LAB-AIDS®

Proven Science Programs

APPLIED SCIENCE KITS & MODULES CATALOG 2020

SEPUP®
Issue-Oriented Science

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

EDC Learning transforms lives.

We've never been "just kits."

Hands-on learning is more than playing with science equipment.

When students are authentically engaged in a task, they are actively doing, actively thinking, and actively discussing. While hands are engaged, minds are questioning, sorting through input, and making connections. All of our programs — from 1-2 day kits, month long modules, and full-year curricula — are lessons, materials, and teacher supports designed to engage both the hands and the minds of students.

LAB-AIDS®

Science lessons for a day, a week, or the whole year.

	Activities	Instructional Time	Components
Kit	1–3	1–3 days	materials student sheets teacher's guide
Module	6–20	8–30 days	materials curriculum teacher's guide assessment
Unit	15–23	4–10 weeks	materials curriculum teacher's guide ancillaries assessment system*
Full Year	customizable by district	customizable by district	materials curriculum teacher's guide ancillaries assessment system*

Proven Science Programs

* see pages 44-45 on curriculum side

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LAB-AIDS®

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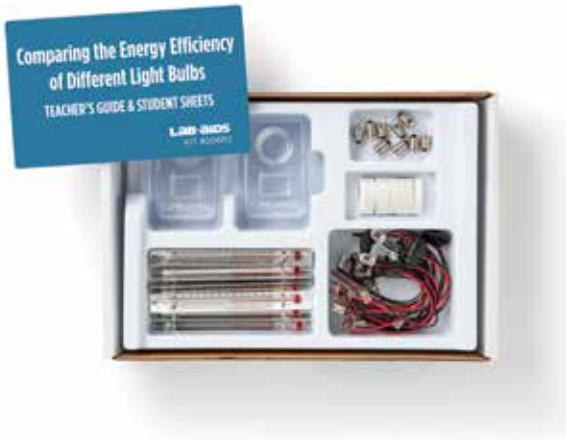
EDC Learning transforms lives.

KEY TO ICONS

- **AG** – popular with AgSci teachers
- **ADD A GROUP** – material packs available that accommodate one additional group
- **LITERACY** – meets our criteria for supporting literacy
- **NONCONSUMABLE** – contains no consumable materials
- **REFILLABLE** – refills for consumable items are available (-RC indicates a discounted refill pack)
- **SPANISH** – comes with two sets of student sheets, one in English, one in Spanish
- **STEM** – meets our stringent STEM criteria



COMPARING THE ENERGY EFFICIENCY OF DIFFERENT LIGHT BULBS

Kit #206RS — Developed by SEPUP

Students use a unique piece of equipment to collect data and compare the efficiencies of a small incandescent bulb and a small LED bulb. They use their measurements to calculate the efficiency of the bulbs to produce light by measuring how much "waste" thermal energy is produced. They also compare "lifetime costs" for different types of bulbs and consider the trade-offs involved when deciding which type of bulb to purchase.

Accommodates unlimited classes, each with 8 groups of 4 students.

Kit No. 206RS $156.25

STEM LITERACY NONCONSUMABLE

ORGANICALLY GROWN? TESTING FOR SIMULATED PESTICIDE RESIDUE

Kit #321

In this investigation, students will use a chemical test in order to determine whether fruit samples have been treated for any simulated pesticides. Based on their test results they grapple with the further question of which sample(s) could potentially be marketed as organic.

Accommodates one class with 8 groups of 4 students.

Kit No. 321 $119.95

STEM LITERACY AG NONCONSUMABLE

ANALYZING & EXPLAINING MOON PHASES

Kit #353S — Developed by SEPUP

In the first of three activities in this kit, students are challenged to figure out if there is a predictable and repeating pattern in how the Moon's appearance changes over time. They then use a computer simulation to collect, analyze, and interpret data to identify the causes of the cyclic pattern of the Moon's phases. In the final activity, students use a model that illustrates and explains why solar and lunar eclipses occur and why they do not occur each lunar cycle.

Accommodates unlimited classes, each with 8 groups of 4 students.

Kit No. 353S $274.50

STEM LITERACY NONCONSUMABLE

ENGINEERING & DESIGN: CHEMICAL HAND WARMERS

Kit #493S — Developed by SEPUP

Students undertake a design challenge to use a specific set of materials to construct and test a chemical hand warmer. In Part One students brainstorm and sketch several possible designs then choose one to build as a prototype and test. In Part 2, students redesign, construct, test, and evaluate hand warmers with an additional design criterion introduced—users must be able to start the chemical reaction "on demand." Pairs of students exchange prototypes, test and evaluate them, then think about what modifications can help optimize their designs.

