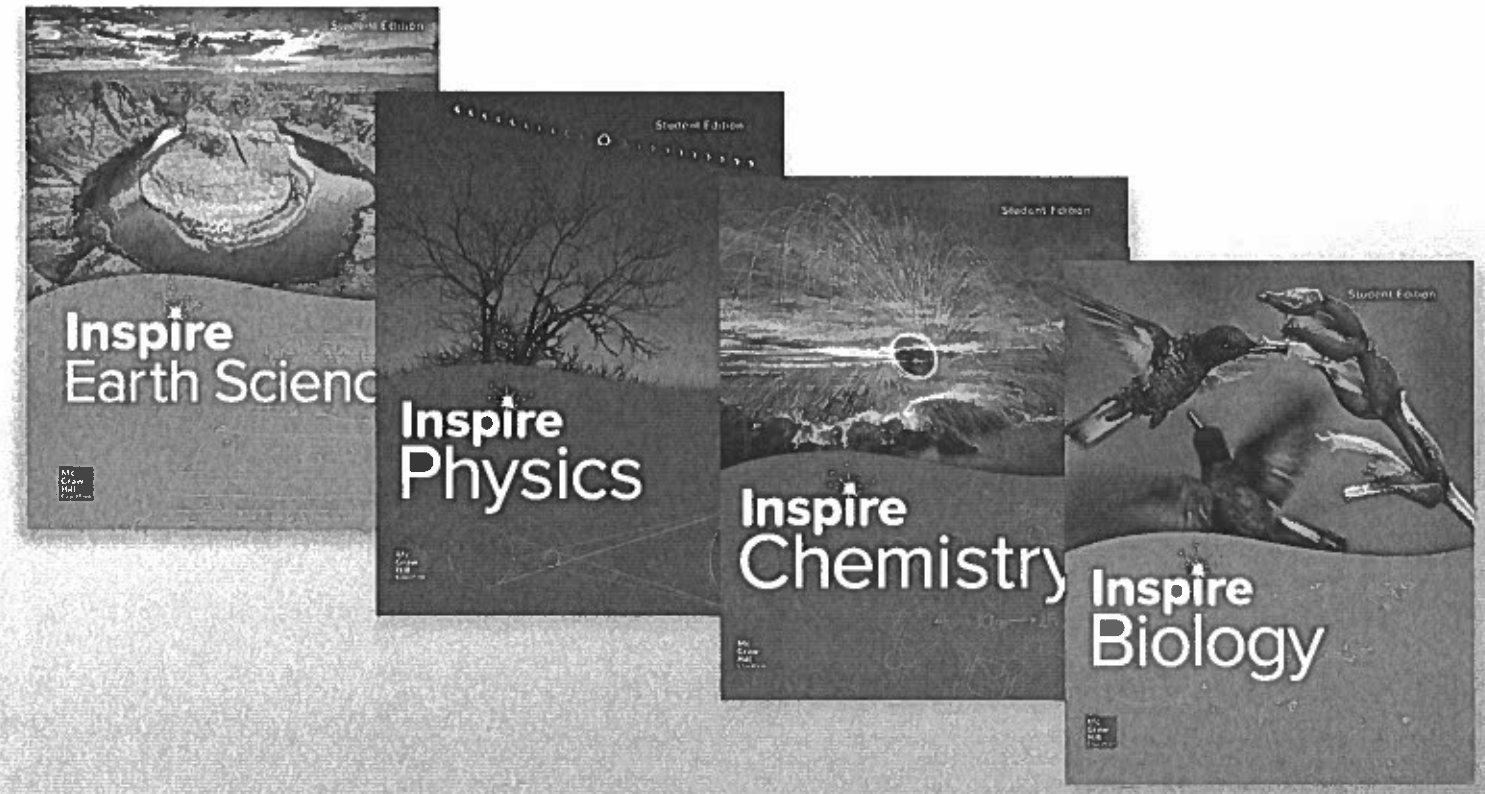
High School Series

Program Guide

Program Design
Unit, Module, and Lesson Structure
Digital Experience

Inspire Science

Explore Our Phenomenal World



INSPIRE CURIOSITY • INSPIRE INVESTIGATION • INSPIRE INNOVATION

Mc Graw Hill Education

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As students explore the covers of their Student Edition's, their curiosity begins as they study the main image. The rich phenomena image encourages students to start asking questions.

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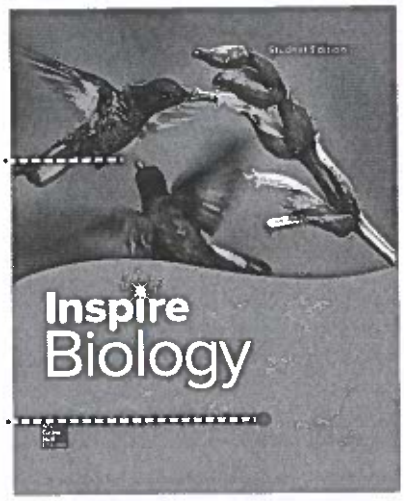
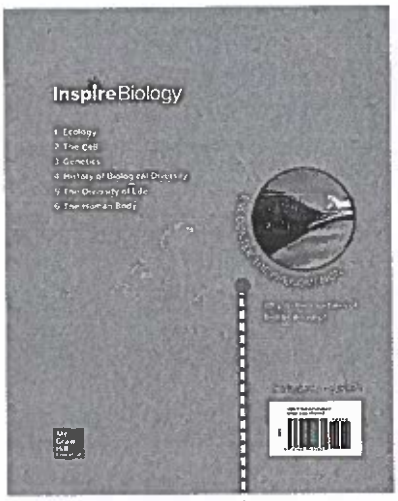
INSPIRE BIOLOGY





Each back cover supports the illustration that students will encounter on each cover of Inspire High School Science.

inspire-science.com/6-12

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Columbus, OH 43240

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QVS

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STEM

Our mission is to provide educational resources that enable students to become the problem solvers of the 21st century and inspire them to explore careers within Science, Technology, Engineering, and Mathematics (STEM) related fields.

Table of Contents

Inspire Science

Explore Our Phenomenal World

Use this Program Guide to learn about the overall program philosophy and the design, the module and lesson structure, and digital experience that align *Inspire Science* High School series 100% to Next Generation Science Standards (NGSS).

Learning Science

Look for this icon to see the some of the key areas where learning science has influenced the development of Inspire High School Science to optimize learning outcomes.

Learning Science Research Council

At McGraw-Hill Education, we believe that by applying what we know about learning science, we can create powerful learning experiences. We believe our contribution to creating a brighter future lies within our deep understanding of how learning happens and how the mind develops. To that end, the McGraw-Hill Education Learning Science Research Council works closely with highly-regarded scholars from the United States and abroad to guide our own use of learning science, as well as further the research and discussion of learning science across the education and technology communities at large.

To learn more, go to mheducation.com/learning-science.

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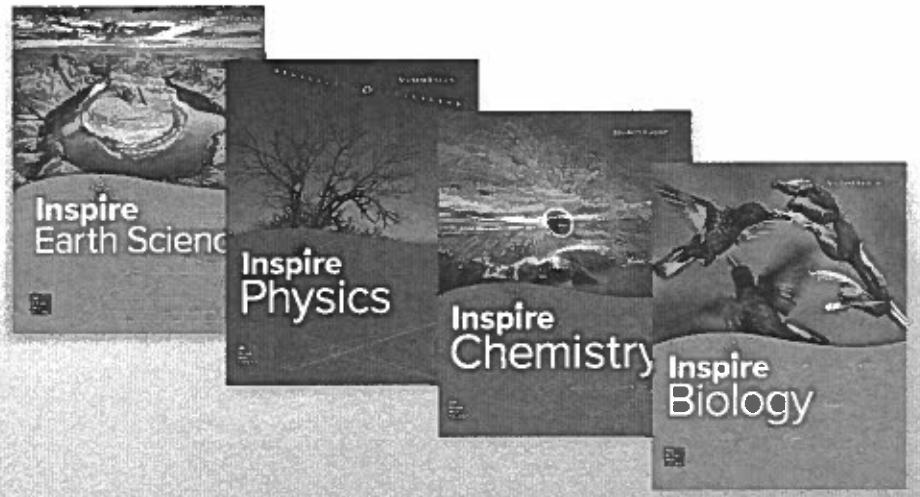

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Mc Graw Hill Education

Inspire Science

Biology • Chemistry • Physics

Explore Our Phenomenal World

Learning begins with curiosity. McGraw-Hill Education's *Inspire Science* High School series provides an in-depth, collaborative, and project-based learning experience designed to help you spark students' interest, and empower them to ask more questions and think more critically. Through inquiry-based, hands-on investigations of real-world phenomena, your students will be able to construct explanations for scientific phenomena or design solutions for real-world problems.

Are you ready to inspire the next generation of innovators?

Inspire Curiosity

Spark critical thinking.

Inspire Investigation

Spark inquiry-driven, hands-on exploration.

Inspire Innovation

Spark creative solutions to real-world challenges.

Go Online

Go to inspire-science.com/6-12 for more information

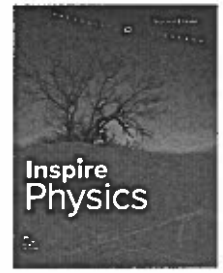
Learning Resources

Inspire Science High School series combines online and print resources to support student inquiry into real-world phenomena. Online projects and investigations give students options to plan their inquiry, collect evidence, and develop their reasoning. The Student Edition, as well as the digital Interactive Content and Additional Resources, serve as research tools to add context and background knowledge. Full support for classroom success is provided in the Teacher's Edition and online.

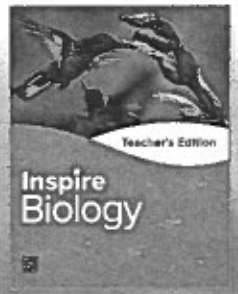
INSPIRE BIOLOGY
STUDENT EDITION

INSPIRE CHEMISTRY
STUDENT EDITION

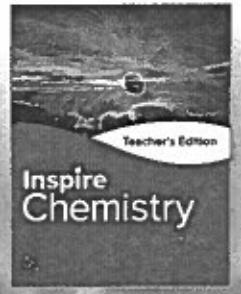
INSPIRE PHYSICS
STUDENT EDITION



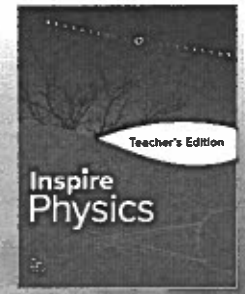
INSPIRE BIOLOGY
TEACHER'S EDITION



INSPIRE CHEMISTRY
TEACHER'S EDITION



INSPIRE PHYSICS
TEACHER'S EDITION

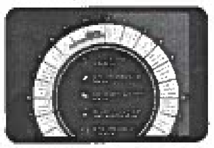


Digital Student Resources

Why Go Online?

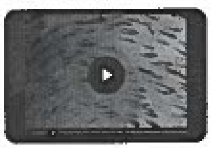
- Engaging Interactive Content for Student's and Teacher's.
- Science Content Videos
- Text Read Aloud and Highlighting Features
- Dynamic Search Tools

Info Graphic

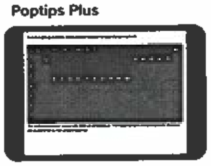


Layer Reveal

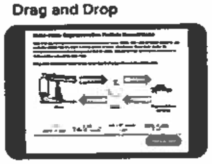
Phenomena Videos



Poptips Plus

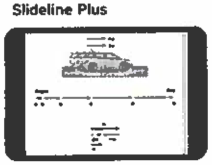


Drag and Drop



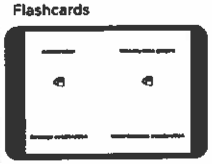
Swypeline

Slideline Plus

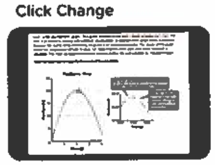


Step by Step

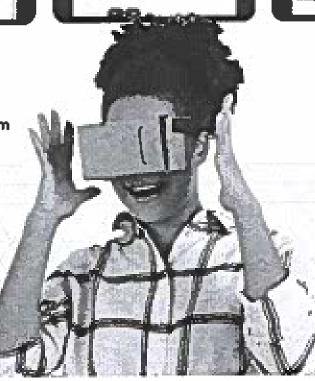
Flashcards



Click Change



Beyond the Classroom

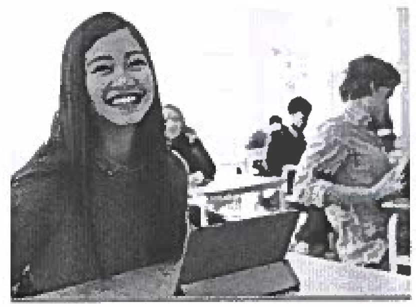


See the Digital Experience section of this guide to learn more about these engaging interactives.

