

Program Guide for Mississippi Science



Conceptual Academy for
Foundations of Biology, Biology, Chemistry, Earth and Space
Science, Physics, Physical Science



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Course Sequencing and Course Progression

Scope and Sequence

- Foundations of Biology and Biology

- Chemistry

- Earth and Space Science

- Physics

- Physical Science

Assessment

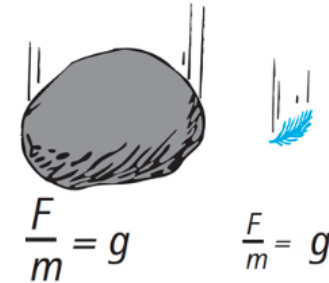
MAAP Biology Exam Preparation

Professional Learning with Science is Cool

Research and Effectiveness

Conceptual Academy and PocketLab

Conceptual Academy was founded on Paul Hewitt's *Conceptual Physics*, which pioneered a phenomena-based approach that makes complex science ideas intuitive and accessible for students. Its iconic illustrations translate equations and concepts into understanding.

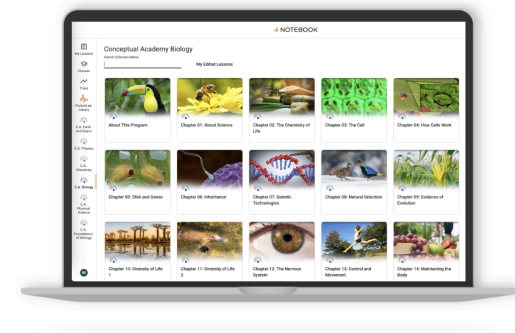


Today, Conceptual Academy and PocketLab extend this proven approach across Foundations of Biology, Biology, Chemistry, Earth & Space Science, Physics, and Physical Science, delivering a **complete, concept-driven Mississippi high school science program.**



All Conceptual Academy programs are hosted in PocketLab Notebook, the leading platform for hands-on science. Notebook is rich with modern resources, including time-saving AI tools, to optimize every minute of the teaching and learning experience. Notebook AI powers:

- Auto-grading and providing formative feedback
- Generating differentiated student resources
- Adjusting the reading-level of text
- Translating lessons into 50+ languages
- Alia: A learning assistant great for Q+A



Conceptual Academy and PocketLab differ from other Publishers

Conceptual Academy for Mississippi is the first science program authored by human experts and 100% customizable through generative AI.

100% Customizable by the Teacher with Built-in AI

Simplify tasks, save time
for what matters most

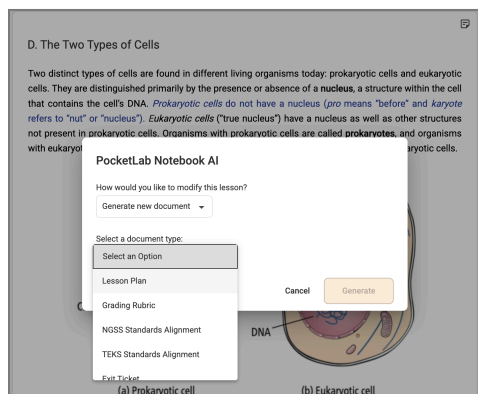
- **Simple to use:** Integrated into textbook content, no need to copy/paste into external AI tools hoping for the best
- **All-in-one tool:** Plan, teach and assign lessons, give feedback, create new activities, and more
- **Streamline busywork:** Handle repetitive tasks, grade, differentiate, build sub plans, presentations, and more

Maximize your impact
while teaching

- **100% Aligned** to MCCRS for Science
- **AI teaching assistant:** help students with an AI chatbot trained on approved instructional materials
- **Instant Feedback:** Generate quick, targeted feedback for students within the same class period
- **Personalize Resources:** Quickly generate multiple versions of materials to meet various student needs

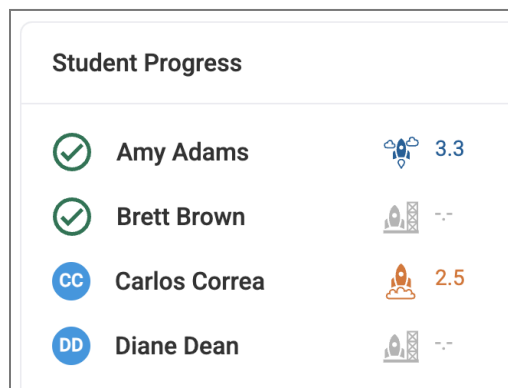
How PocketLab Notebook AI works

Create



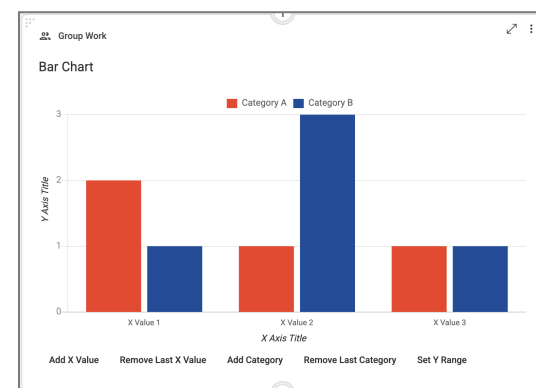
Create additional resources based off of the existing lesson

Grade and Give Feedback



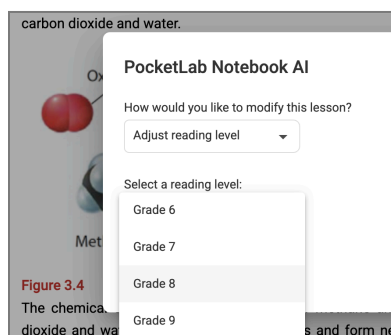
Deliver personalized feedback and grade student free responses