Accommodates one class with 8 groups of 4 students.

Kit No. 493S $174.95

STEM LITERACY REFILLABLE

ENGINEERING & DESIGN: MAGLEV TRANSPORT SYSTEMS

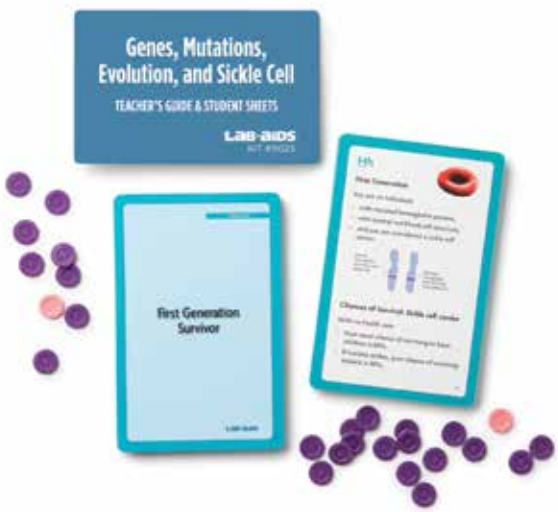
Kit #496S — Developed by SEPUP

In this multi-day activity students are challenged to design a magnetically levitated cart. They follow the engineering design process by building a prototype and then using an iterative testing procedure to optimize the size of the cart and the number and placement of magnets on the cart in order to maximize the load the cart can transport.

Accommodates unlimited classes, each with 8 groups of 4 students.

Kit No. 496S $298.00

STEM LITERACY NONCONSUMABLE



GENES, MUTATIONS, EVOLUTION, & SICKLE CELL

Kit #902S — Developed by SEPUP

In this two-part activity students follow the inheritance of a hemoglobin mutation through generations. In Part 1, they use a physical model to collect data for two generations. In Part 2, they use a computer model to extend their study to 30 generations. Students identify patterns in their data, investigate the cause-and-effect relationship between several environmental conditions and the frequency and distribution of a trait, and explain how mutations lead to changes in protein structure and function that can affect survival.

Accommodates unlimited classes, each with 8 groups of 4 students.

Kit No. 902S $89.50

STEM LITERACY AG NONCONSUMABLE

SKELETAL & EMBRYOLOGICAL EVIDENCE FOR EVOLUTIONARY RELATIONSHIPS

Kit #910S — Developed by SEPUP

Students first examine forelimb skeletons of six species to identify bones with homologous structures and functions and identify similarities at the skeletal level. They then examine embryological development of limbs and notice many similarities between different species not obvious in the mature animals. Finally. students examine the development of whole embryos of different species to infer evolutionary relationships.

Accommodates unlimited classes, each with 8 groups of 4 students.

Kit No. 910S $153.45

LITERACY
NONCONSUMABLE

MODELING THE INHERITANCE OF TRAITS

Kit #912S — Developed by SEPUP

Students model the diversity of offspring possible from two parents and discover patterns of inheritance other than strict dominant/recessive traits. These patterns help them model and explain the wide variation that can result from sexual reproduction and explore the cause-and-effect relationships for additional traits.

Accommodates unlimited classes, each with 8 groups of 4 students.

Kit No. 912S $184.80

STEM LITERACY
AG NONCONSUMABLE

MODELING STREAM EROSION AND DEPOSITION

Kit #442

Student groups use a Lab-Aids® Mini Stream Table to investigate the dynamics of stream erosion and deposition. Using specially engineered materials students create, observe, describe, and interpret the erosional and depositional patterns created when "rainwater" flows over an area. Some of the features commonly formed include canyons, braided streams, and deltas.

Accommodates two classes, each with 6 groups of four students.

Kit No. 442	$171.55
Add a Group No. 442EL	$34.95

LITERACY STEM AG REFILLABLE ADD A GROUP

EARTH AND YOU (CREATED BY THE AMERICAN GEOLOGICAL INSTITUTE)

Kit #AGI-1

Earth and You™ brings planet Earth and its systems right into the classroom! Video vignettes using stunning high definition footage and Hollywood style animations take you back to Earth's beginning, down to its hot interior, within volcanoes, over mountaintops, into deep oceans, through the evolution of life, and much, much more.