Scope and Sequence

Inspire Science High School series is intentionally designed to support students in the three dimensions of the NGSS—Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts. Learning progressions are specifically designed to build on previously-acquired knowledge and skills. STEM Unit projects focus on real-world phenomena and engage students in science investigations and engineering solutions designed to meet Performance Expectations. The modules within each unit bundle additional investigations and projects that support acquisition of the knowledge and skills to meet additional performance expectations and prepare for the unit project.

The *Inspire Science* High School series also supports the high school three-course model by providing Earth science content and projects online that can be seamlessly integrated to meet the performance expectations from the Living Earth, Chemistry in the Earth System, and Physics in the Universe courses.



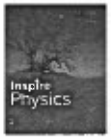
Inspire Biology

MODULE	The Study Of Life
UNIT 1	ECOLOGY
MODULE	Principles Of Ecology
MODULE	Communities, Biomes, And Ecosystems
MODULE	Population Ecology
MODULE	Biodiversity And Conservation
UNIT 2	THE CELL
MODULE	Chemistry In Biology
MODULE	Cellular Structure And Function
MODULE	Cellular Energy
MODULE	Cellular Reproduction And Sexual Reproduction
UNIT 3	GENETICS
MODULE	Introduction To Genetics And Patterns Of Inheritance
MODULE	Molecular Genetics
MODULE	Biotechnology
UNIT 4	HISTORY OF BIOLOGICAL DIVERSITY
MODULE	The History of Life
MODULE	Evolution
MODULE	Primate Evolution
MODULE	Organizing Life's Diversity
UNIT 5	THE DIVERSITY OF LIFE
MODULE	Bacteria And Viruses
MODULE	Protists And Fungi
MODULE	Introduction To Plants
MODULE	Introduction To Animals
MODULE	Animal Diversity And Behavior
UNIT 6	THE HUMAN BODY
MODULE	Integumentary, Skeletal, And Muscular Systems
MODULE	Nervous System
MODULE	Circulatory, Respiratory, And Excretory Systems
MODULE	Digestive And Endocrine Systems
MODULE	Human Reproduction And Development
MODULE	The Immune System

Inspire Chemistry

- MODULE The Central Science
- **UNIT 1 STRUCTURE AND PROPERTIES OF MATTER**
- MODULE Matter—Properties And Changes
- MODULE The Structure Of The Atom
- MODULE Electrons In Atoms
- MODULE The Periodic Table And Periodic Law
- **UNIT 2 CHEMICAL BONDING AND REACTIONS**
- MODULE Ionic Compounds And Metals
- MODULE Covalent Bonding
- MODULE Chemical Reactions
- MODULE The Mole
- MODULE Stoichiometry
- **UNIT 3 MATTER, ENERGY, AND EQUILIBRIUM**
- MODULE States Of Matter
- MODULE Gases
- MODULE Mixtures And Solutions
- MODULE Energy And Chemical Change
- MODULE Reaction Rates
- MODULE Chemical Equilibrium
- MODULE Acids And Bases
- **UNIT 4 ORGANIC AND NUCLEAR CHEMISTRY**
- MODULE Hydrocarbons
- MODULE Substituted Hydrocarbons And Their Reaction
- MODULE The Chemistry Of Life
- MODULE Nuclear Chemistry

Inspire Physics



- MODULE A Physics Toolkit
- **UNIT 1 MECHANICS IN ONE DIMENSION**
- MODULE Representing Motion
- MODULE Accelerated Motion
- MODULE Forces In One Dimension
- **UNIT 2 MECHANICS IN TWO DIMENSIONS**
- MODULE Displacement And Force In Two Dimensions
- MODULE Motion In Two Dimensions
- MODULE Gravitation
- MODULE Rotational Motion
- **UNIT 3 MOMENTUM AND ENERGY**
- MODULE Momentum And Its Conservation
- MODULE Energy And Its Conservation
- MODULE Thermal Energy
- MODULE States Of Matter
- **UNIT 4 WAVES AND LIGHT**
- MODULE Vibrations And Waves
- MODULE Sound
- MODULE Fundamentals Of Light
- MODULE Reflection And Refraction
- MODULE Interference And Diffraction
- **UNIT 5 ELECTRICITY AND MAGNETISM**
- MODULE Electrostatics
- MODULE Electric Current And Circuits
- MODULE Magnetic Fields
- MODULE Electromagnetism
- **UNIT 6 SUBATOMIC PHYSICS**
- MODULE Quantum Theory And The Atom
- MODULE Solid State Electronics
- MODULE Nuclear And Particle Physics

Key Shifts for NGSS Success

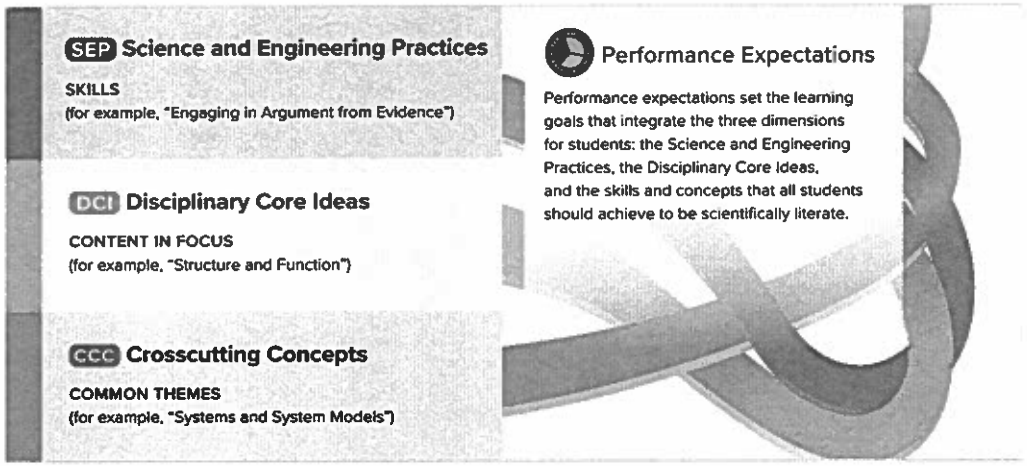
The NGSS Standards are designed to help you prepare students for college and career readiness through a more innovative approach to K-12 science education. This new approach requires a few shifts in science instruction and learning, and *Inspire Science* High School series was designed to support you through each one.

Look for this symbol throughout this guide to learn more about these *Key Shifts for CA NGSS Success*:

- Three-Dimensional Learning
- Phenomena-Driven, Inquiry-Based, Hands-On Learning
- Evaluating Performance Over Testing Knowledge
- Integrated Engineering
- Depth Over Breadth
- Progressive Learning

Three-Dimensional Learning

The three-dimensional learning framework of *Inspire Science* High School series delivers on the application-oriented approach needed to prepare your students for any challenge. Students achieve proficiency with the Performance Expectations by working with the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts in tandem to make sense of phenomena and design solutions to real-world problems.



Unit and Module At-A-Glance

Phenomena-Driven, Inquiry-Based, Hands-On Learning

The philosophy of Phenomena-Driven and Hands-On Learning shown throughout *Inspire Science* High School series helps students build long-lasting knowledge and skills by experiencing science and engineering through real-world application.

Integrated Engineering

Engineering Design is a key shift that is dominant in the *Inspire Science's* High School series. This shift is shown seamlessly throughout the programs in engineering activities and content within the student edition and in teacher support.

Progressive Learning

The *Inspire Science* series is built on the Next Generation Science Standards for to ensure concepts deepen students conceptual understanding year after year. These progressions serve as a key building block for *Inspire Science* High School series, allowing students to learn more about a given topic each year for an in-depth understanding by the end of Grade 12.

Evaluating Performance Over Testing Knowledge

The formative and summative assessments in the *Inspire Science* High School series focus on helping students achieve a deep level of conceptual understanding through project-based learning with performance-based evaluations and rubrics.

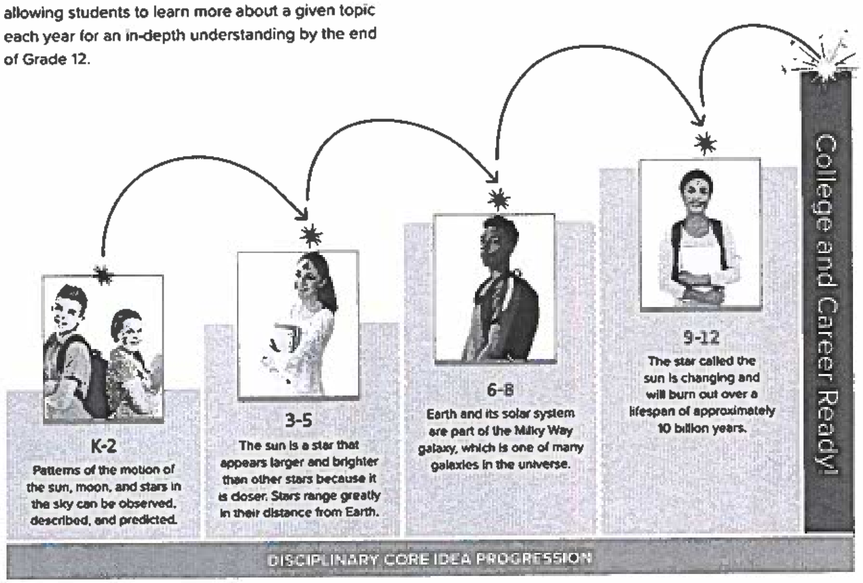
Depth Over Breadth

Inspire Science High School series provides investigations and projects that support in-depth inquiry backed by print and digital resources that support understanding of a full array of concepts.

Did You Know? Learning Science

Central to the research-based NGSS are three distinct and interrelated dimensions Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas across four domains of scientific knowledge.

Krajcik, 2015, NGSS, National Research Council, 2012



The *Inspire Science* High School series provides two pathways for learning, teacher-facilitated and student-led. Each pathway provides teachers and students flexibility dependent on the preferred method of learning, day, or topic.

Teacher-Facilitated Pathway

Use the Teacher Presentation to support classroom instruction and spark discourse. Obtain data to inform your instruction by assigning the Interactive Content, Additional Resources, and Assessment.

Student-Led Pathway

Students can use the online Interactive Content, along with the Student Edition, Science Notebook, and printable projects and labs, to collect evidence to support their claims and demonstrate 3D thinking.

Each *Inspire Science's* High School series unit phenomenon sets the stage for the STEM Unit Project. Each module within the unit supports the STEM Unit Project with phenomena-driven 5E lessons to support a variety of learning pathways.

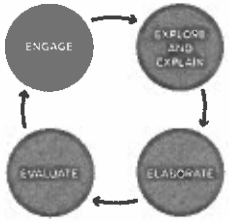
UNIT OPENER

Encounter the Phenomenon
STEM Unit Project Launch
Formative Assessment Science Probe

MODULE OPENER

Encounter the Phenomenon
CER Claim, Evidence, Reasoning

LESSON



ENGAGE:
Encounter the Phenomenon
Phenomenon Question

EXPLORE/EXPLAIN:
Virtual Labs
PhET Simulations
Labs
Applying Practices
Supporting Resources

ELABORATE:
Environmental Connection
STEM Career Connections

EVALUATE:
Lesson Review
Three-Dimensional Assessment

MODULE CLOSE

Revisit the Phenomenon
Three-Dimensional Assessment
CER Claim, Evidence, Reasoning
Labs/Projects
Revisit STEM Unit Project
Module Test
Vocabulary Review

UNIT CLOSE

Go Online
Complete STEM Unit Project

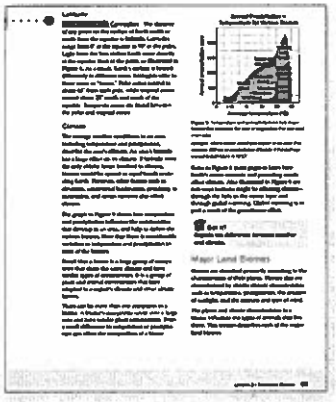
Inspire Science's High School series integrates cross-curricular connections to the Common Core State Standards for ELA/Literacy and Mathematics in alignment with the NGSS and Science Framework.

