STEM Learning Experiences for Every Student

Let students take an active role! Students learn best, and are more self-motivated, when they become active participants in their lessons. Savvas K12 Science programs engage students with real-world tasks, open-ended investigations, and the engineering design process.

Experience IT! It's the Science of Doing.

elevate science

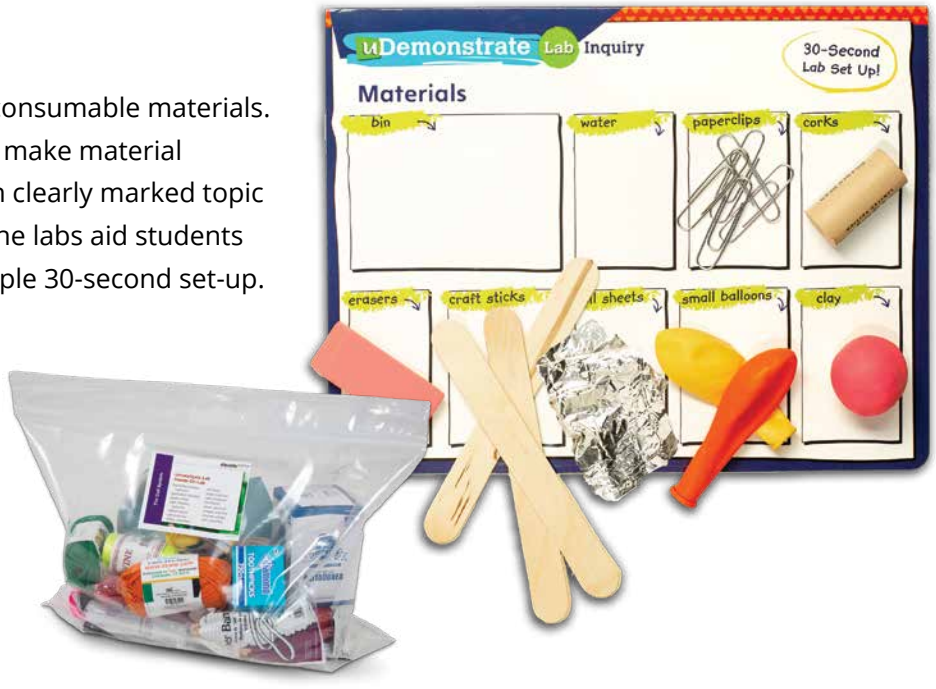
Introduce students to the engineering design process by bringing STEM into your classroom with ***Elevate Science*** K-8. STEM activities are integrated in every topic. Simple, doable, and adaptable, the STEM activities fully align to new Science Standards. Fuel innovation, problem solving, and collaboration with ***Elevate Science.*** Experience *IT!* Its the science of doing!

The Science Quest!

Students explore like scientists and engineers as they use STEM practices to solve Quest problems in every topic of ***Elevate Science.***

Classroom Materials Kits

Kits include consumable and nonconsumable materials. Each classroom kit is organized to make material distribution easy and efficient with clearly marked topic bags. Activity Placemats (K-5) for the labs aid students and teachers with a quick and simple 30-second set-up.



littleBits™ STEM Invention Toolbox

Grades 3-8

Contains programmable electronic modules from our partner littleBits. Easy-to-use, color-coded electronic "Bits" snap together to create an endless array of inventions.