Accommodates unlimited classes with one group of students.

Kit No. AGI-1	$77.20

NONCONSUMABLE

MAKING AND INTERPRETING TOPOGRAPHIC MAPS

Kit #439S — Developed by SEPUP

This activity provides students with a basic understanding of topographic maps and how to interpret them. Students conduct a hands-on investigation using the Lab-Aids® Topographic Model to construct contour lines and create a topographic map of an area. The activity illustrates the relationship between the contour lines on a topographic map and the actual shape of the land.

Accommodates dozens of classes, each with 6 groups of four students.

Kit No. 439S	$94.65
Add a Group No. 439SEL	$16.45

LITERACY ADD A GROUP AG REFILLABLE

DENDROCHRONOLOGY: TREE RING DATING

Kit #52

Your students will learn the important effects of climate on living things as they unravel secrets about the age and history of trees. They will also be asked to estimate the climate of a particular year in the distant past by carefully studying a tree's annual rings. Students can also infer similar information by using various wooden objects.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 52	$57.55
Add a Group No. 52EL	$9.65
Eng./Spn. Kit No. 52-BL	$59.85

SPANISH ADD A GROUP AG NONCONSUMABLE

MODELING AND INVESTIGATING WATERSHEDS

Kit #437

Despite the significance of watersheds, many students get few opportunities to explore this important aspect of topography and its relationship to the water cycle. Students apply "rain" over a topographic model and observe the water runoff. From their observations they identify the location of major bodies of water such as lakes, rivers, and streams. This activity not only provides students with first-hand experience with watersheds but also provides a knowledge base to better understand issues such as how an abandoned mine may influence water quality far from the mine site or how farming practices in Nebraska may influence the health of organisms in the Gulf of Mexico.

Accommodates ten classes, each with 6 groups of four students.

Kit No. 437	$104.75
Add a Group No. 437EL	$17.95

LITERACY STEM AG REFILLABLE ADD A GROUP

MAGNETIC FIELDS AND FORCES

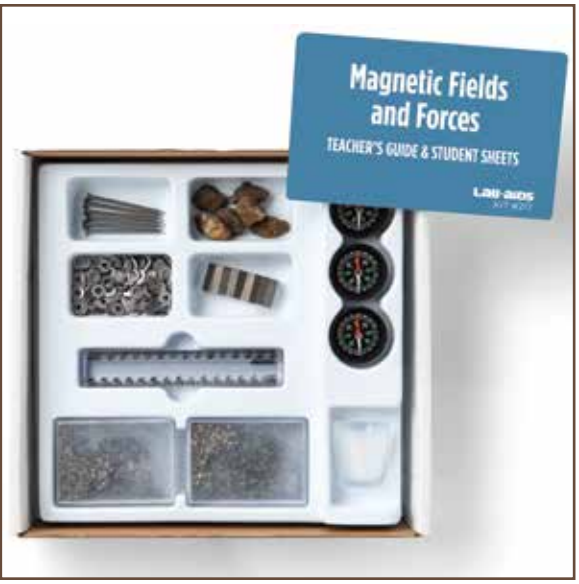
Kit #217

The two activities included explore magnets and magnetic fields, particularly Earth's magnetic field. Students first develop operational definitions of magnets, magnetic poles, and magnetic fields then continue their exploration by examining naturally magnetic rocks and the behavior of navigational compasses.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 217	$136.15
Add a Group No. 217EL	$23.65

LITERACY ADD A GROUP AG NONCONSUMABLE



CLASSIFYING SEDIMENTARY, METAMORPHIC AND IGNEOUS ROCKS

Kit #403S — Developed by SEPUP

Why study rocks? This kit helps you answer this question while providing rock samples for study. A fictional scenario describes the alleged discovery of diamonds in a national forest by a pair of hikers. Students learn that certain natural resources are often found in association with certain rocks. A reading on the formation of igneous, sedimentary, and metamorphic rocks supplements student observations as they examine, describe, and group rock samples.

Accommodates unlimited classes, each with 16 groups of two students.