Content Integration

Other connections, such as those listed below, are found throughout each lesson of the *Inspire Science* High School series. These connections are found across disciplines as students approach a single phenomena from different perspectives.

CHEMISTRY Connection Refer back to the energy and biomass pyramids in **Figure 16.** At each link upward in a food web, only a fraction of the matter and energy consumed is transferred to produce growth and release.

INSPIRE BIOLOGY, UNIT 1, MODULE 1, LESSON 3



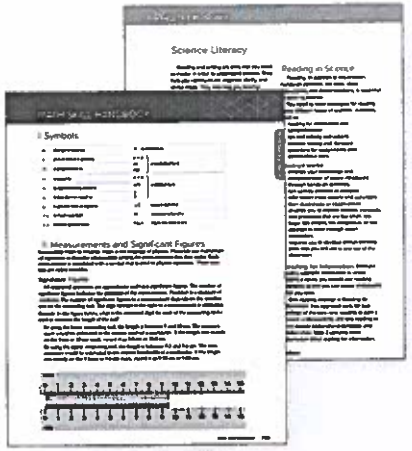
EARTH SCIENCE Connection The distance of any point on the surface of Earth north or south from the equator is **latitude.** Latitudes range from 0° at the equator to 90° at the poles. Light from the Sun strikes Earth more directly at the equator than at the poles, as illustrated in **Figure 4.** As a result, Earth's surface is heated differently in different areas. Ecologists refer to these areas as "zones." Polar zones extend to about 66° from each pole, while tropical zones extend about 23° north and south of the equator. Temperate zones are found between the polar and tropical zones.

INSPIRE BIOLOGY, UNIT 1, MODULE 1, LESSON 2

Integrated Engineering

Inspire Science's High School series supports teachers and students with the integration of engineering into the science curriculum. For broad support, teachers and students can access the Science and Engineering Handbook, which provides simple, approachable descriptions of science and engineering practices. Students can also practice these skills as they read through the handbook.

Go Online to find the Science and Engineering Handbook to learn more about each of the eight SEPs.



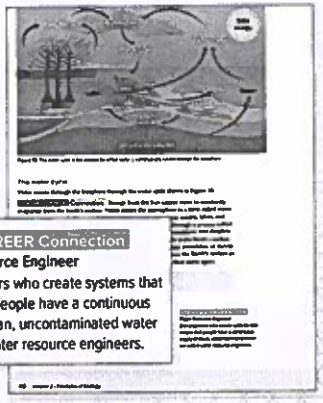
Go Online to find the Math and Literacy Handbook.

Math and Literacy

Inspire Science's High School series supports students with literacy and math access through the Literacy Handbook and the Math Handbook. Each of these handbooks provides background information, student support, and examples that get students ready to make the connections they need to science.

STEM Career Connections

STEM Career Connections allow students to connect with science by seeing potential career paths, as well as how what they're studying connects to the real world.



Advanced Learners and Gifted Learners

Provide your advanced and gifted learners with challenging activities that identify the Depth of Knowledge (DOK) to provide enrichment opportunities for demonstrating advanced performance in science and engineering. This is in addition to the Approaching, On, and Beyond Level support, included in the differentiated instruction strategies for each module and lesson.

Did You Know? Learning Science

The NSTA recommends supporting ELL students by incorporating collaboration, explicitly teaching new vocabulary, and using technology in the classroom.

Alozie et al., 2010, Colonn Colorado, 2014, Helman et al., 2015, Medina-Jerez et al., 2007

EL Support

Rooted in learning sciences research, *Inspire Science* High School series applies the best instructional practices for teaching EL students. Each module and lesson have scaffolded activities designed to meet the English Language Development Standards which offers students of any level of English language proficiency the opportunity to engage in academically challenging science and engineering content that will grow content knowledge and support language acquisition.

Throughout each High School program of *Inspire Science* you will find:

- EL Overview for Teachers
- Module-level support for teachers
- Targeted support in the Teacher's Edition
- Student worksheets with EL strategies

EL Support

Writing ELD PI.9/10.6a

Support students in understanding compare/contrast structures to interpret the paragraph "Two basic cell types."

EMERGING LEVEL Ask students to highlight the two sentences that contain a comparison. Elicit the comparison words in these two sentences (one hundred times larger than, both have...but...). Create a Venn diagram together and elicit from students similarities and differences in the cells to include in the diagram.

BRIDGING LEVEL Elicit compare/contrast words from students using the classroom environment/realia. Then, direct students to use the text and images to list similarities and differences in the cells on a Venn Diagram.

Strategies and activities allow for EL instruction that is just right for each of your students.

Phenomena-Driven Learning

Inspires Science's High School series has been designed to ensure that ALL students have access to quality, intellectually-rich science and engineering curriculum that supports language development and provides engaging learning opportunities.
Here's how!

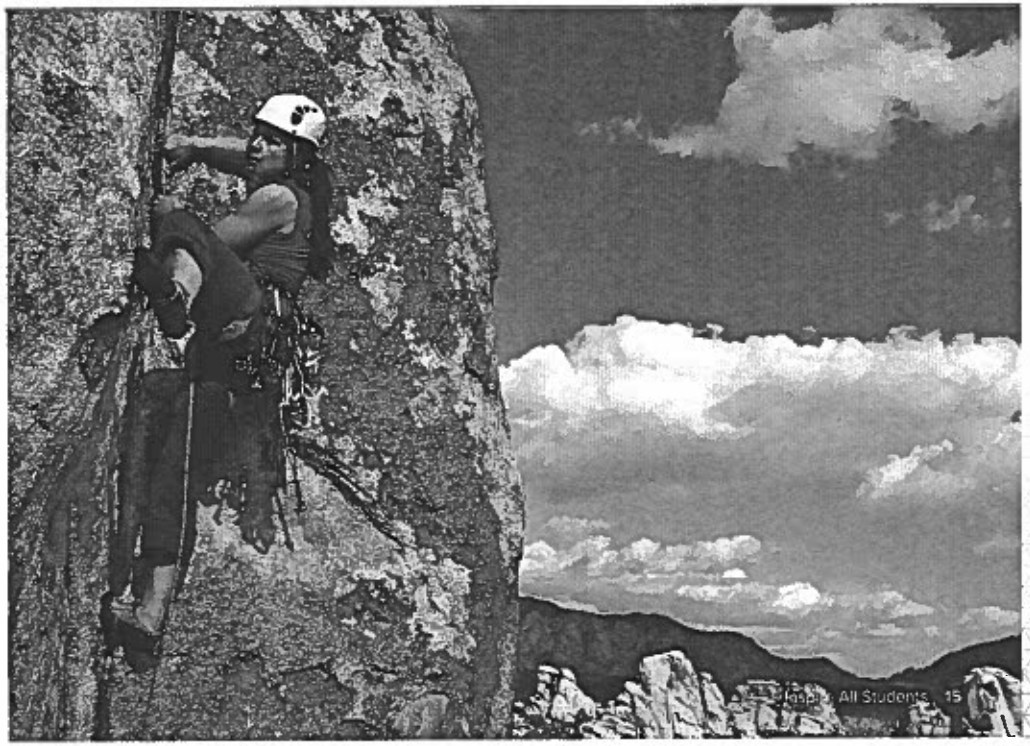
Uniting Phenomena

Phenomenon-driven instruction levels the playing field for learners by allowing them to access the core science content through a shared experience observing a highly relevant real-world phenomenon. When students feel a personal connection to the phenomenon they are more invested in aggregating the knowledge needed to explain the event. It is through these shared occurrences and supported instruction that learning is truly accessible to ALL students as they work towards achieving their learning goals.

Did You Know? Learning Science

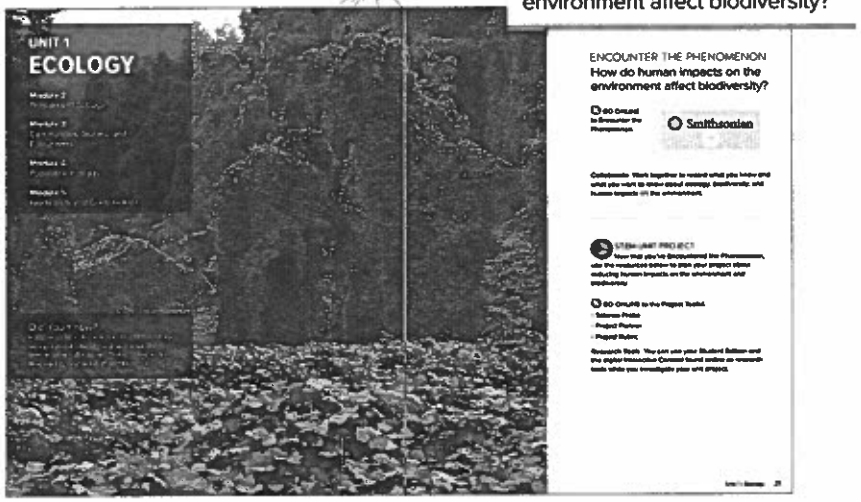
Alignment with Universal Design for Learning (UDL) guidelines has been found to increase student engagement and contribute to improved learning outcomes, particularly for struggling learners

King-Sears, 2009; Katz, 2013



Every day, we are surrounded by natural phenomena that pique our curiosity. In *Inspire Science*'s High School series, these phenomenon are the centerpiece of each unit, module, and lesson to engage students and inspire them to investigate key science and engineering concepts through their three-dimensional learning experience. As students investigate each phenomena, they will gather their Claim, Evidence, and Reasoning to solve and explain the module-level phenomenon.

Anchoring Unit Phenomena



INSPIRE BIOLOGY, UNIT 1, ECOLOGY

Phenomenon:

A way to make learning accessible to all students in a purposeful way. Phenomena are mechanisms that drive dimensions by providing a window into student learning and understanding.

Did You Know? Learning Science

Use of real-world phenomena increases student engagement and depth of understanding, grounding scientific concepts in relatable, observable examples and setting the stage for learners to engage in authentic inquiry and scientific thinking

UW Institute for Science and Math Education, 2016; Hapka, 2017

Inquiry-Based Learning

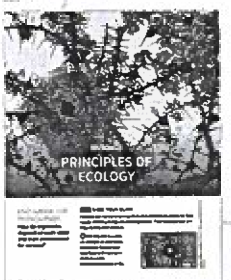
Investigative Module Phenomena

Students will investigate related module-level phenomena that will help them build understanding so they can uncover the mystery of the anchoring module phenomena.

MODULE 1

ENCOUNTER THE PHENOMENON
How does studying biology help us understand life around us?

MODULE 2

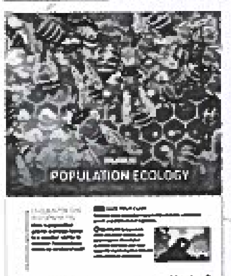


ENCOUNTER THE PHENOMENON
How do organisms depend on each other and their environment for survival?

MODULE 3

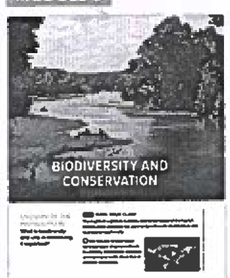
ENCOUNTER THE PHENOMENON
In what kind of community do you live? Is it urban, rural, or suburban?

MODULE 4



ENCOUNTER THE PHENOMENON
How is population growth a critical factor in a species' ability to maintain homeostasis within its environment?

MODULE 5



ENCOUNTER THE PHENOMENON
What is biodiversity and why is conserving it important?

Revisit the Phenomenon

Each Module contains a Module Wrap-Up where students will connect what they've learned through the lesson to explain the anchoring module phenomenon.

Unit Wrap-Up

Go Online. The Unit Wrap-Up allows students to connect what they have learned throughout the unit and complete the STEM Unit Project.

