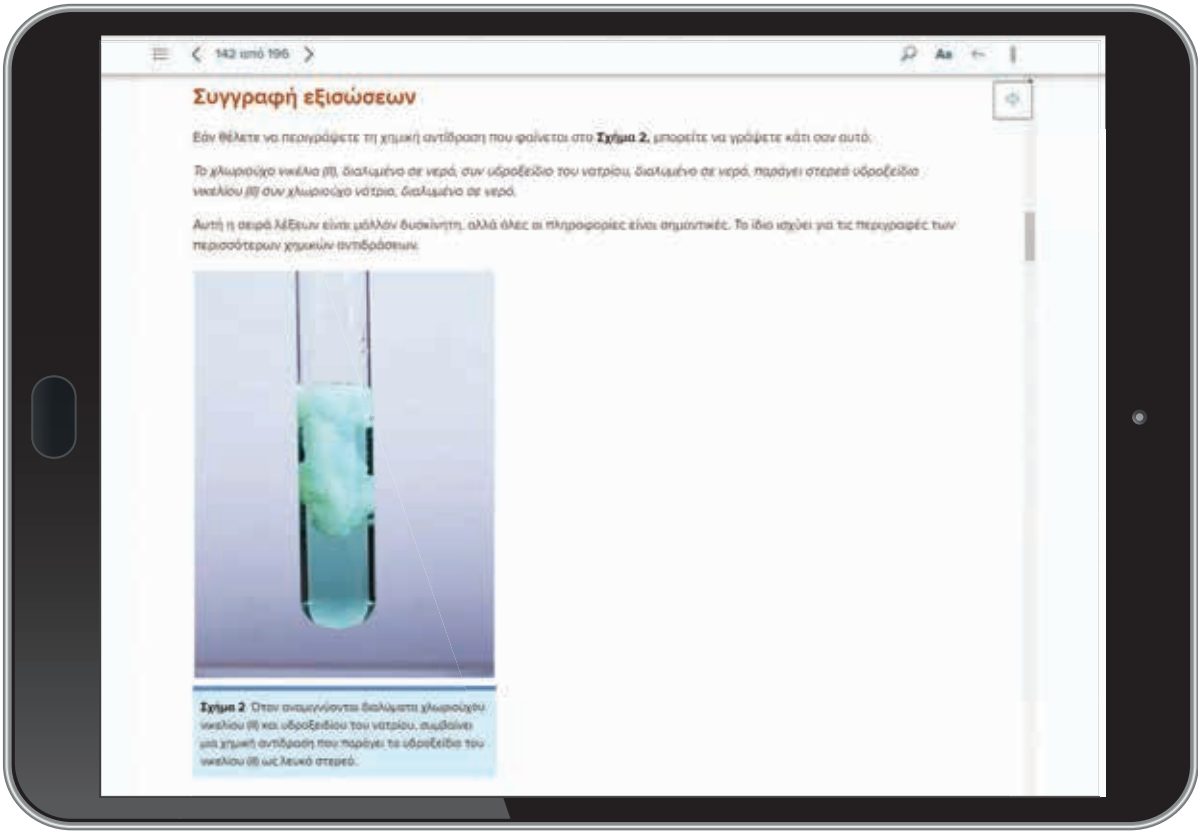
Reading Comprehension and Multilingual Support

Florida Science supports reading comprehension by using a variety of innovative tools and scaffolds:

- Both the core text and Reading Essentials are **available in Spanish** online in a printable format.
- **Google Translate** is available for students where needed.
- The **multilingual glossary** offers key vocabulary definitions in over 10 different languages.

biodiversity	التنوع الأحيائي	ات الحية الموجودة في منطقة معينة.
biogenesis	النشوء الحيوي	الكائنات الحية تتوالد من الكائنات الحية الأخرى فقط.
biological vector	الناقل الحيوي	ران والبعوض والذباب، ناقلٌ للأمراض وتعمل هذه ر الأمراض المعدية.
biomass energy	طاقة الكتلة الحيوية	تج عن إحراق المواد العضوية كالخشب والكحول.
biomass	الكتلة الحيوية	تجددة تؤخذ من النباتات والحيوانات، مثل الخشب ت، والتي يمكن إحراقها بغرض التدفئة.
biomes	المواطن البيئية	شاسعة متشابهة من حيث الظروف المناخية والنظام لتندرة والتايغا والصحاري والغابات الموسمية المعتدلة ة المعتدلة والغابات الاستوائية الممطرة والمراعي.
biosphere	الغلاف الحيوي	عم الحياة على الأرض ويشمل ذلك الجزء العلوي من والغلاف الجوي وكل المناطق التي بها مياه على سطح
biotic	الحيوية	ية أو التي كانت حية يومًا ما.
black hole	الثقب الأسود	تطور نجم هائل الحجم حيث تنفجر كتلة المركز مخلفة الجاذبية بشكل كبير بحيث لا يمكن حتى للضوء الإفلات
bladder	المثانة	ن يحمل البول بداخله إلى أن يخرجه الجسم عبر مجرى
boiling point	نقطة الغليان	تي يكون عندها ضغط بخار السائل مساويًا للضغط على سطح السائل.
brain stem	جذع الدماغ	حبل الشوكي، ويتألف من الدماغ الأوسط والجسر ونخاع
breaker	الموجة المنكسرة	ا، وتتكون في المياه الضحلة ثم تنكسر على الشاطئ.
bronchi	الشعيبات	بب القصيرة تنبعان من الجزء المنخفض من القصبة ن الهواء إلى الرئتين.
budding	التبرعم	التوالد اللاجنسي حيث ينمو كائن حيّ على جسم والده.
budding	البرعمة	التوالد اللاجنسي حيث يولد كائن حيّ من كائن حيّ آخر الصفات الوراثية للكائن الأصلي.
buffer	المحلول الداري	على أيونات تتفاعل مع الحمضيات أو القواعد ويقلل من