MakerCrates

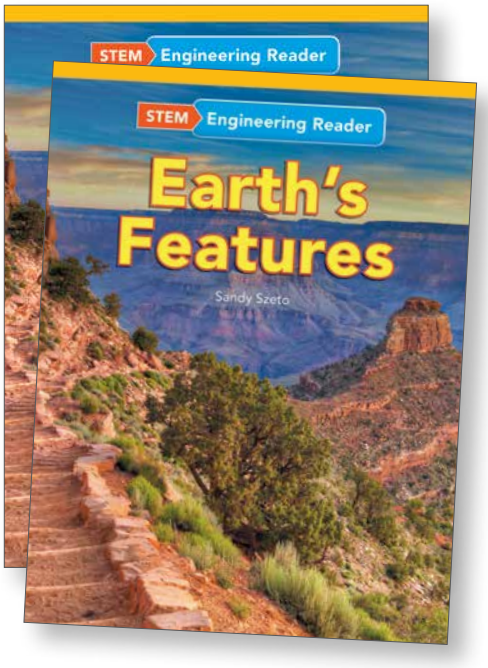
Grades K-2, 3-5, and 6-8

Create your own makerspace! Includes plenty of reusable materials for ongoing innovation, iteration, and design improvement. Tips are provided for starting your own makerspace, creating design challenges, and working in small groups.

STEM Engineering Readers

Grades K-5

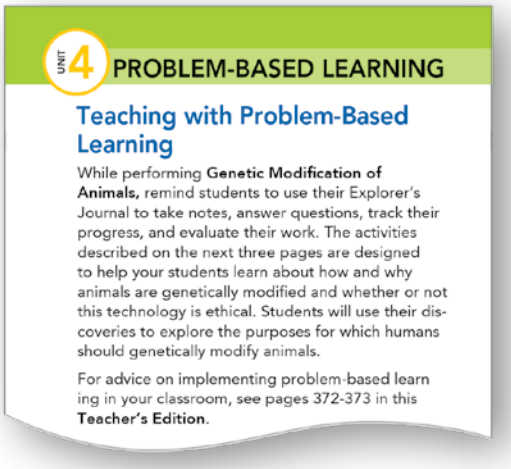
On-Level Readers help introduce the engineering design process to young students. These readers develop problem-solving skills, inspire natural curiosity and creative thinking while building engineering and design skills.



Miller & Levine Biology

DO MORE INQUIRY!

Throughout each lesson, students learn about real-life science problems—and take steps to solve them. Students are engaged with natural phenomena through case studies, labs, STEM activities,and research projects as they investigate key questions, apply science and engineering practices, and interpret data.


UNIT 4 PROBLEM-BASED LEARNING

Teaching with Problem-Based Learning

While performing **Genetic Modification of Animals,** remind students to use their Explorer's Journal to take notes, answer questions, track their progress, and evaluate their work. The activities described on the next three pages are designed to help your students learn about how and why animals are genetically modified and whether or not this technology is ethical. Students will use their discoveries to explore the purposes for which humans should genetically modify animals.

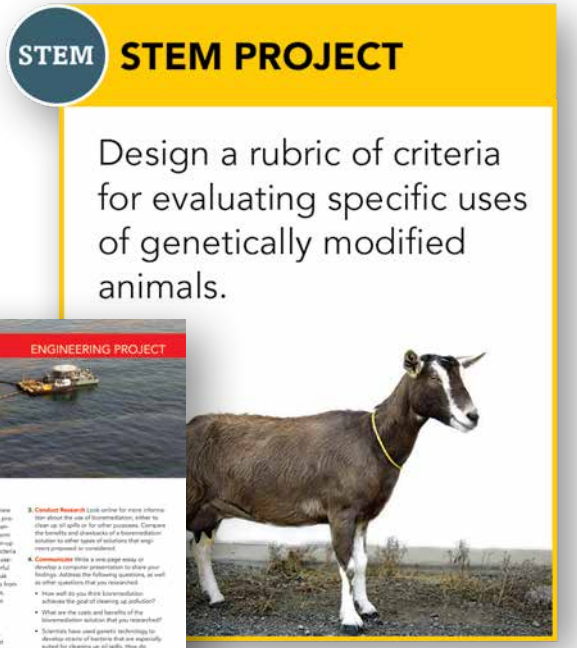
For advice on implementing problem-based learning in your classroom, see pages 372-373 in this **Teacher's Edition**.