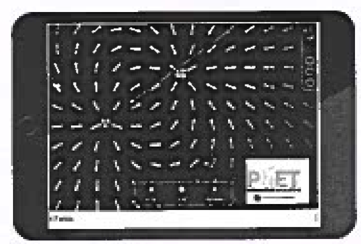
Investigate questions and solve problems from a variety of angles. Inquiry-driven instruction gives students the practice they need to succeed in developing solutions to whatever challenges they may encounter.

Types of Inquiry Activities in each High School program of *Inspire Science*

Inquiry is more than hands-on activities. With *Inspire Science*'s High School series, students will investigate phenomena through several techniques reflective of the way science and engineering are done in the real world.

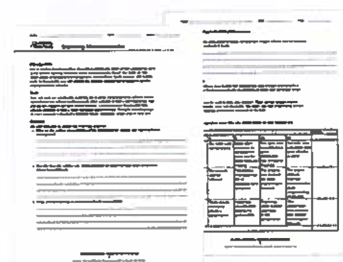
Inquiry Activities:

Demonstrations & Hands-on Activities



Simulations

Engineering



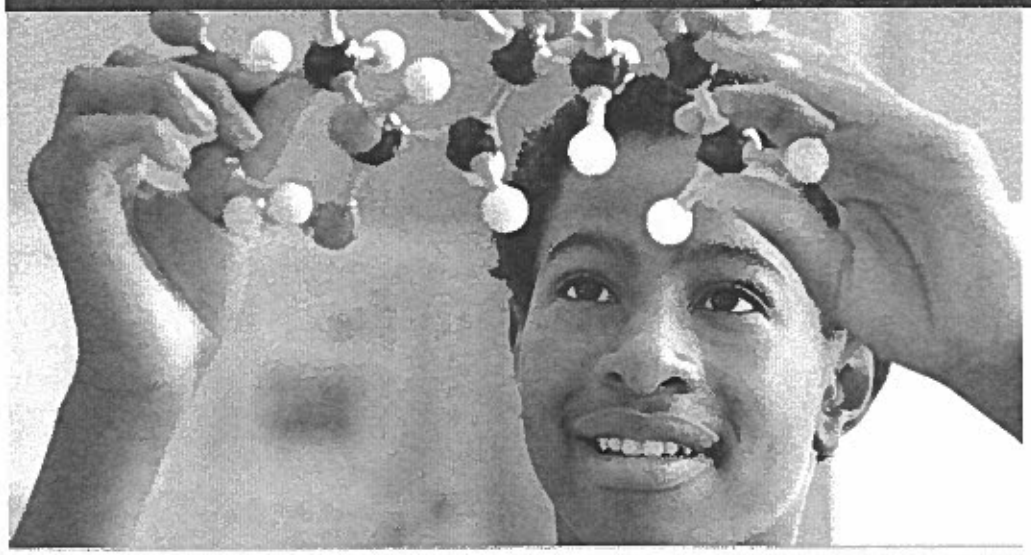
Research

Did You Know?

Learning Science

Simulations 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.

Sarab & Dede 2007, Scalise et al. 2011



Fuse/Getty Images

Hands-On Inquiry

Inspire Science High School series is centered around inquiry where the program provides several opportunities in each module for student exploration.

All inquiry activities in *Inspire Science* High School series promote student engagement and allow each student to develop inquiry and 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 *Inspire 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 *Inspire Science* High School series **Inquiry Spectrum** provides flexible options to adjust the inquiry level to align with the learning needs of each student.

Did You Know? Learning Science

Research suggests that deploying the appropriate type of inquiry approach at various stages of students' learning can improve their understanding of scientific concepts and procedures.

Rga, 2017; Marlin-Hansen, 2002

Next Generation Assessment Strategies

Inspire Science's High School series includes a variety of assessment options to support teachers with differentiation strategies and support students on their journey to mastery of the performance expectations.

Formative Assessment

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 *Inspire Science*'s High School programs.

Following are the types of formative assessment resources you'll find each of *Inspire Science*'s High School programs found online and in the print Student Editions.

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.
Three-Dimensional Thinking Questions	Students will encounter questions that address the 3 dimensions of the NGSS check progress with the SEPs, DCIs, CCCs, and Performance Expectations.
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.

Did You Know? Learning Science

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

Brunswil, 2012; Zohar, 2007

Summative Assessment

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 *Inspire Science's* High School 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 are ready for the module.
Three-Dimensional Thinking Questions	At the end of the lessons, students will demonstrate their understanding of at least two of the three dimensions of NGSS to develop three-dimensional thinking skills.
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 understand of science language. Immediate feedback from the system provided!

LEARNSMART®

LearnSmart® with SmartBook® transforms the way students read. A proven, adaptive learning program, LearnSmart helps students study more efficiently and retain more knowledge.

- Improves reading comprehension by highlighting the most critical content a student needs to know
- Provides practice and review to identify where students are excelling or where more support is needed
- Prompts students to check their understanding and confirm content retention
- Includes detailed reports to help you identify at-risk students or topics for whole-group instruction

We know it can be a challenge to implement a new Science program with new standards. That's why The *Inspire Science* High School series comes with a an evolving library of relevant, self-paced, professional learning videos and modules to support you from implementation through instructional progression and mastery, all 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.

- **Quick Start eLearning Module** explains program basics to help get you started.
- **Plan, Teach, and Assess eLearning Modules** provides deep-dives of the program instructional model and resources and resources.

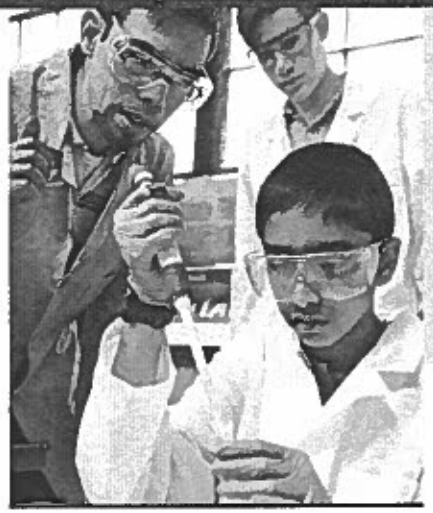
Digital Platform Support

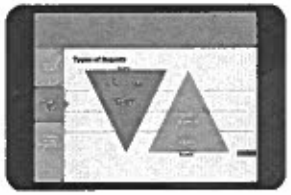
Step-by-step instructions for the use of each of your digital tools are found in the Technical Support Resource Library which will support confident planning, teaching, and assessing in the digital experience. In the Technical Support Resource Library, you will find step-by-step instructions for each of your digital tools to help you feel confident planning, teaching, and assessing in the digital experience.

Ongoing Pedagogy Support

With The *Inspire Science* High School series, 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** that model lessons from real classrooms
- **Science Preconceptions Videos** that review common preconceptions and strategies to overcome them
- **Instructional Coaching Videos** discussing best practice strategies and the "Why" behind the success
- **Science Pedagogy Micro-Courses** designed for your professional learning community with facilitation guides for both self-guided or small-group courses





Finding Your Professional Learning Resources

All professional learning resources are easily identifiable in your digital experience — just look for the apple icon in your course, module or lesson pages.

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Each advisor provided valuable feedback and suggestions regarding effective science instruction. We thank them for their help.

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Smithsonian

Smithsonian

Following the mission of its founder James Smithson for "an establishment for the increase and diffusion of knowledge," the Smithsonian Institution today is the world's largest museum, education, and research complex. To further their vision of shaping the future, a wealth of Smithsonian online resources are integrated within this program. *License agreement with Smithsonian is pending

SPONGELAB

SpongeLab Interactives

SpongeLab Interactives is learning technology company that inspires learning and engagement by creating gamified environments that encourage students to interact with digital learning experiences.

Students participate in inquiry activities and problem-solving to explore a variety to topics using games, interactives, and video while teachers take advantage of formative, summative, or performance-based assessment information that is gathered through the learning management system.

PhET INTERACTIVE SIMULATIONS

PhET Interactive Simulations

The PhET Interactive Simulations project at the University of Colorado Boulder provides teachers and students with interactive science and math simulations. Based on extensive education research, PhET sims engage students through an intuitive, game-like environment where students learn through exploration and discovery.

Learning Science

Did You Know?

	TOPIC	
1	Three-Dimensional Learning	Krajcik, J. (2015). Project-based science: Engaging students in three-dimensional learning. The Science Teacher, 82(1), 25. Next Generation Science Standards (NGSS). (n.d.). Three Dimensional Learning	Next Generation Science Standards. Retrieved, from https://www.nextgenscience.org/three-dimensions National Research Council (U.S.) (Ed.). (2012). A framework for K-12 science education: practices, crosscutting concepts, and core ideas. Washington, D.C: The National Academies Press. Three Dimensional Learning	Next Generation Science Standards. (n.d.). https://www.nextgenscience.org/three-dimensions
2	Phenomena	UW Institute for Science and Math Education. (2016). Using Phenomena in NGSS-Designed Lessons and Units	(Practice Brief). http://stemteachingtools.org/brief/42 Hapke, A. (2017, June 26). How to Choose Good Phenomena [National Science Teachers Association]. http://nstacommunities.org/blog/2017/06/26/how-to-choose-good-phenomena
3	Inquiry	Riga F., Winterbottom M., Harris E., Newby L. (2017) Inquiry-Based Science Education. In: Taber K.S., Akpan B. (eds.) Science Education: New Directions in Mathematics and Science Education (pp. 247-261). SensePublishers, Rotterdam. Martin-Hansen, L. (2002). Defining Inquiry. The Science Teacher, 69, 2.
4	UDL & Differentiated Instruction	King-Sears, M. (2009). Universal design for learning: Technology and Pedagogy. Learning Disability Quarterly, 32(4), 199–201. Katz, J. (2013). The three block model of universal design for learning (UDL): Engaging students in inclusive education. Canadian Journal of Education, 36(1), 153.
5	Claim, Evidence, Reasoning Framework	Brunsell, E. (2012, September 25). Designing Science Inquiry: Claim + Evidence + Reasoning = Explanation. https://www.edutopia.org/blog/science-inquiry-claim-evidence-reasoning-eric-brunsell Zohar, A. (2007). Science Teacher Education and Professional Development in Argumentation. In S. Erduran, & M. Pilar Jimenez-Aleixandre (Eds.), Argumentation in Science Education: Perspectives from Classroom-Based Research (pp. 245–268). The Netherlands: Springer Press.
6	EL Support	Colorin Colorado. (2014). Opportunities and Challenges for ELLs in the Science Inquiry Classroom (Part 1). http://www.colorincolorado.org/article/opportunities-and-challenges-ells-science-inquiry-classroom-part-1 Medina-Jerez, W., Clark, D. B., Medina, A., & Ramirez-Marin, F. (2007). Science for ELLs: Rethinking our approach. The Science Teacher, 74(3), 52. Miller, E., Lauffer, H. B., & Messina, P. (2014). NGSS for English Language Learners: From Theory to Planning to Practice. Science and Children, 51(5), 55–59.
7	Simulations	Barab, S., & Dede, C. (2007). Games and immersive participatory simulations for science education: an emerging type of curricula. Journal of Science Education and Technology, 16(1), 1–3. Scalise, K., Timms, M., Moorjani, A., Clark, L., Holtermann, K., & Irvin, P. S. (2011). Student learning in science simulations: Design features that promote learning gains. Journal of Research in Science Teaching, 48(9), 1050–1078.

Inspire Science
Biology · Chemistry · Physics

Unit, Module, and Lesson Walk Through

This section will provide you with a step-by-step tour of one unit and module to give you a sense for the types of activities and resources, both print and digital, available *Inspire Science* High School series. Here you will find examples of the following:

- Unit, Module, and Lesson Planning Resources
- Correlations for the NGSS
- Performance Expectations
- Unit Opener
- Module Opener
- 5E Lesson
- Unit and Module Wrap-Up

Go Online
Go to inspire-science.com/6-12 for more information

Performance Expectations and NGSS Correlations

At the beginning of each Unit and Module are pages that show how the content within each align to the NGSS in the **Performance Expectations.**

The *Inspire Science* High School Teacher's editions provide easy-to-follow correlations to the Next Generation Science Standards, so you know which modules address each Performance Expectation.