Deter Cheating



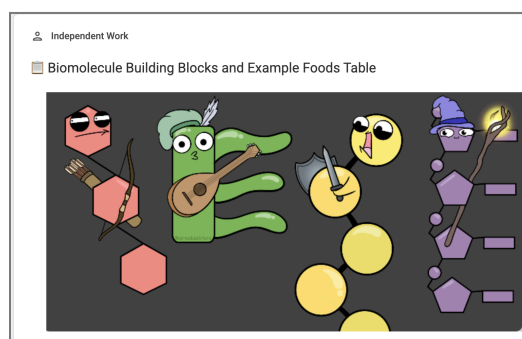
Custom interactives like bar charts deter copy/paste cheating

Change Reading Level



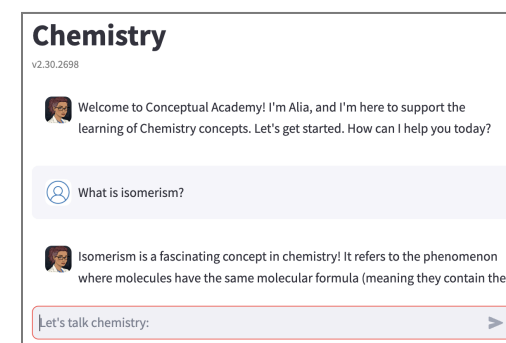
Change the reading level and translate text to 50+ languages

Extend Student Activities



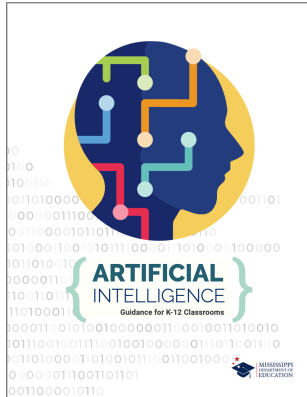
Extend activities with additional practice, exit tickets, or discussion

AI Learning Assistant



Notebook's AI teaching assistant helps explain complex topics

Notebook AI supports Mississippi's Guidance on AI in the K-12 Classroom



Mississippi is on the forefront of leveraging AI in the classroom and was one of the first states to develop guidance for its use in the K-12 classroom.

Notebook supports the five key areas outlined for AI's use with Mississippi students:

1. Digital citizenship, including strategies to deter cheating and plagiarism
2. Focus on standards-aligned content
3. Active learning and engagement
4. Formative assessment and feedback
5. Accessibility

Digital Citizenship	<ul style="list-style-type: none"> Hands-on activities designed to be AI cheating-resistant Automated detection of large chunks of copy-and-pasted text
Standards-Aligned Content	<ul style="list-style-type: none"> Core instructional materials are 100% aligned to MCCRS for Science Supplemental materials are based on three-dimensional teaching approach that combines SEPs, CCCs, and DCIs
Active Learning and Engagement	<ul style="list-style-type: none"> Create extension activities for a text Create personalized learning paths tailored to individual needs Workshops, training, and online resources to help understand how to effectively integrate AI tools
Formative Assessment and Feedback	<ul style="list-style-type: none"> Interactive learning assistants that can offer support for complex topics Assessment tools that provide real-time feedback to students based on their answers
Accessibility	<ul style="list-style-type: none"> Use speech-to-text or dictation to assist with typing Translate text, images, and speech for students and families

Supplemental Curriculum for High School Science

In addition to the core curriculum, PocketLab Notebook host hundreds of supplemental resources from world-class creators and science authors like the Amoeba Sisters, Startalk with Neil deGrasse Tyson, and many more.



Prepare for the Biology MAAP assessment with end of chapter video review lessons from the Amoeba Sisters

STARTALK

Engage in hands-on lessons with Neil deGrasse Tyson to explore physical science topics on exo-planets and what causes the seasons.



Learn about biology through nature documentaries Chasing the Tide and Deep in the Heart



Start a design challenge that uses biomimicry to solve real-world problems



CRASH SCIENCE IN THE CLASSROOM

Presented by IIHS-HLDI

Learn how physics and biology play a role in the crash safety of vehicles and how engineers design cars to be safer



ISS NATIONAL LABORATORY®

Explore science phenomena on the International Space Station through hands-on activities

PocketLab technology builds 21st Century hands-on science skills

Supercharge Phenomenon-Based Learning

- Empower students to collect real-world data
- Ignite curiosity and critical thinking with hands-on experiments
- Align with widely-adopted science standards and methodologies

Optimize instructional time

- Slash prep time with seamlessly integrated sensors and lessons
- Streamline instruction using a vast library of customizable content
- Elevate student assessment through instant data visualization

Maximize your STEM Budget

- Invest in one versatile, long-lasting system- replacing multiple tools
- Eliminate material cost through digital experimentation
- Secure potential grant funding with our STEM-aligned solution

Amplify Student Engagement

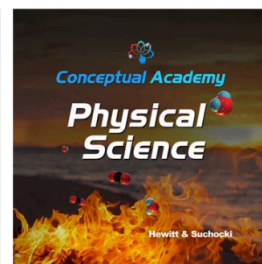
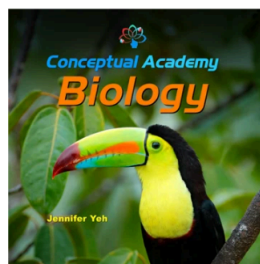
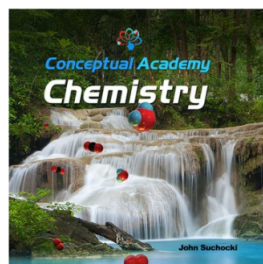
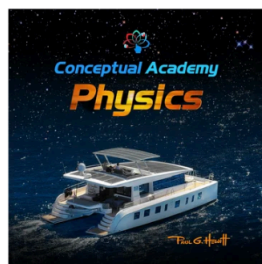
- Spark curiosity with student-designed experiments
- Transform learning into exciting self-driven adventures
- Foster STEM passion through creative, fun experiences
- Drive improved performance on standardized tests



High School Course Coverage

The *Conceptual Academy* materials cover six Mississippi approved secondary science courses with the corresponding program title in the table below.