Problem-Based Learning

Miller & Levine Biology students complete a Problem-based Learning project every unit! Students who can self-direct when faced with a problem show deeper understanding, better retention, and more creativity. Watch your class experience being scientists and engineers as they solve real-world problems.

Performance-Based Assessments

Students demonstrate mastery of performance expectations through scientific inquiry and engineering design projects at the end of every chapter. They practice important STEM skills such as analyzing data, evaluating solutions, and constructing arguments.


STEM STEM PROJECT

Design a rubric of criteria for evaluating specific uses of genetically modified animals.


PERFORMANCE-BASED ASSESSMENT ENGINEERING PROJECT

Bioremediation

Using Cells to Clean Up Pollution

Evaluate a Solution

Experience Chemistry

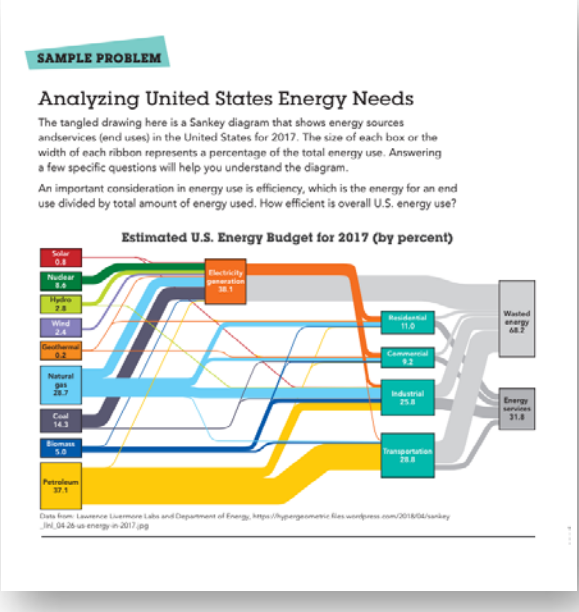
Investigate the chemical potential energy in food. Develop models of energy conservation. Evaluate chemical engineering solutions that reduce climate change. This is the science of doing! *Experience Chemistry* uses cool, weird, and amazing phenomena to engage students in 3D science.

The Flinn Lab Experience

Savvas is proud to partner with Flinn Scienti ic on the highest quality laboratory experiences for your chemistry class. Resources include four versions of every inquiry lab, videos, lab kits and virtual reality experiences.

Real-World Science and Engineering Performance Tasks

The Engineering Design Challenges and Performance-Based Assessments take students through the engineering design process and build their science and engineering skills while assessing their mastery of the standards.


SAMPLE PROBLEM

Analyzing United States Energy Needs

The tangled drawing here is a Sankey diagram that shows energy sources andservices (end uses) in the United States for 2017. The size of each box or the width of each ribbon represents a percentage of the total energy use. Answering a few specific questions will help you understand the diagram.

An important consideration in energy use is efficiency, which is the energy for an end use divided by total amount of energy used. How efficient is overall U.S. energy use?

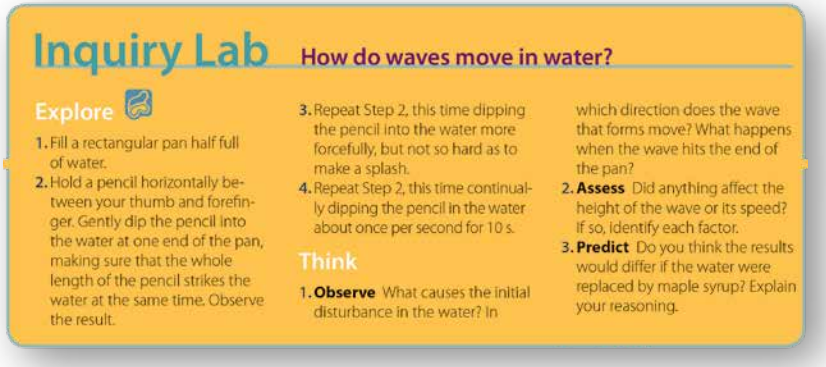
Estimated U.S. Energy Budget for 2017 (by percent)