SEP Science and Engineering Practices

SKILLS (for example, "Engaging in Argument from Evidence")

Science and Engineering Practices guide how you ask questions and define problems, plan and carry out investigations, analyze and interpret your findings, develop and use models, use mathematics and computational thinking, develop explanations and solutions based on evidence, and critique and communicate ideas.

- **Practice 1** Asking questions (for science) and defining problems (for engineering)
- **Practice 2** Developing and using models
- **Practice 3** Planning and carrying out investigations
- **Practice 4** Analyzing and using data
- **Practice 5** Using mathematics and computational thinking
- **Practice 6** Constructing explanations (for science) and designing solutions (for engineering)
- **Practice 7** Engaging in argument from evidence
- **Practice 8** Obtaining, evaluating, and communicating information

DCI Disciplinary Core Ideas

CONTENT IN FOCUS (for example, "Structure and Function")

Disciplinary Core Ideas bring into focus the concepts and organizing principles important across science or engineering.

CCC Crosscutting Concepts

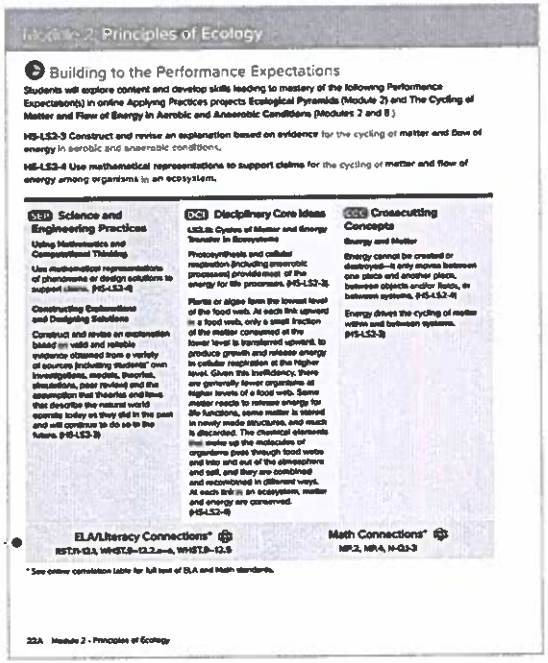
COMMON THEMES (for example, "Systems and System Models")

Crosscutting Concepts are big ideas that apply to many areas of science and engineering. They help you to think scientifically while you apply the science and engineering practices and link the core ideas you learn during your biology course.

- Patterns
- Cause and Effect
- Scale, Proportion, and Quantity
- Systems and System Models
- Energy and Matter
- Structure and Function
- Stability and Change

Performance Expectations

This table shows were students will discover and practice the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts needed to succeed with each Performance Expectation. Every Unit and Module clearly identifies by page number the *Inspire Science* High School resources that correlate to the Next Generation Science Standards.



Each Module Correlates:

- ELA Connections
- Literacy Connections
- Common Core Connections

Online Resources Planner

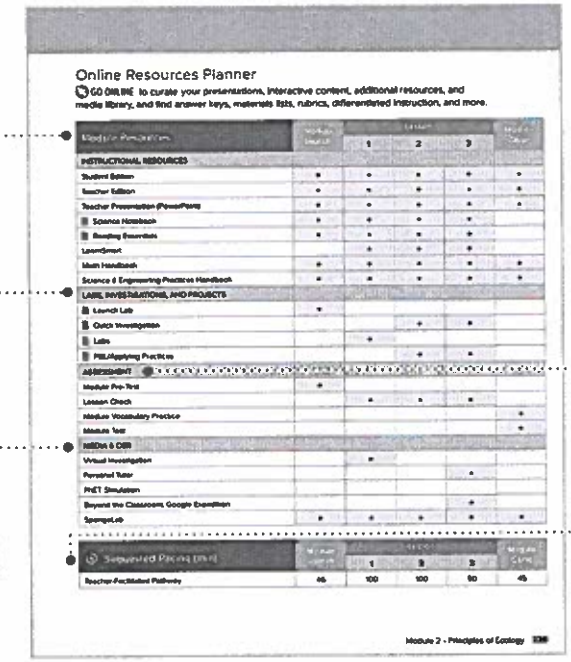
An Online Resource Planner begins every module. It's a great tool for you to see all the digital assets that support each module and lesson.

Module Resources

The *Inspire Science* High School series provides numerous resources for teachers to utilize including: **Labs, Investigations, and Projects Assessment and Differentiation Media and OER.**

Assessment and Differentiation

Within each module and lesson, you will find multiple forms of assessment and differentiation.



Media and OER

Each module and lesson include Media and OER options to utilize in your classroom to support the content within the program.

Suggested Pacing

Pacing suggestions are provided for *Inspire Science* High School series to utilize when managing their time. With three different tracks to follow: Basic, General, and Honors, teachers are provided suggested pacing options to teach each module and lesson.

Labs, Investigations, and Projects

Within each module and lesson you will find multiple labs, investigations, and projects to utilize when teaching each lesson

Unit Walk Through

Real-World Connections

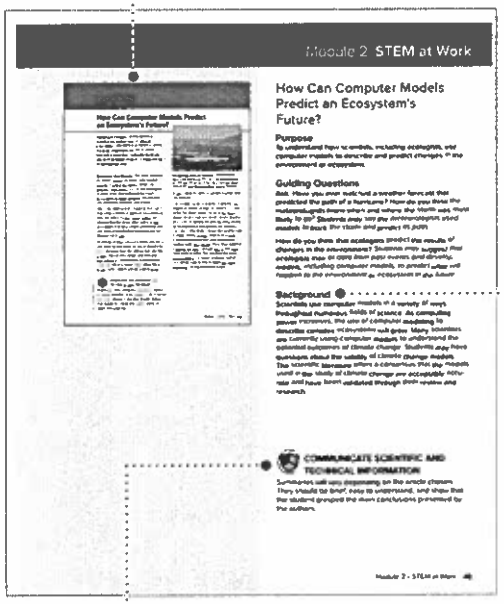
Found at the end of each module are real-world connections to engage students in inquiry on the endless opportunities in STEM. *Inspire Science*'s High School series provides numerous example including:

- Science in Society
- STEM at Work
- Scientific Breakthrough
- Nature of Science
- Engineering and Technology

STEM at Work

Introduce students to real-world STEM professions and how they can made a difference.

Additional STEM career connections are available online.



Three-Dimensional Learning

Throughout each *Inspire Science* High School series lesson you will find correlating **Performance Expectations where Students will apply their three-dimensional learning to show their understanding.**

Background

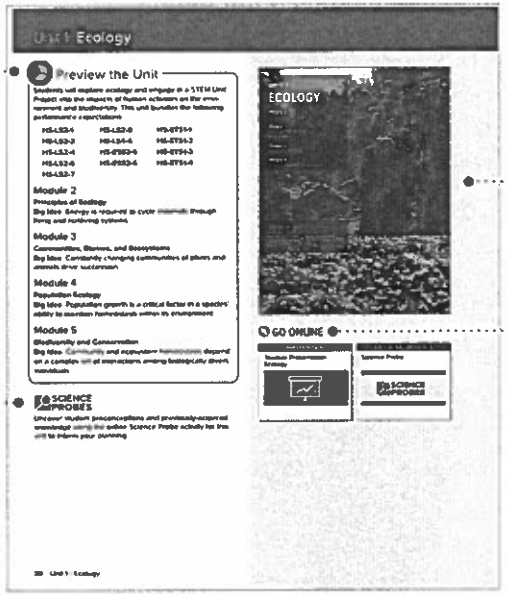
STEM at Work provides Background information.

Unit

Inspire your students' curiosity with real-world phenomena that create the desire to ask questions and investigate the world around them. Uncover student preconceptions and allow students to see how their thinking changes as they learn throughout the unit. Your students will get excited about what they will be learning and set goals for the skills they will develop.

Student Edition

Each Student Edition page is shown aligns to the correlating Teacher Edition page.



SCIENCE PROBES

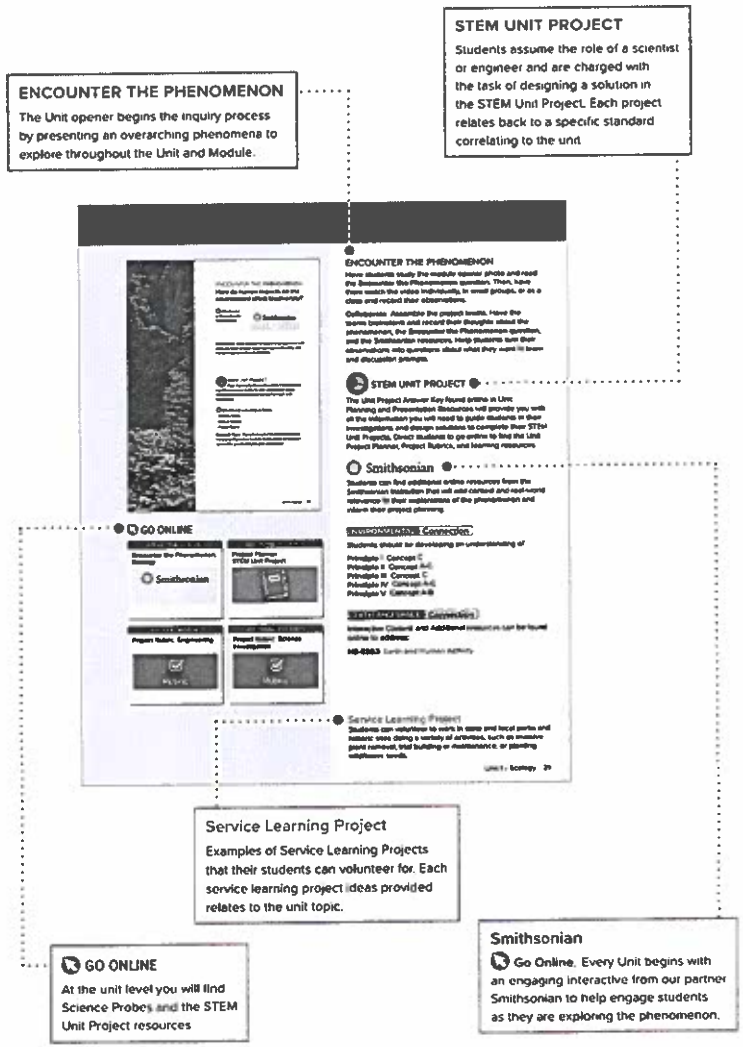
Go Online. The *Inspire Science* High School series begins each unit with a formative assessment science probe to assess students' prior knowledge.

Preview the Unit

- The main goal is to focus on the desired results before planning each module's instruction.
- Preview the Unit includes the standards that are covered in the unit along with the Big Idea for Students to explore throughout each module in the unit.

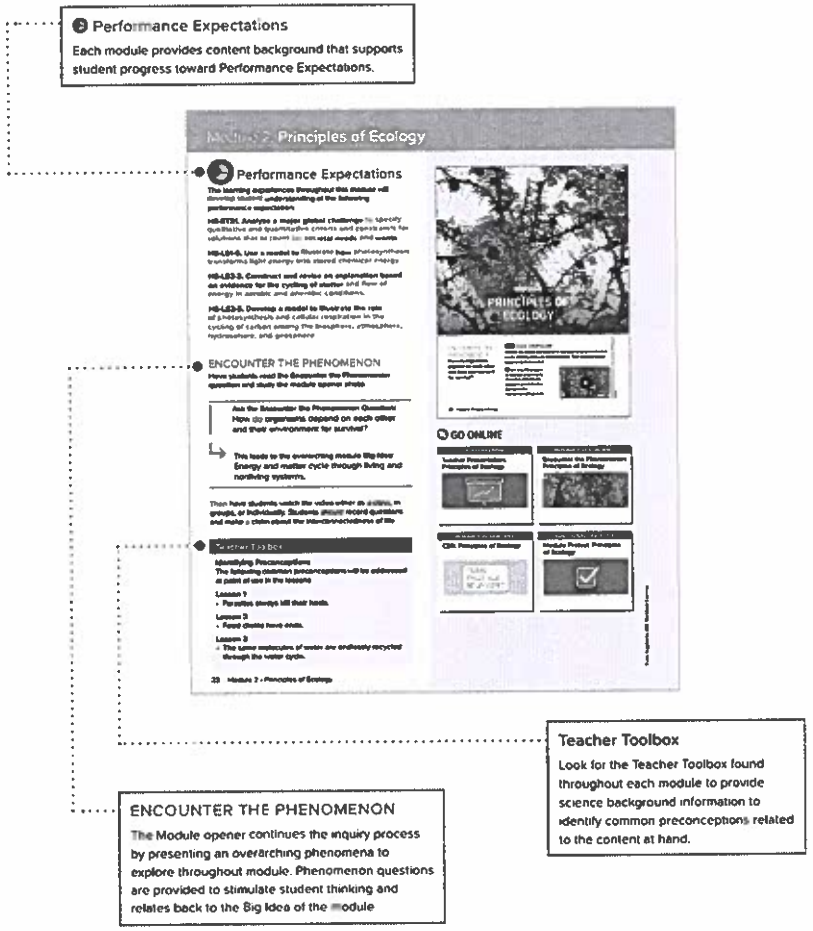
GO ONLINE

The *Inspire Science* High School series provides numerous online supporting resources for students and teachers. You will find the resources that correlate the student page with wrap around resources.