Approved Courses for the Secondary Schools of Mississippi	Conceptual Academy Program Name
Foundations of Biology	<i>Conceptual Academy Biology</i>
Biology	<i>Conceptual Academy Biology</i>
Chemistry	<i>Conceptual Academy Chemistry</i>
Earth and Space Science	<i>Conceptual Academy Earth and Space Science</i>
Physical Science	<i>Conceptual Academy Physics and Chemistry Integrated</i>
Physics	<i>Conceptual Academy Physics</i>



High School Course Progression

The Conceptual Academy High School scope and sequence fully supports Mississippi's *Best Practices for CCR Sequencing in Science*.

Grade	9	10	11	12
Course	Biology (260131)	Chemistry 1 (400519)	Physics (400820) <u>or</u> Earth and Space (260629)	Physics (400820) <u>or</u> Earth and Space (260629)

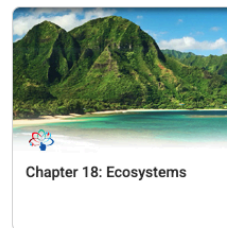
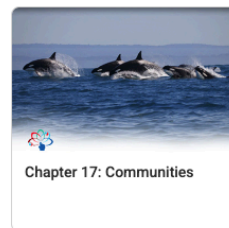
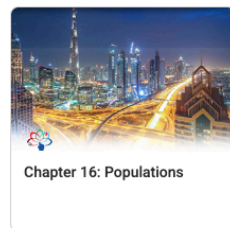
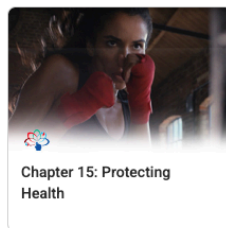
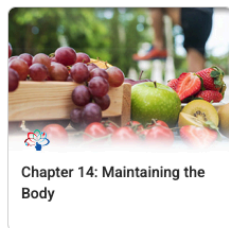
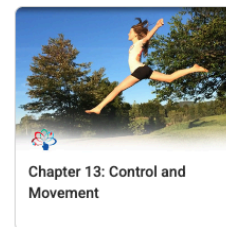
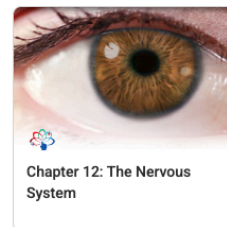
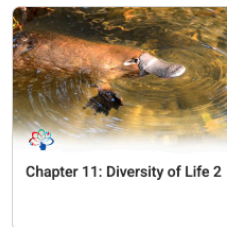
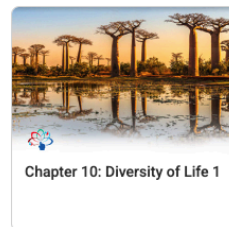
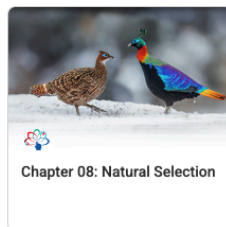
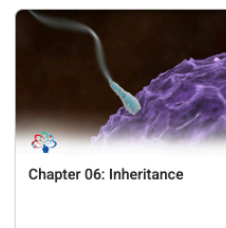
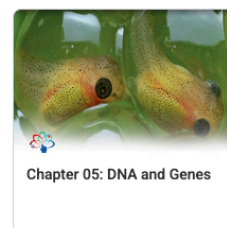
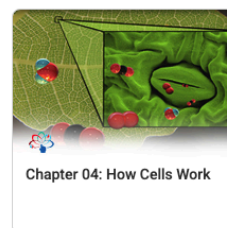
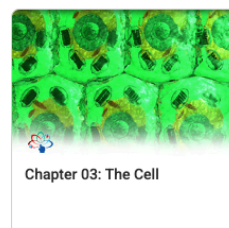
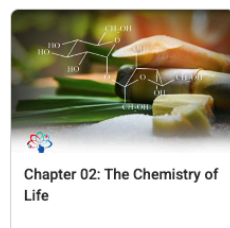
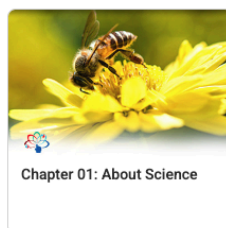
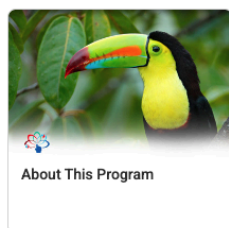
Additionally, the Foundations of Biology program is available for students to master the necessary concepts prior to attempting the rigorous Biology course required for graduation. Along with the Biology program in 10th grade, and the Physical Science program in 11th grade, this sequence gives students breadth of knowledge across the three core science disciplines in three years. If students opt for a fourth year of science, they may choose the Chemistry or Physics programs, or gain further breadth with *Earth and Space Science*.

Grade	9	10	11	12
Course	Foundations of Biology (260628)	Biology (260131)	Physical Science (400700)	Chemistry 1 (400519) <u>or</u> Physics (400820) <u>or</u> Earth and Space (260629)

The order of the standards within each program reflects a purposeful consideration of how to build disciplinary core ideas (DCIs), science and engineering practices (SEPs), and crosscutting concepts (CCCs) through three-dimensional learning, while also maintaining a logical progression through the core content and covering 100% of the MCCRS for Science.