Data Analysis Activities and Math Support Videos

Students interact with math problems and math-related science and engineering practices throughout the program, to practice and become proficient with math and chemistry concepts. Look for Stepped-out Sample Problems in the Student Experience Notebook, Analyzing Data Activities and Worksheets on Savvas Realize™, Integrating Math and Quantitative Thinking prompts in the Teacher Guide, and a Math Problem Bank on the Savvas Realize™ digital platform.

Physics

Savvas Physics is the only high school program that blends conceptual development and quantitative problem solving. The dual emphasis on concepts and math and numerous and varied examples —together with Mastering™ Physics — deliver a superior program.



Inquiry Lab How do waves move in water?

Explore

1. Fill a rectangular pan half full of water.
2. Hold a pencil horizontally between your thumb and forefinger. Gently dip the pencil into the water at one end of the pan, making sure that the whole length of the pencil strikes the water at the same time. Observe the result.
3. Repeat Step 2, this time dipping the pencil into the water more forcefully, but not so hard as to make a splash.
4. Repeat Step 2, this time continually dipping the pencil in the water about once per second for 10 s.

Think

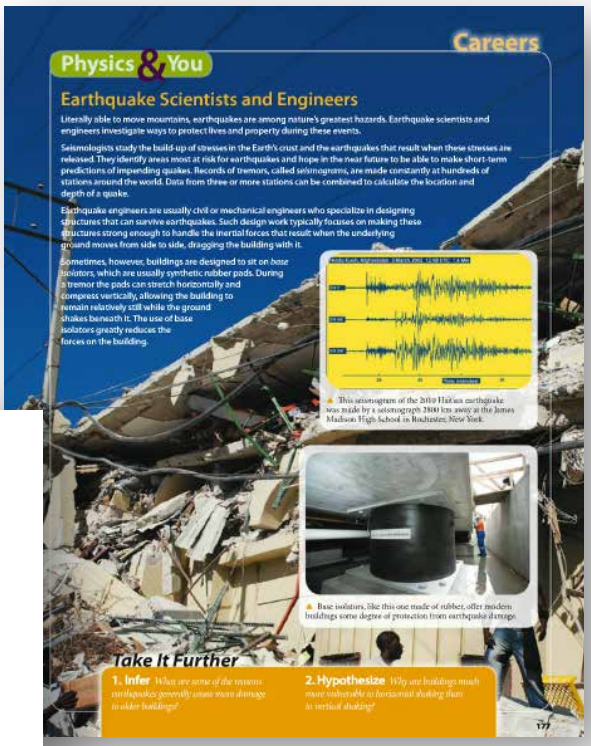
1. **Observe** What causes the initial disturbance in the water? In which direction does the wave that forms move? What happens when the wave hits the end of the pan?
2. **Assess** Did anything affect the height of the wave or its speed? If so, identify each factor.
3. **Predict** Do you think the results would differ if the water were replaced by maple syrup? Explain your reasoning.

Math Skills and Lab Explorations

Students gradually build their math skills by beginning with simple examples and building to more advanced skills. The program extends conceptual understandings and helps connect students to related equations and problem-solving skills. Hands-on lab explorations are found in the text itself and through a separate Lab Manual.

STEM Activities

Mastering™ Physics STEM activities are an interdisciplinary approach to learning where rigorous academic concepts are coupled with real-world lessons. Students apply science, technology, engineering, and mathematics in contexts that make connections between school, community, work, and the global enterprise.



Careers

Physics & You

Earthquake Scientists and Engineers

Literally able to move mountains, earthquakes are among nature's greatest hazards. Earthquake scientists and engineers investigate ways to protect lives and property during these events.