Module

Inspire Science High School series encourages student engagement driven by real-world phenomena, claim-evidence-reasoning, and rich interactive content.

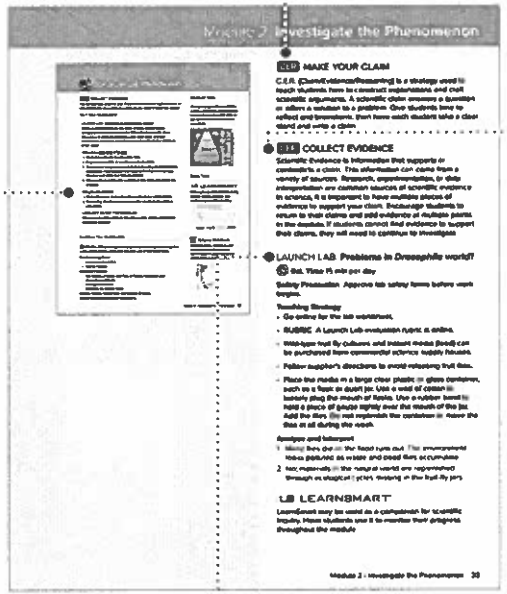


Student Edition

The Inspire Science High School series provides the necessary information for each student to be successful. On many pages you will see an indicator to utilize the Science Notebook and LearnSmart to aid in your students success

CER MAKE YOUR CLAIM

The first step in Claim, Evidence, and Reasoning is where students will reflect and brainstorm possible answers.



LAUNCH LAB

Launch Labs start the inquiry process for students. Each Launch Lab is complete with an estimated time frame in which to conduct the lab, safety precautions, and teaching strategies to ensure a successful hands-on experience.

CER COLLECT EVIDENCE

In the second step of Claim, Evidence, and Reasoning students can provide their initial evidence from what they learned in the Inquiry Activity. However, students will return to their claim to add more evidence as it is revealed throughout the lesson

Lesson

At the lesson level digital and print resources support students throughout the 5E instruction model.

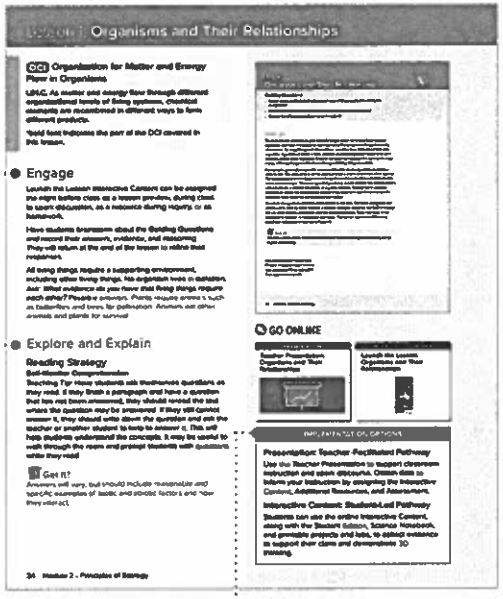
Engage

The Engage phase will inspire students to uncover preconceptions with collaborative conversations and watch turn their initial observations into questions.

As students progress through the lesson they will begin to reveal answers to the questions they generated. They will then revisit their initial thinking and see how it changes as they learn new information.

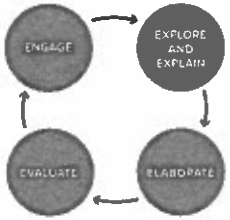
Explore and Explain

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.



5E Instructional Model

The 5E Instructional Model provides a proven, research-driven lesson flow with the flexibility to adjust as needed for your classroom needs



Implementation Options

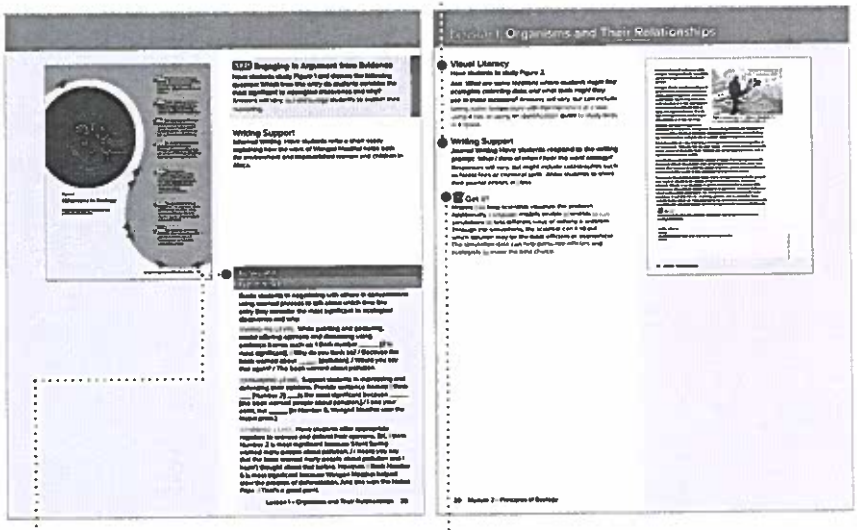
Inspire Science High School series provides two pathways for learning teacher-facilitated and student-led. Each pathway enables teachers and students the ability to adjust dependent on the preferred method of learning

Learning Styles

All students learn differently, *Inspire Science* High School series provides opportunities for all learners to be successful.

Visual Literacy encourages students to study and review the figure to better learn the topic.

Writing Support encourages students to journal to understand and comprehend the topic.



EL Support

Rooted in learning sciences research, *Inspire Science* High School series 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.

Get It?

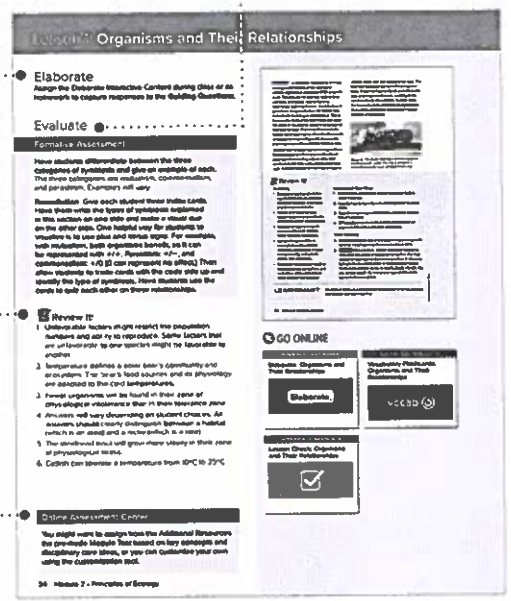
Inspire Science High School series provides assessment every step of the way. Get It allows the student to think about the phenomena provided and understand how it relates back to the text providing assessment for each teacher

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.

Evaluate

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



Review It!

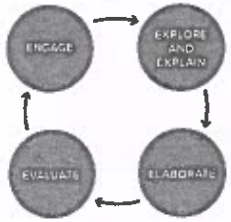
Review It provides students a summary of the lesson along with follow up questions to stimulate thinking to help in understanding the main ideas.

Online Assessment Center

The Online Assessment Center provides additional assessment support for student success.

5E Instructional Model

The 5E Instructional Model provides a proven, research-driven lesson flow with the flexibility to adjust as needed for your classroom needs.



Module

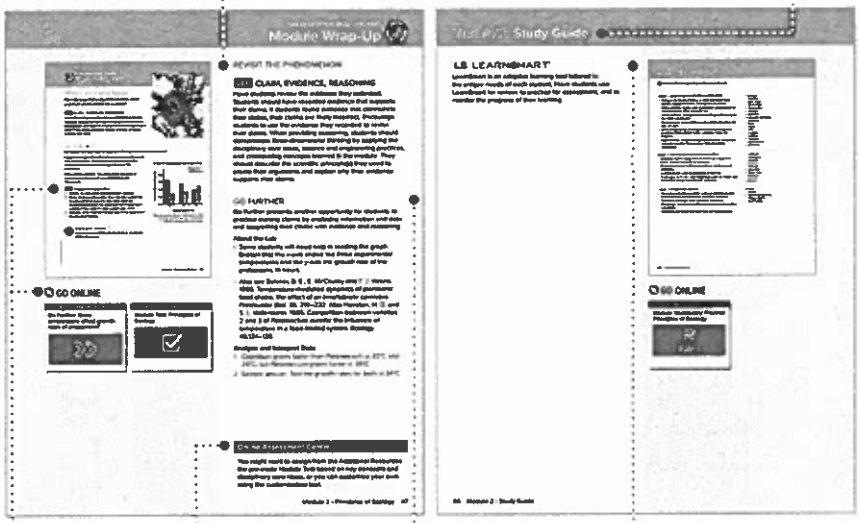
Students revisit the module phenomenon and try to answer the phenomenon question using evidence from what they have learned throughout the module.

REVISIT THE PHENOMENON

Students revisit the phenomenon and try to answer the phenomenon question using evidence from what they have learned throughout the module.

Study Guide

While the Study Guide is available for students to utilize, teachers are provided resources to aid in each student's retention of the lesson.



GO FURTHER

Go Online. Use the Go Further activity as another opportunity to have students make and support claims with evidence and reasoning.

GO FURTHER

Students are presented the opportunity to practice making claims and supporting their claims with evidence and reasoning.

LEARNSMART

LearnSmart® with SmartBook® transforms the way students read. A proven, adaptive learning program, LearnSmart individualizes instruction to help students study more efficiently and retain more knowledge.

Module Test

Go Online during the Module Wrap-Up to access the Module Test.

Inspire Science

Biology · Chemistry · Physics

Digital Experience

Use this section to learn more about the engaging interactive resources in the *Inspire Science* High School series digital experience. This section will provide an overview of the following:

- The Course Dashboards
- Unit, Module, and Lesson Landing Pages
- Digital Resource Types and Learning Impact

Get Started by Logging In:

1. Go to https://my.mheducation.com from an Internet browser.
2. Enter your username and password and click "Log In."

Upon login, you will find helpful videos to support your digital review.

Go Online

Go to inspire-science.com/6-12 for more information

Welcome to the *Inspire Science* High School series Digital Experience!

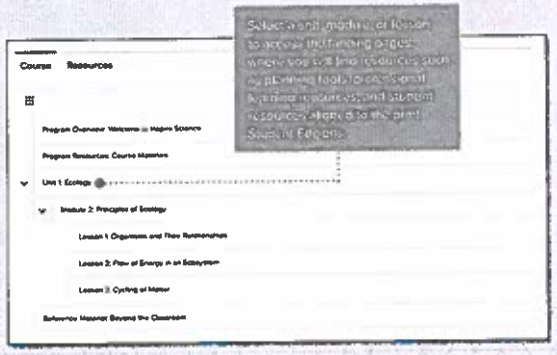
Use this section of your Program Guide to easily find the digital resources that make the *Inspire Science* High School series engaging and fun for students.