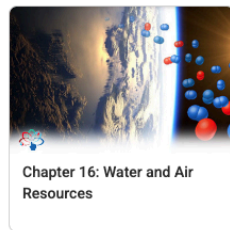
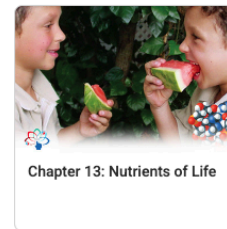
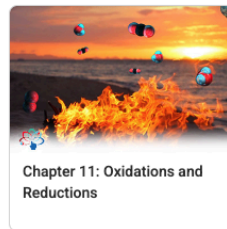
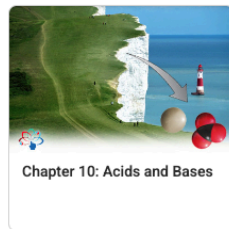
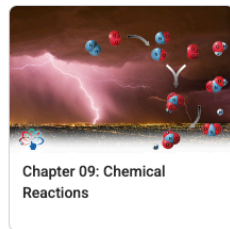
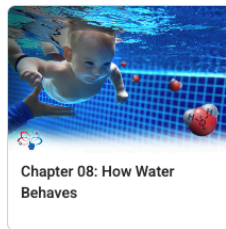
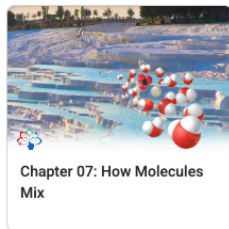
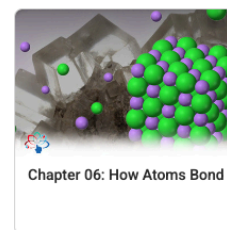
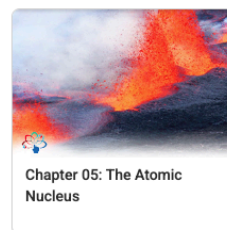
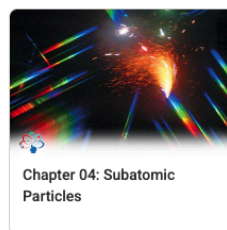
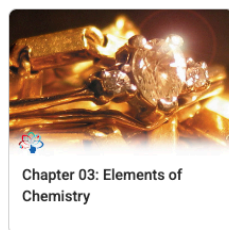
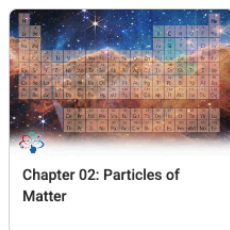
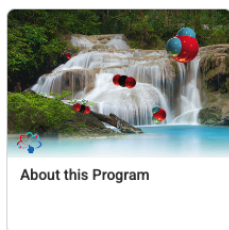
Scope and Sequence: Foundations of Biology and Biology

Conceptual Academy Biology applies to courses for Foundations of Biology and Biology, with different MCCRS Alignment for each course. Beginning with *the chemistry essential to life* at the molecular level, we build toward cells, genetics, and inheritance—laying the groundwork for evolution and the remarkable diversity of life. From there, the focus moves to human anatomy and physiology, culminating in an exploration of populations, communities, and ecosystems. Throughout, biological concepts connect to real-world examples from medicine, nutrition, health, and biotechnology.