Seismologists study the build-up of stresses in the Earth's crust and the earthquakes that result when these stresses are released. They identify areas most at risk for earthquakes and hope in the near future to be able to make short-term predictions of impending quakes. Records of tremors, called seismograms, are made constantly at hundreds of stations around the world. Data from three or more stations can be combined to calculate the location and depth of a quake.

Earthquake engineers are usually civil or mechanical engineers who specialize in designing structures that can survive earthquakes. Such design work typically focuses on making these structures strong enough to handle the inertial forces that result when the underlying ground moves from side to side, dragging the building with it.

Sometimes, however, buildings are designed to sit on *base isolators*, which are usually synthetic rubber pads. During a tremor the pads can stretch horizontally and compress vertically, allowing the building to remain relatively still while the ground shakes beneath it. The use of base isolators greatly reduces the forces on the building.

▲ This seismogram of the 2010 Haitian earthquake was made by a seismograph 2800 km away at the James Madison High School in Rochester, New York.

▲ Base isolators, like this one made of rubber, offer modern buildings some degree of protection from earthquake damage.

Take It Further

1. **Infer** *What are some of the reasons earthquakes generally cause more damage to older buildings?*
2. **Hypothesize** *Why are buildings much more vulnerable to horizontal shaking than to vertical shaking?*

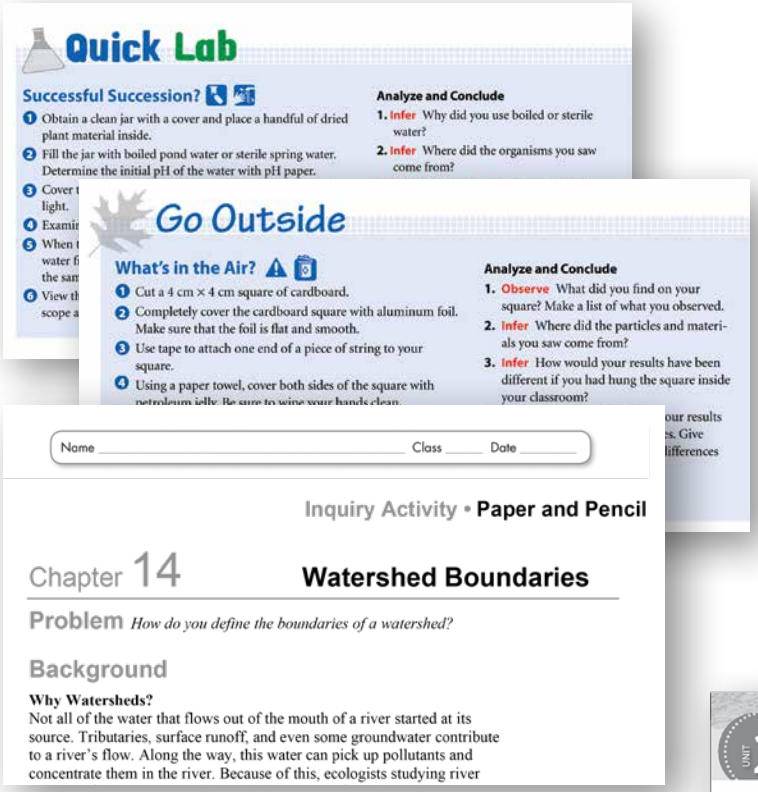
177

Physics & You: Technology The wheels on older cars often lock during panic braking, causing the car to skid uncontrollably. In general, sliding or skidding tires are subject to kinetic friction, whereas tires that roll experience static friction, as discussed in Conceptual Example 5.13. Since static friction is usually greater than kinetic friction, a car will stop in a shorter distance if its wheels are *rolling* (static friction) than if its wheels are locked up and skidding (kinetic friction)!