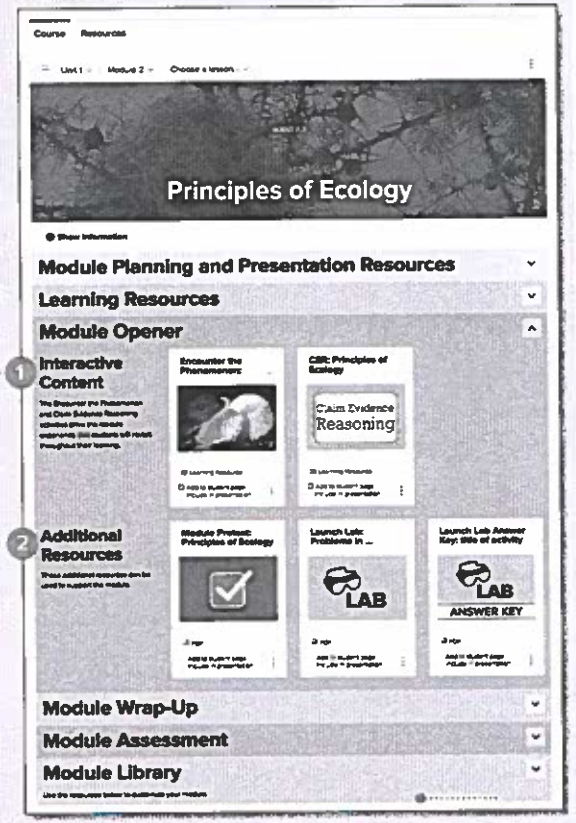
Launch Your Course

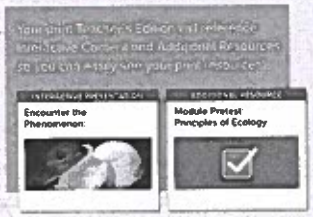
Upon login you will see a colorful banner for your course showing the images from your book covers. Select "Launch Course" or anywhere in this banner to begin access course resources.

Choose a Unit, Module, and Lesson

After launching the course, you will access the table of contents page which includes expandable folders for all units, modules, and lessons in the course. Other folders, such as the Program Overview, provide support for understanding the program.







[Ullandré Gibson/Alamy Stock Photo (c. b)Video Supplied by BBC Worldwide Learning

Note: Digital design and navigation may vary.

Access Your Resources

You will notice within the module and lesson landing page folders that many digital resources are further organized by two categories:

1 Interactive Content

These resources provide access to the digital content that aligns with the resources featured in the print Student Edition. By default, these resources will display on the student page and in the teacher presentation.

2 Additional Resources

These resources provide access to supplemental content and assessments. Resources in this section are typically hidden from students until teachers are ready to add them to student pages or assign them.

Access Interactive Resources

The Unit Landing Pages

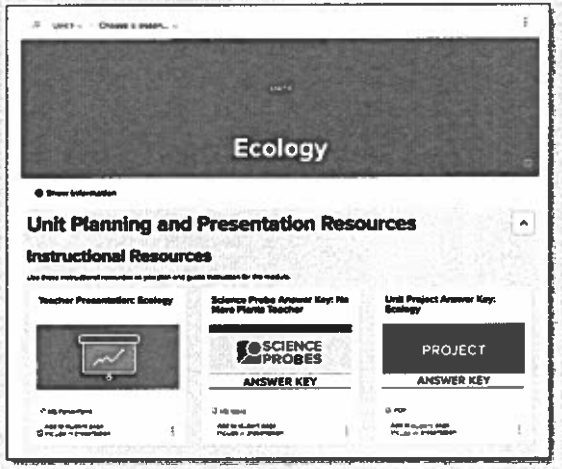
From the unit landing pages, teachers and students can access unit resources. Unit resources include:

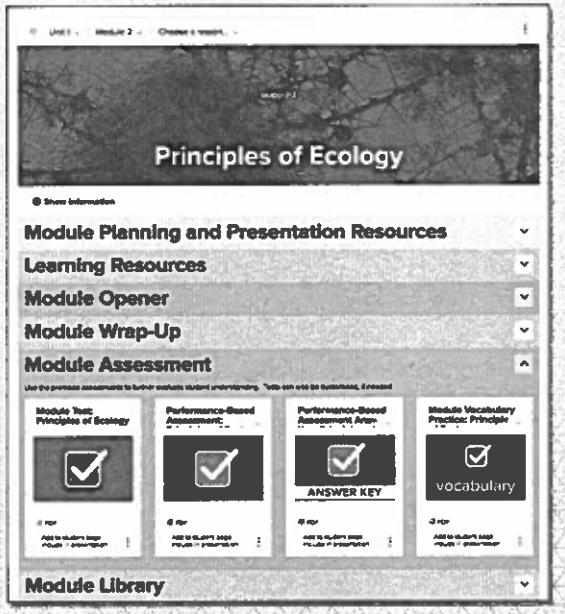
- Unit Planning and Presentation Resources
- Learning Resources
- Unit Library

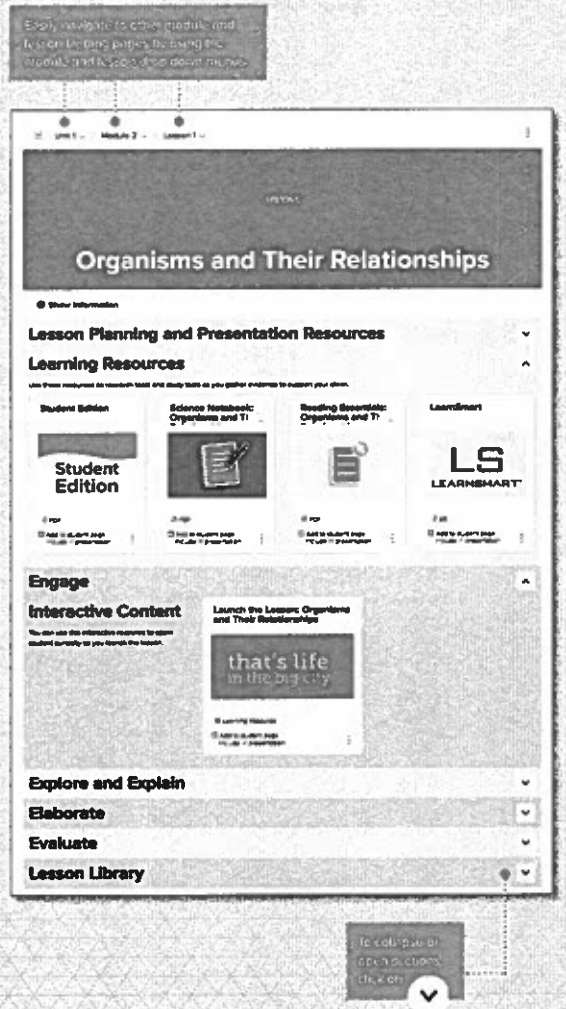
The Module Landing Pages

From the module landing pages, teachers and students can access module resources, organized by key module-level activities. Module resource folders for each module include:

- Module Planning Resources (including Professional Learning Resources)
- Module Opener
- Module Wrap-Up
- Module Assessment
- Module Library







André Gilden/Alamy Stock Photo

Note: Digital design and navigation may vary.

Access Interactive Resources

The Lesson Landing Pages

From the lesson landing pages, teachers and students can access lesson resources, organized by the 5E instructional model. Lesson resource folders for each lesson include:

- Lesson Planning Resources
- Engage
- Explore / Explain
- Elaborate
- Evaluate
- Lesson Library

Viewing Interactive Resources

Inspire Science High School series offers a variety of rich media and interactive content with the flexibility to customize lessons to fit students needs.

Follow these tips for viewing resources:

Note: Digital design and navigation may vary.

Types of Interactive Resources

In the *Inspire Science* High School series digital experience, students will interact with a wide variety of digital content types that will make learning science engaging and fun.

Why Go Online?

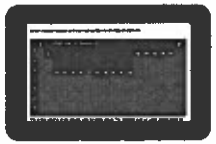
- Engaging Interactive Content
- Science Content Videos
- Text Read Aloud and Highlighting Features
- Dynamic Search Tools

Info Graphic

Layer Reveal

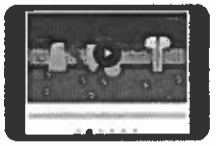
Phenomena Videos

Poptips Plus

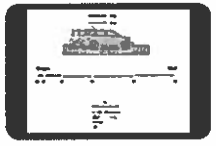


Drag and Drop

Swypeline



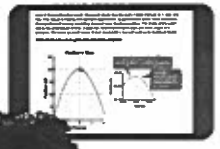
Slideline Plus



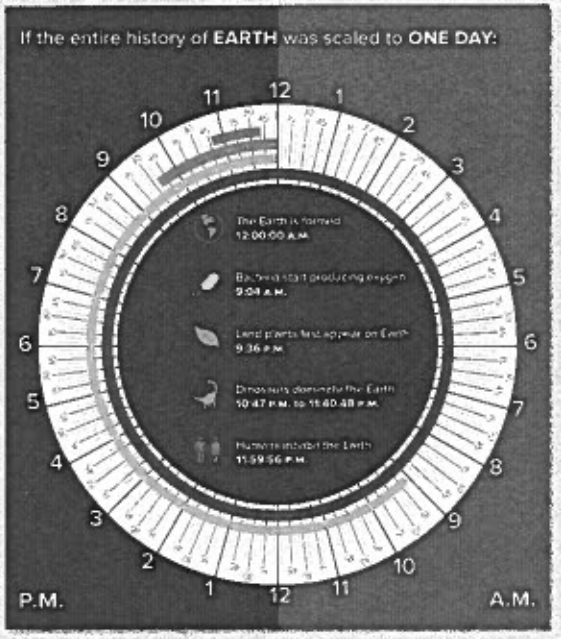
Step by Step

Flashcard

Click Change



Beyond the Classroom

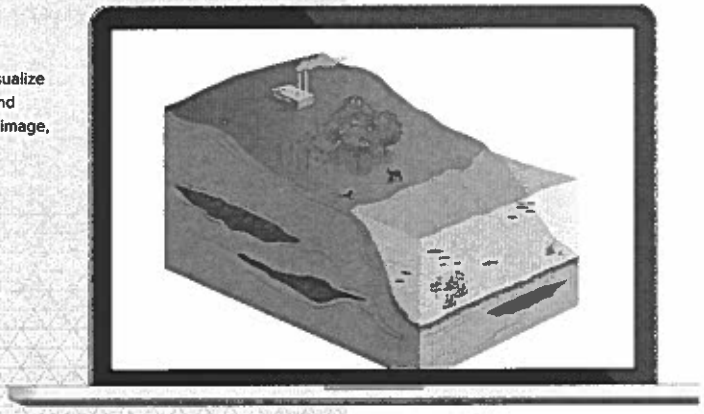


Info Graphic

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

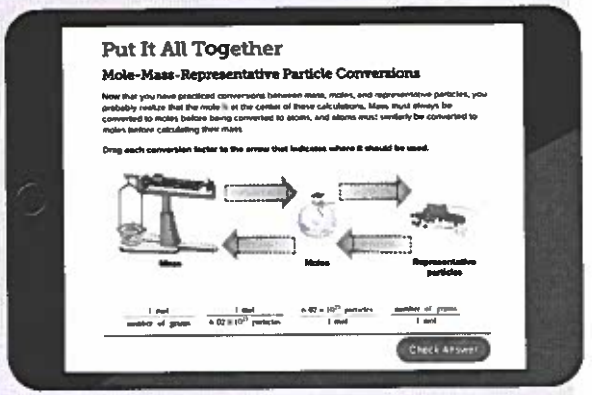
Layer Reveal

The **Layer Reveal** interactive enables students to easily visualize cause and effect scenarios and focus on specific areas of an image, one section at a time.



Phenomenon Videos

Phenomenon videos are used to draw students into the content and provide a visual experience to encourage thinking and collaborative conversations.