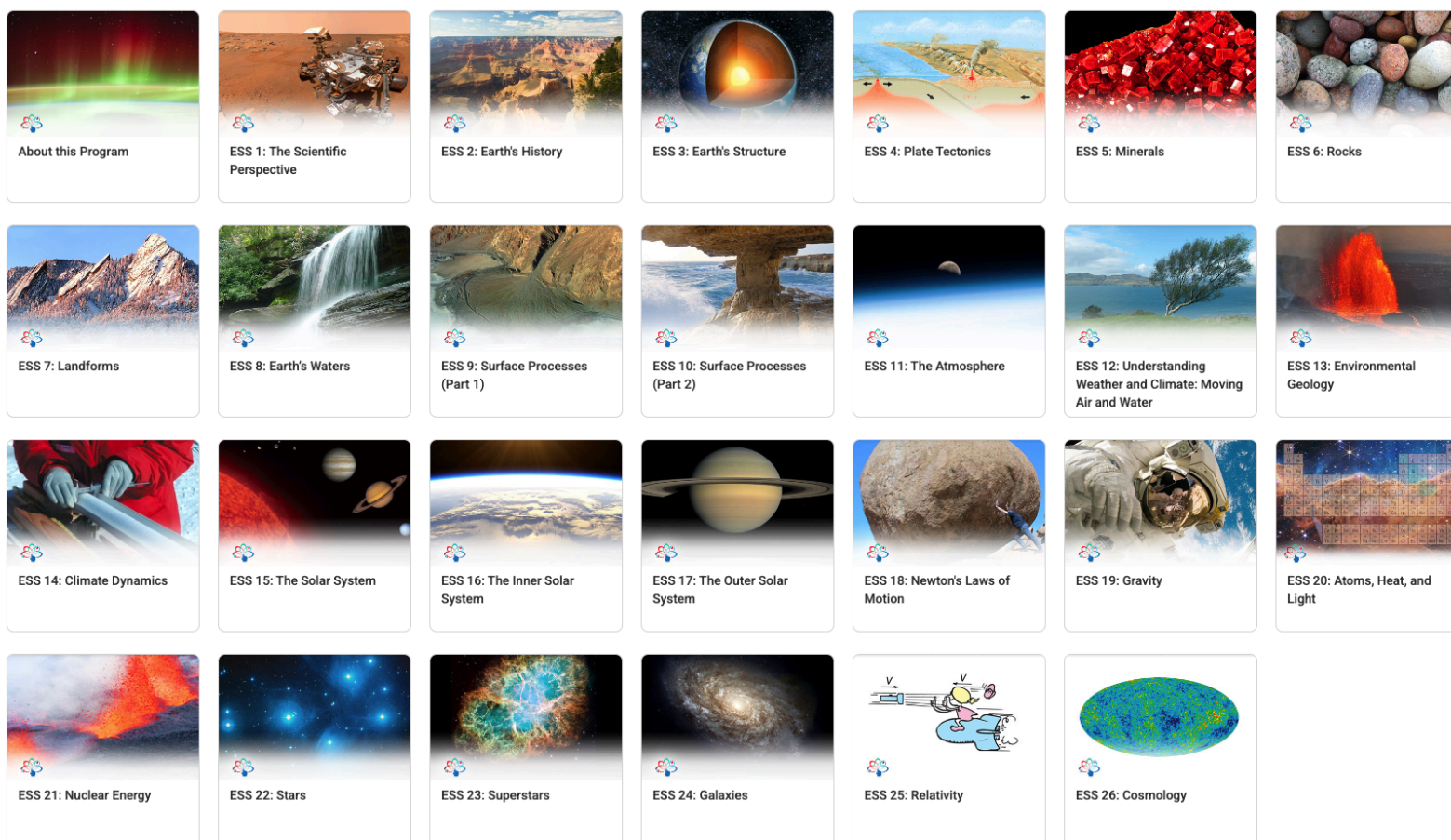
Scope and Sequence: Chemistry

Conceptual Academy Chemistry emphasizes the interconnected ideas that make the molecular world understandable. Beginning with the submicroscopic world of atoms, we explore atomic structure and the periodic table, then lay the groundwork for understanding how atoms bond to form molecules. From there, the focus moves into solutions, chemical reactions, and the behavior of acids, bases, and electrons. Finally, the diverse world of organic compounds and polymers are covered. Throughout, chemical concepts connect to real-world examples from materials science, medicine, environmental protection, and energy.



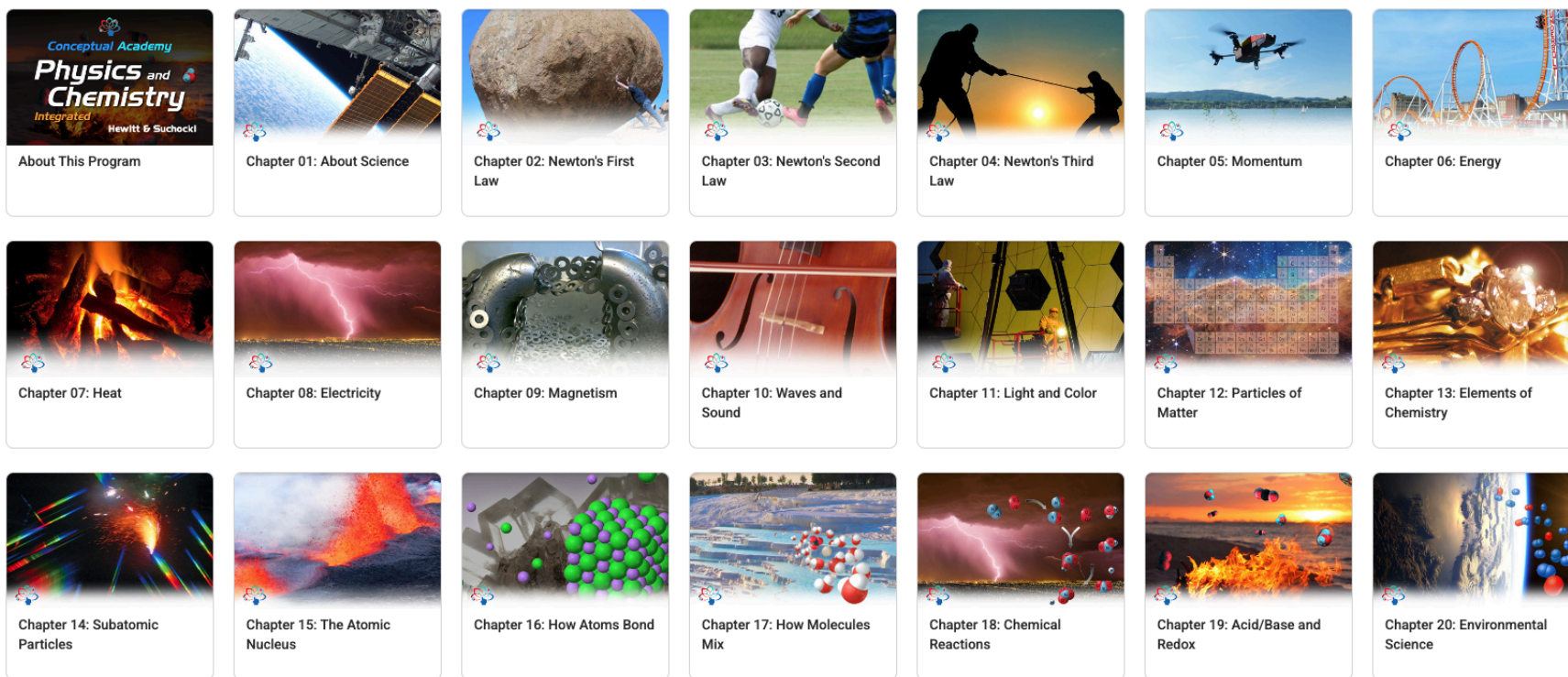
Scope and Sequence: Earth and Space Science

Conceptual Academy Earth and Space Science begins with Earth's deep history and interior structure. Your students will explore plate tectonics, minerals, rocks, and the surface processes that shape our world. From there, the focus moves through oceans, atmosphere, weather, and climate before venturing out to the solar system, stellar life cycles, galaxies, and cosmology. Foundational physics—from Newton's laws to relativity—is woven throughout.