Kit No. 403S $126.45

LITERACY
NONCONSUMABLE

CLASSIFYING OBJECTS IN THE SOLAR SYSTEM

Kit #352S — Developed by SEPUP

Students use sets of SEPUP/Lab-Aids cards to identify different kinds of objects found in space, with a focus on those observed in our Solar System. The cards contain comparable characteristics of the different objects and students use this information to develop a system of classification. They then compare their own classification system with the standard system used by astronomers. Students then apply their knowledge by analyzing the reasons for the reclassification of Pluto and deciding whether they think it should be classified as a planet or a dwarf planet.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 352S $70.95
Add a Group No. 352SEL $12.30

ADD A GROUP
LITERACY NONCONSUMABLE

READING RIVER SEDIMENTS: SIMULATED MINERAL EXPLORATION

Kit #435

Students conduct a mineral exploration which simulates real-life economic, societal and issue-oriented problems. The activities are designed to introduce and use topographic maps and learn about rock types, erosion and river dynamics. The kit is based on the understanding that as water works along the Earth's surface and through the ground, it picks up small amounts of the minerals found in the rocks and sediments. Certain minerals ionize, then travel along in the moving water and later react chemically with the surface of river sediments. The closer the section of river is to a mineral deposit, the greater the detectable amount will be of the river sediments.

Accommodates three classes, each with 15 groups of two students.

Kit No. 435	$175.15
Eng./Spn. Kit No. 435-BL	$177.30

LITERACY STEM AG REFILLABLE

GEOMETRY OF CRYSTAL STRUCTURE

Kit #401

Using a unique approach to explore crystal structure, students use transparent pre-cut shapes to construct models of the six basic crystal shapes. They insert axes at established center points on each crystal face. Using the provided goniometers, students measure the length of the axes and the angles formed. They observe the geometric shape of all facets (squares, rectangles, and triangles) and record the data about each crystal form. By rotating the model on a central axis, students study the symmetry and repetition of forms.

Accommodates unlimited classes, each with 15 groups of two students.

Kit No. 401	$125.50
Eng./Spn. Kit No. 401-BL	$127.75

LITERACY NONCONSUMABLE SPANISH

THE ROCK CYCLE ACTVITY

Kit #404S — Developed by SEPUP

The concept of the rock cycle is complex, including the formation and break down of rocks and the processes by which one type of rock can become another. This game models and reinforces these ideas. Playing in groups of four, students record what happens to their set of igneous, sedimentary, and metamorphic rocks. After completing the game, they work together to share results. A detailed student sheet guides students on how to use their results to describe the rock cycle. The kit contains eight complete sets of the game so that an entire class can play simultaneously.

Accommodates unlimited classes, each with 8 groups of four students.

Kit No. 404S $116.65

LITERACY
NONCONSUMABLE

MINERAL STRUCTURE – CLEAVAGE AND FRACTURE

Kit #402

This engaging activity is used to help students identify minerals by their physical properties of cleavage and fracture. Mineral samples (included) are used to show cleavage in one, two, three, four, and six directions. Other minerals in the kit are used to demonstrate the conchoidal and uneven properties of fracture.

This is an excellent activity to follow up an activity on crystal structure

Accommodates unlimited classes, each with 15 groups of two students.

Kit No. 402 $198.85
Eng./Spn. Kit No. 402-BL $201.00

SPANISH
NONCONSUMABLE

CLIMATE CHANGE: ORGANISMS AS CLIMATE INDICATORS

Kit #481E — Developed by EDC

In this activity students examine simulated drill cores of recent and much older seafloor sediments that contain "fossils" of microscopic organisms called foraminifera (forams). Students sort the different forams contained in their sediment core and determine the percentage of a certain species with right-coiling shells. Knowing the age of the sediments and that the percentage of right-coiling shells correlates to the water temperature at the time, students create a graph showing how water temperature has changed over time.

Kit does not include the actual sediments that form the matrix surrounding the "fossils." Use your own or those in EDCE-B013, chosen to reduce "fossil" damage.

Accommodates unlimited classes, each with 16 groups of two students.

Kit No. 481E	$107.60
Core Sediments EDC-B013	$16.67

STEM LITERACY AG NONCONSUMABLE

EXAMINING FOSSILS

Kit #406S — Developed by SEPUP

Fossils provide important evidence about changes on Earth. This kit provides students with the opportunity to handle and examine eight different fossils from various localities and geologic ages. Fossils of species that are no longer living, as well as fossils of species similar but not identical to those alive today, provide evidence for extinction and evolutionary change. Students experience first-hand the power and limitations of using fossils as evidence of past life and as one of the bases for determining evolutionary relationships. The geologic time scale is also introduced.

Accommodates unlimited classes, each with 16 groups of two students.