Multilingual Glossary



Google Translate (Greek)

Assess and Address Learning Needs

Chart the path to FSAS mastery with a suite of easy-access tools aimed at gauging student understanding, identifying learning gaps, and targeting misconceptions throughout each lesson and chapter. Formal exam practice, personalized and adaptive study tools, and a curated selection of learning assets ensure Florida state science assessment success and deep comprehension for all students.

Formative Assessment Tools

Formative assessment facilitates student reflection on their thinking (meta-cognition) and allows teachers to dynamically differentiate instruction. You can find the following formative assessments, embedded at many points throughout each module and lesson, in each of *Florida Science*'s High School programs.

FEATURE	INSTRUCTIONAL PURPOSE
Science Probes	Found at the beginning of each unit in the online resources, Science Probes reveal student preconceptions to guide instruction.
Claim, Evidence, Reasoning	With the CER Framework (Claim, Evidence, Reasoning) students will make claims and document their reasoning during the EXPLORE phase and add evidence and adjust their claims as needed later in the lesson.
Applying Practices	Within each lesson you will find Appling Practices Projects to help you apply the Science and Engineering Practices and build understanding of the Disciplinary Core Ideas so that you can complete each STEM Unit Project.

LEARNING SCIENCE!

Did You Know? The CER framework provides a systematic and effective means of developing students' argumentation skills, logical thinking, and explanations for what they observe.

Summative Assessment Tools

Summative assessment tools at the module and lesson level help ensure lasting learning and alignment of student skills to the Performance Expectations. Following are the summative assessment tools found in each of the *Florida Science* programs found online and in the print Student Editions.

FEATURE	INSTRUCTIONAL PURPOSE
Module Pretest	The Module Pretests, found at the beginning of each module, assess prerequisite knowledge of Disciplinary Core Ideas from prior grades to evaluate student readiness for the module.
Lesson Check	Found in every lesson online, Lesson Checks determine how students are building a progression of learning toward the performance expectations.
Module Test	Found at the end of each module online, Module Tests evaluate student proficiency against the performance of the module with multiple choice, extended response, constructed response, and performance-task items.
STEM Unit Project	With each STEM Module Project, found at the end of each module, students will complete performance-based rubrics and answer summative questions to demonstrate how they've applied their knowledge and understanding of the performance expectations to their project.
Module Vocabulary Practice	Through online interactives, students practice and check their understanding of science language. Immediate feedback from the system is provided!

Customized Professional Development

To help school districts across Florida meet new educational standards, *Florida Science* comes with an evolving library of relevant, self-paced, professional learning videos and modules. From implementation through instructional progression and mastery, these resources are available 24/7 at your fingertips.

Program Implementation Support

Implementation support provides everything you need to know to get up to speed on the first day of school.

- **The Quick Start eLearning Module** explains program basics to help get you started.
- **Plan, Teach, and Assess eLearning Modules** provide deep-dives into the program's instructional model and resources.
- **Digital Platform Support** provides step-by-step instructions for digital tools to help you feel confident planning, teaching, and assessing in the digital experience.

Ongoing Pedagogy Support

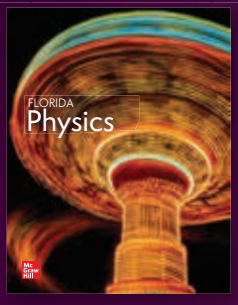
With *Florida Science*, you will find a wide range of resources on key instructional and pedagogical topics, including videos from our program authors and consultants.

- **STEM Classroom Videos** model lessons from real classrooms.
- **Science Preconceptions Videos** review common preconceptions and strategies to overcome them.
- **Instructional Coaching Videos** discuss best practice strategies and the "why" behind the success.
- **Science Pedagogy Micro-Courses** are designed for your professional learning community with facilitation guides for both self-guided or small-group courses.

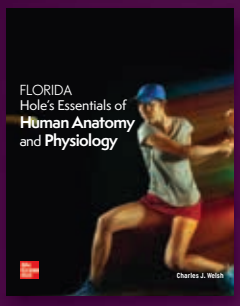
FLORIDA Science

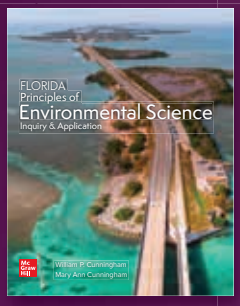
UNLIMITED POTENTIAL

GRADES 9-12



ELECTIVES





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