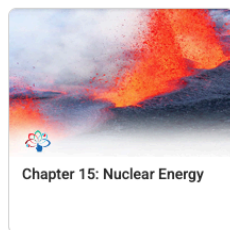
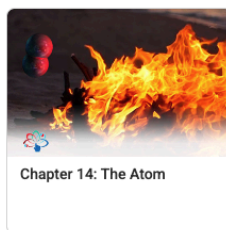
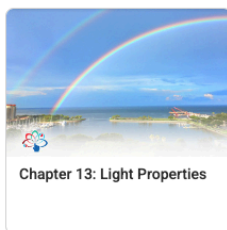
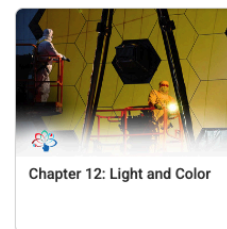
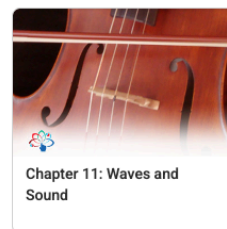
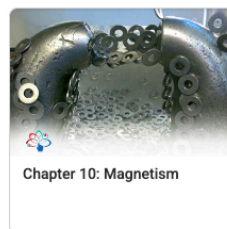
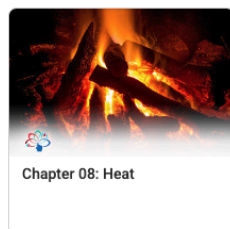
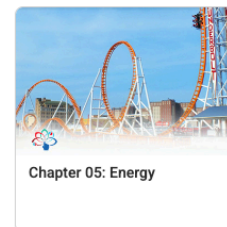
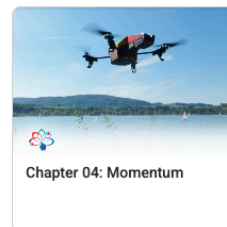
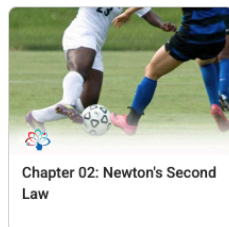
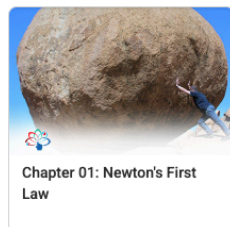
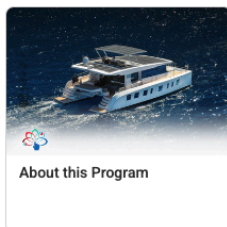
Scope and Sequence: Physical Science

Conceptual Academy Physics and Chemistry Integrated is designed as an introductory-level program for a comprehensive course in physical science. Beginning with Newton's laws of motion, students explore momentum, energy, and heat then progress to electricity, magnetism, and waves. From there, they journey into the submicroscopic world of atoms, the periodic table, and how atoms bond to form molecules. Students then examine solutions and chemical reactions, culminating in environmental science applications such as water quality, air pollution, climate, and sustainable energy.



Scope and Sequence: Physics

This program takes a conceptual approach to physics at an introductory level, building on the legacy of Paul Hewitt's acclaimed Conceptual Physics curriculum now tailored specifically for high school students. Beginning with Newton's laws of motion, students explore momentum, energy, and gravity—gaining a foundation for understanding fluid mechanics and heat. From there, they journey into electricity and magnetism, waves and sound, and the fascinating behavior of light. Finally they'll explore atomic structure and nuclear energy. Physics concepts connect to real-world phenomena and students' everyday experiences.



Assessment

Every subchapter has in-line formative assessments providing checks for understanding. Exit Tickets in the form of a front-of-class *Next Time Question* are available to conclude each topic. All practice worksheets and homework are available to assign digitally, fully customizable and as printable PDF files. For summative assessment, each program includes a text bank with thousands of multiple choice and free response questions. Each chapter also offers a *Random Test Generator* which includes Teach inputs on how many questions and the level of difficulty for each question. If additional resources are desired, teachers may use Notebook's AI tools to generate formative or summative assessments with answer keys and exemplar student responses based off of the lesson material.

Independent Work

B. Video Check

A cell without a cell nucleus is

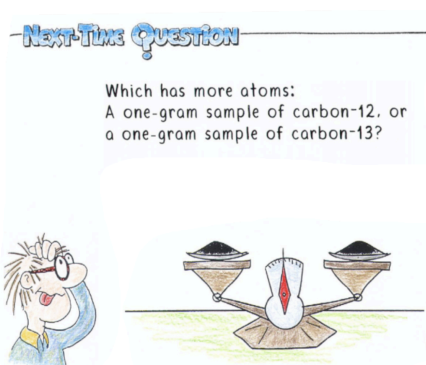
☐ A eukaryotic.

☐ B prokaryotic.

☐ C either prokaryotic or eukaryotic.

☐ D neither prokaryotic nor eukaryotic.

Submit



Name _____ Date _____

Conceptual Chemistry

Chapter 3: Elements of Chemistry
Polyatomic Ions

Sometimes a molecule can lose or gain a proton (hydrogen ion) to form what we call a polyatomic ion:

$$\text{HO}-\text{P}(\text{OH})_2-\text{OH} \rightarrow \text{O}=\text{P}(\text{O})_2-\text{O}^- + \text{H}^+ \quad \text{H}-\text{N}(\text{H})_3 + \text{H}^+ \rightarrow \text{H}-\text{N}^+(\text{H})_3-\text{H}$$

Phosphoric acid (molecule) Phosphate ion (polyatomic ion) Ammonia (molecule) Ammonium ion (polyatomic ion)

NAME	FORMULA	NAME	FORMULA
Ammonium ion	NH_4^+	Hydroxide ion	OH^-
Bicarbonate ion	HCO_3^-	Nitrate ion	NO_3^-
Carbonate ion	CO_3^{2-}	Phosphate ion	PO_4^{3-}
Cyanide ion	CN^-	Sulfate ion	SO_4^{2-}

Some monatomic ions: Sodium, Na^+ ; Potassium, K^+ ; Calcium, Ca^{2+} ; Aluminum, Al^{3+}

When it comes to naming compounds, a polyatomic ion is treated as a single unit. Positively charged ions are listed first followed by the negatively charged ions, but we don't include the word "ion". For example, below is the formula for ammonium phosphate. Notice how we need three (+) ammoniums to balance a single (3-) phosphate.

positively charged ion negatively charged ion

$(\text{NH}_4)_3\text{PO}_4$

Use the table of common polyatomic ions to deduce the formula for the following compounds:

Ammonium sulfate _____ Potassium cyanide _____

Sodium sulfate _____ Calcium phosphate _____

Chapter 3 Random Test Generator

Enter the number of each type of question along with the name of your exam or quiz.
Questions from the test bank for this chapter are chosen randomly with each click of an export button.