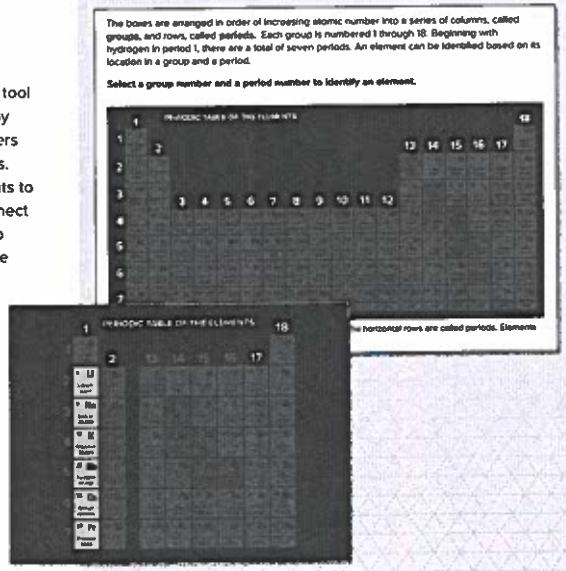


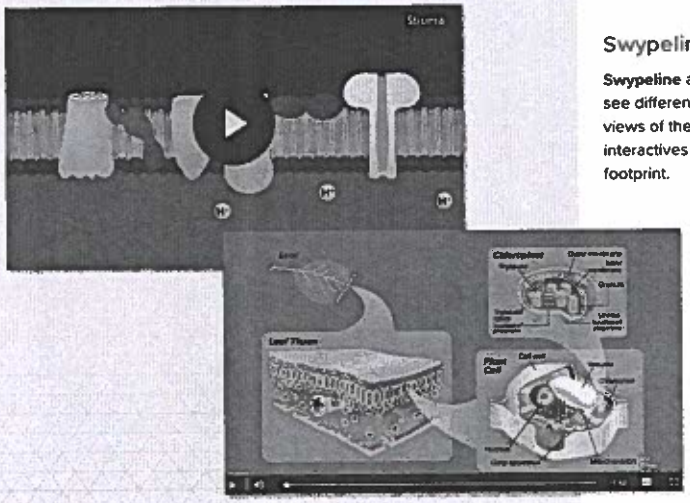
Drag and Drop

The **Drag and Drop** interactive tool is used to support students with sorting and classifying content such as vocabulary terms.

Poptips Plus

Poptips Plus is an interactive tool with a single image or an array of text and images with markers that define clickable hot spots. This interactive allows students to interact with images and connect them to related information to support understanding of core content.





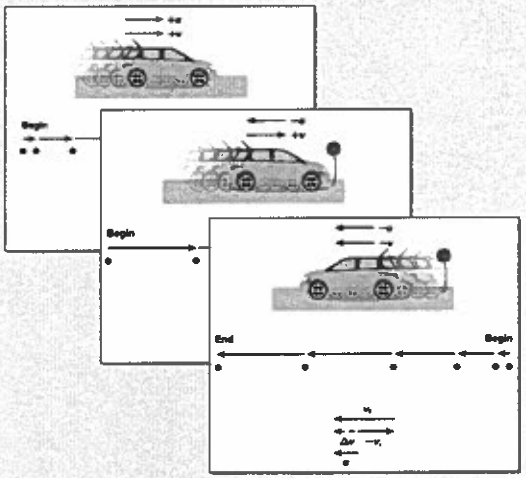
Swypeline

Swypeline allows students to see different stages, versions, or views of the content in sequential interactives that occupy the same footprint.

Video Supplied by BBC Worldwide Learning

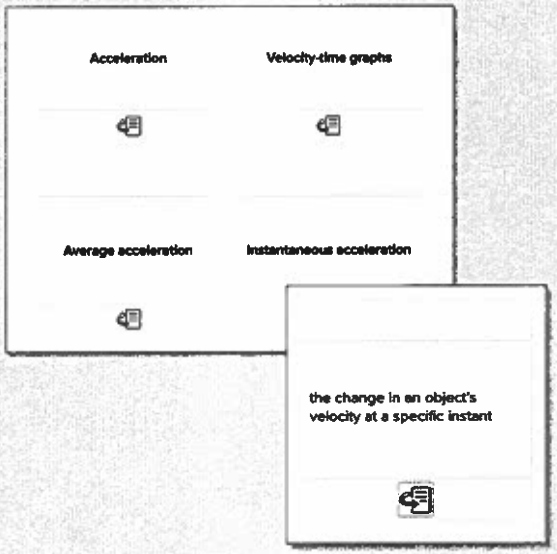
Slideline Plus

Slideline Plus allows students to view a slide show of images that seamlessly fade from one to the next as the user navigates between them.



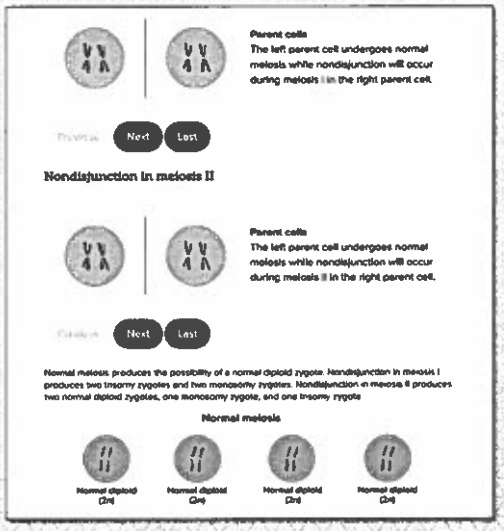
Flashcard

Flashcards present students with content on both sides of an interactive card to allow assessment opportunities.



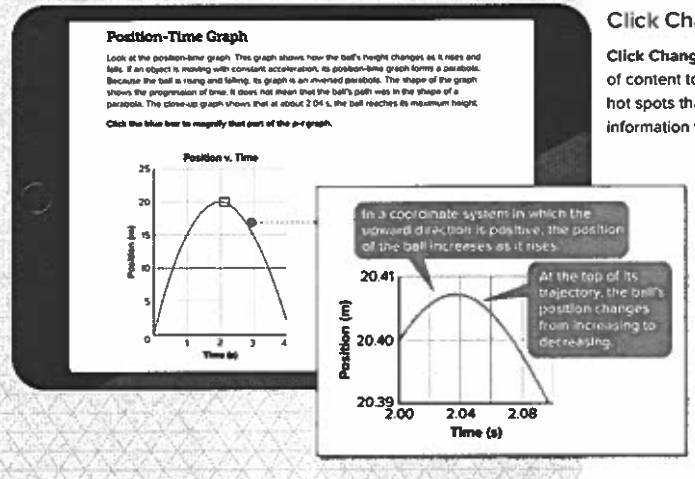
Step-by-Step

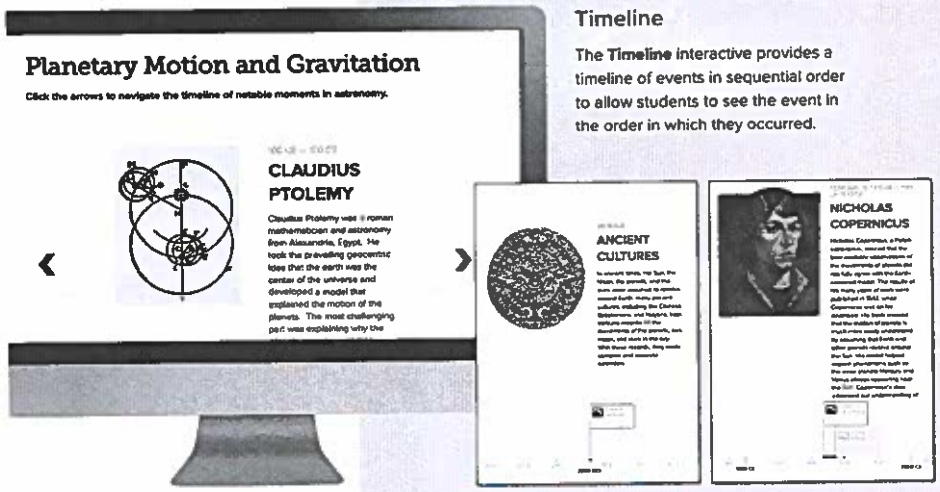
Step-by-Step is a presentation of a multi-step process that allows students to view one step at a time.



Click Change

Click Change presents a screen of content to the student with hot spots that reveal additional information when clicked.





Timeline

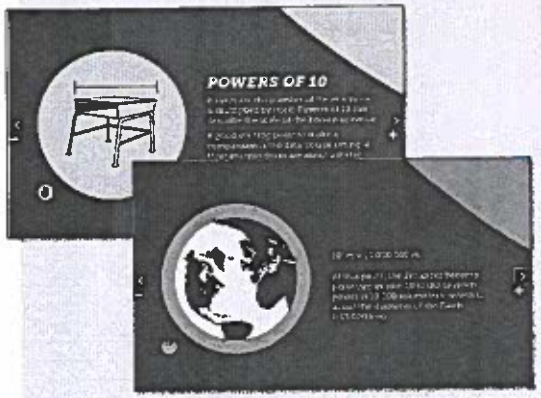
The **Timeline** interactive provides a timeline of events in sequential order to allow students to see the event in the order in which they occurred.

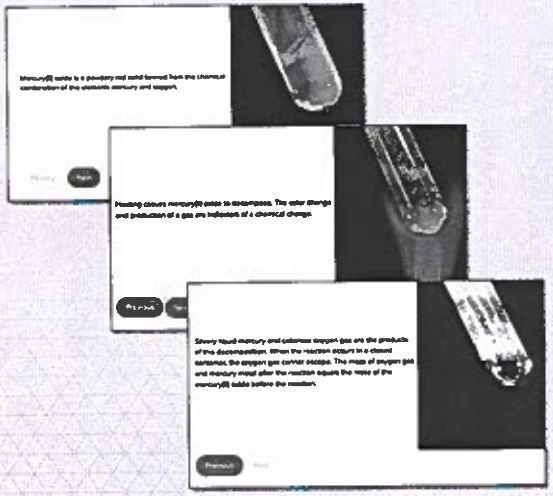
Layer Reveal Slider

The **Layer Reveal Slider** interactive enables students to easily visualize cause and effect scenarios and focus on specific areas of an image, one section at a time.

Swype

Swype allows students to see different stages, versions, or views of the content in an engaging interactive way.





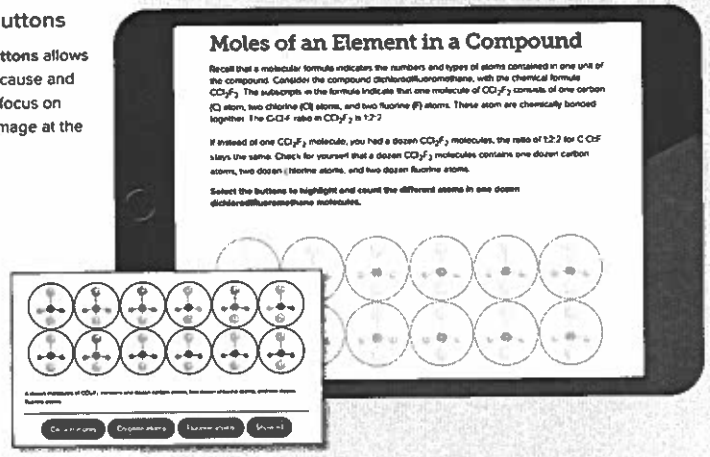
Step-by-Step, Replace Functionality

Step-by-Step is a presentation of a multi-step process that allows students to view one step at a time to see the change that is occurring.

Digital Resource Types and Learning Impact

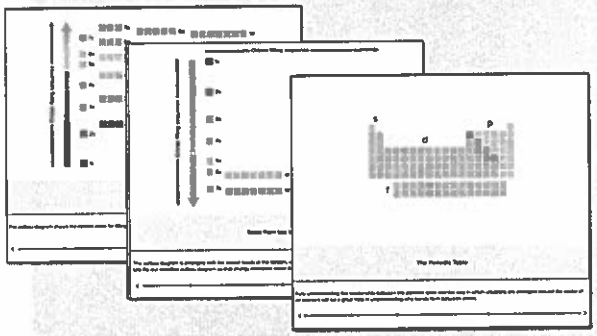
Layer Reveal Buttons

The **Layer Reveal Buttons** allows students to visualize cause and effect scenarios and focus on specific areas of an image at the click of a button.



Slideline Plus with Animations

The **Slideline Plus** allows students to progress through a storyline of images or highlight focused areas of visuals to concentrate on one element of a schematic at a time.



Inspire Science

We hope you've found this guide helpful in getting started with *Inspire Science* High School series. Thank you for all you do to inspire the students of to be curious, to investigate, and to innovate.

Let's Explore Our Phenomenal World!

Inspire Science

Biology • Chemistry • Physics

Explore Our Phenomenal World

INSPIRE CURIOSITY

INSPIRE INVESTIGATION

INSPIRE INNOVATION

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