This is the idea behind antilock braking systems (ABS). When the brakes are applied in a car with ABS, an electronic rotation sensor at each wheel detects when the wheel is about to skid. To prevent the skidding, a small computer automatically begins to pump the brakes. This pumping allows the wheels to continue rotating, even in an emergency stop, and thus static friction determines the stopping distance. Figure 5.17 shows a comparison of braking distances for cars with and without ABS.

Environmental SCIENCE

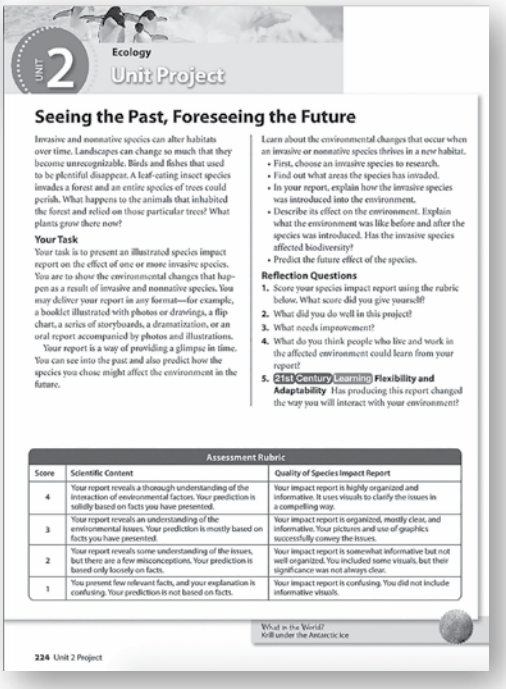
Using real-world case studies and a wide range of inquiry activities, *Environmental Science: Your World, Your Turn* puts the world in context by empowering your students to take an active role in their learning—and the world in which they live.



Lab Manual

This editable, online manual supports your STEM and inquiry needs with:-

- **In Your Neighborhood:** research-based activities that connect students with their local environment
- **Outdoor Labs and Activities:** inquiry labs and activities that take students into the field as they explore chapter concepts
- **Modeling Labs:** classroom labs that simulate environmental processes and concepts

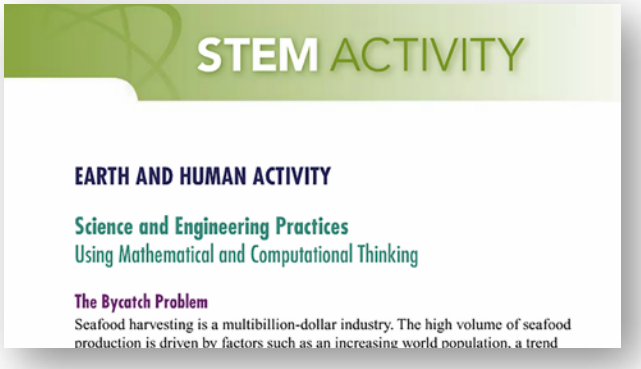


Unit Project

Students design a project that demonstrates a thorough understanding of the interaction of environmental factors. They develop arguments and positions based on facts they have uncovered through research and activities.

EARTH SCIENCE

Invite students on a journey of observation, explanation, and participation in the study of Earth's processes. An accessible writing style, coupled with powerful technology, support your high school curriculum through STEM activities with teacher support.



STEM Activities

Excite students with real-world engineering design problems and hands-on inquiry. These new activities promote higher-order critical thinking skills and result in improved student performance.

Marine Science:
The Dynamic Ocean

Marine Science offers STEM in context. Provide students with a unique way to learn about marine science in context — tracking the paths of animals in the ocean in real time. This robust, high school course blends Life, Earth, and Physical Science.

STEM Pedagogical Strategies

Help students understand integrated science content in the context of the ocean—Earth's greatest resource.

For more info about **STEM solutions,**
contact us at Savvas.com/find-my-rep

SAVVAS
LEARNING COMPANY

Savvas.com/Science
800-848-9500

SciBro581R457