Easy:	Multiple Choice	<input type="text"/>	Short Answer	<input type="text"/>	Total <input type="text" value="0"/>
Moderate:	Multiple Choice	<input type="text"/>	Short Answer	<input type="text"/>	
Difficult:	Multiple Choice	<input type="text"/>	Short Answer	<input type="text"/>	

Name of Your Exam:

Export as CSV Export as PDF

PocketLab Notebook AI

How would you like to modify this lesson?

Generate new document

Select a document type:

- NGSS Standards Alignment
- TEKS Standards Alignment
- Exit Ticket
- Quiz
- Lesson Summary for Families
- Other

Cancel Generate

(b) Eukaryotic cell

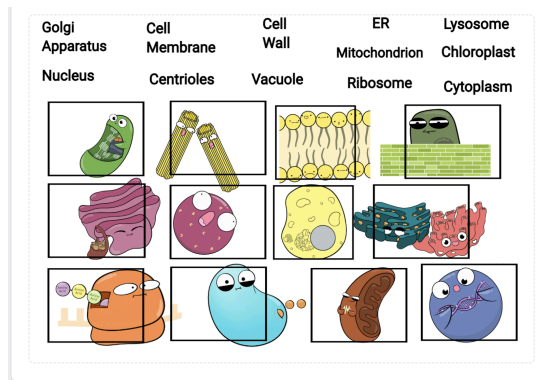
3.1

prokaryotic cells have no nucleus. (b) Eukaryotic cells have a nucleus.

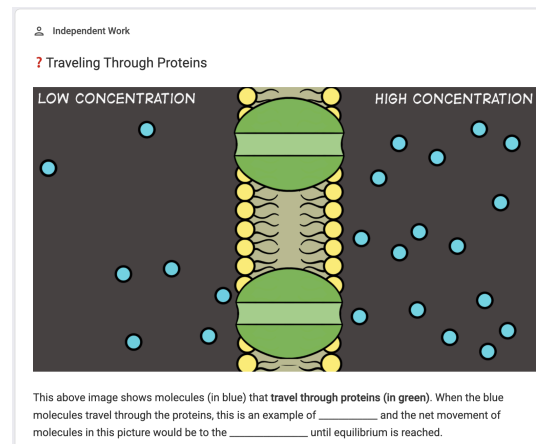
MAAP Biology Exam Preparation

Prepare for the MAAP Biology exam with customized Amoeba Sisters lessons targeting each of the five Mississippi Content Strands. The review lessons conclude each chapter of Conceptual Academy Biology programs and target Depth of Knowledge across Levels 1, 2, and 3.

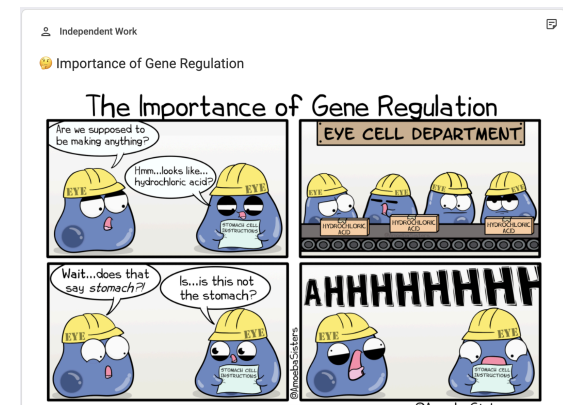
Cells and Energy - Cells as a System



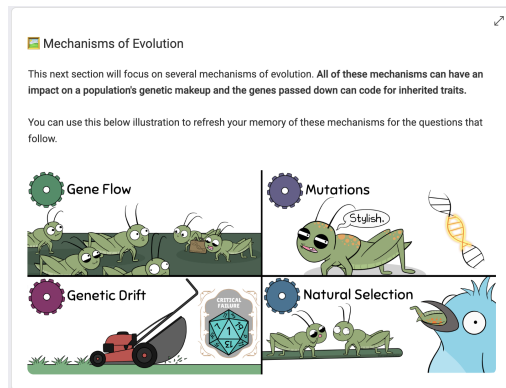
Cells and Energy - Energy Transfer



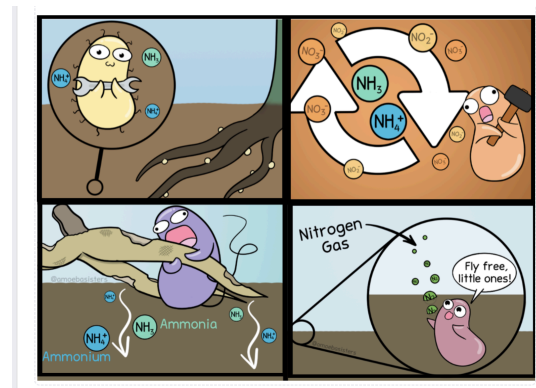
Heredity and Evolution - Reproduction and Heredity



Heredity and Evolution - Adaptations and Evolution



Interdependence of Organisms and their Environments



Question types include:

- Multiple Choice
- Drag and drop
- Hotspot
- Bar graphs
- Data displays
- Matching interactions
- Text entry

Professional Learning with the largest Science Teacher Community in the World: Science is Cool (ScIC)

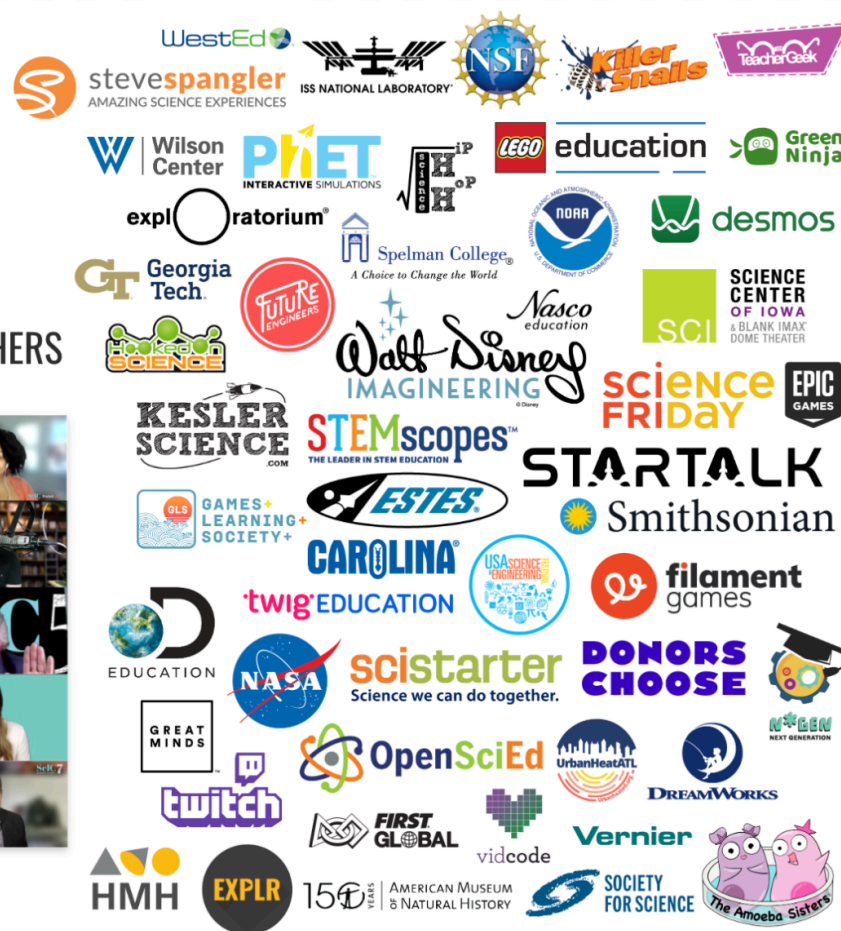
We're on a mission to inspire science teachers through unforgettable professional development experiences and by removing barriers to a more engaged science classroom. The spirit of our work as an *unconference* is to provide everyone with valuable resources as well as giving participants a voice for what's next.

thepocketlab.com/scic

ScIC

SCIENCE IS COOL

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Research and Effectiveness

Patent on AI technology for Formative Assessment

(12) United States Patent Roozeboom et al.	(10) Patent No.: US 11,763,693 B2 (45) Date of Patent: Sep. 19, 2023
(54) ARTIFICIAL INTELLIGENCE DRIVEN ASSESSMENT AND FEEDBACK TOOL	(56) References Cited
(71) Applicant: Myriad Sensors, Inc. , Mountain View, CA (US)	U.S. PATENT DOCUMENTS
(72) Inventors: Clifton Roozeboom , Mountain View, CA (US); David Bakker , San Jose, CA (US); Robert Douthett , Mountain View, CA (US); John Bower , Leeds (GB); Corin Dubie , Nashville, TN (US)	2010/0198903 A1* 8/2010 Brady et al. G06Q 50/20 709/201 2013/0117019 A1* 5/2013 Akopian et al. G06Q 50/00 704/235 2020/0065681 A1* 2/2020 Wolf et al. G06N 5/04 2021/0035464 A1* 2/2021 Otero et al. G09B 23/181 2021/033249 A1* 10/2021 Remes et al. G01N 30/8641
(73) Assignee: Myriad Sensors, Inc. , Mountain View, CA (US)	* cited by examiner
(*) Notice: Subject to any disclaimer, the term of this	Primary Examiner — Di Xiao (74) Attorney, Agent, or Firm — Patterson & Sheridan, LLP

Smithsonian Education Summit

Teaching fellows showcased how PocketLabs and Guided Inquiry Design (GID) work in harmony to create powerful science learning experiences. The approach helped to shift students' perspectives on scientific knowledge, address misconceptions and empower them to think of science as an evolving field.

Teaching AP Science Evaluation

"The PocketLab Air device is a powerful tool that connects to a computer, tablet or phone app, allowing us to monitor air quality factors. By incorporating hands-on activities and real-time data analysis, students can enhance their comprehension of these crucial concepts within the field of environmental science."

Using PocketLab for Hands-on Physical Science Labs

Participants: 1,538 students.

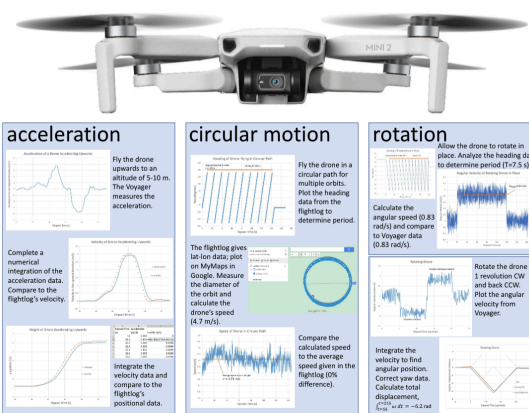
Assessment: 10-question pretest and posttest scores.

Results: Students' science gain scores were significant ($t = 3.34$, $df = 1536$, $p < .001$), for the PocketLab group vs. the non-PocketLab control group



Utilizing Drones and PocketLab in a First-year Physics Lab

Researchers at Nicholls State University combined drones and PocketLab data to introduce students to drone flight mechanics



Georgia Tech and Spelman College Heat Island Research

Atmospheric science researchers and citizen scientists used PocketLab to map heat islands in a cross-disciplinary collaboration with students and Atlanta community members.