Kit No. 406S	$144.25

LITERACY NONCONSUMABLE

CLIMATE CHANGE: CARBON CYCLING

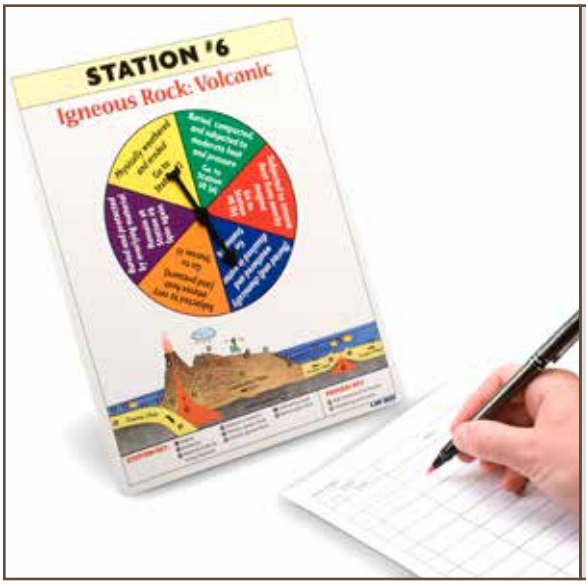
Kit #482E — Developed by EDC

Over the course of several class periods, students engage in four activities related to carbon and its movement through the carbon cycle. In Part A and B students build molecular models to better understand some of the everyday reactions that allow carbon atoms to form different molecules and move from one place to another. Part C ties the previous parts together as students are introduced to, and do a basic analysis of, Earth's major carbon sources, sinks, and associated fluxes. They also learn that when properly balanced, the carbon cycle helps maintain stable conditions, including average surface and ocean temperature.

Accommodates unlimited classes, each with 8 groups of four students.

Kit No. 482E $188.30

AG LITERACY NONCONSUMABLE



ROCK CYCLE: INTERACTIVE EXPLORATION THROUGH GEOLOGIC TIME

Kit #430

The focus of this activity is helping students attain a better understanding of the rock cycle as a series of ongoing geologic processes that constantly reshape the Earth around us and beneath our feet. This activity engages the students through an active learning alternative to the traditional passive methods of studying the rock cycle. Students first imagine themselves as bits of Earth material moving through eight different earth process stages. After a set period of time, students analyze the unique pattern of their movement between these stages, calculate geologic time and illustrate their pattern by constructing a rock cycle diagram based on their own experiences.

Accommodates unlimited classes, each with 8 groups of four students.

Kit No. 430 $57.55

LITERACY NONCONSUMABLE

ENGINEERING AND DESIGN: REDUCING EROSION

Kit #485S — Developed by SEPUP

In this engineering design activity, students model the effect of ocean waves on a sea cliff with and without an erosion-reducing barrier in place. They then use this experience to design, test, and redesign structures to limit beach erosion.

Accommodates unlimited classes, each with 8 groups of 4 students.

Kit No. 485S $242.15

STEM LITERACY AG NONCONSUMABLE

MODELING CONVECTION CURRENTS

Kit #436S — Developed by SEPUP

Small groups of students use unique Lab-Aids/SEPUP materials to investigate convection currents in water. They use their experiences to develop an operational understanding of the relationship between water temperature and its movement. This knowledge is then applied to geology as students analyze data about the Earth's layers and convection currents in the lithosphere. The hands-on experience with convection in water coupled with the knowledge of Earth's interior is combined to explain the motion of the Earth's tectonic plates.

Accommodates dozens of classes, each with 6 groups of four students.

Kit No. 436S $94.65
Add a Group No. 436SEL $9.65

ADD A GROUP LITERACY REFILLABLE

CLIMATE CHANGE: EARTH'S CHANGING ATMOSPHERE

Kit #483S — Developed by SEPUP

In Part 1 of this activity, students analyze and interpret data related to changes in Earth's atmosphere over time. Using cards describing the relative amounts of gases in the atmosphere at different times in Earth's history, they see that Earth's atmosphere has changed dramatically for a variety of reasons. In Part 2, students use a computer simulation (or cards) to analyze data from the past 100 years to investigate the causes of current global warming. They ask data-driven questions to figure out what the evidence does and does not indicate and to examine the influence of both natural and human-related factors.

Accommodates unlimited classes, each with eight groups of students.

Kit No. 483S $94.95

LITERACY
NONCONSUMABLE

ANALYZING & EXPLAINING MOON PHASES

Kit #353S — Developed by SEPUP

In the first of three activities in this kit, students are challenged to figure out if there is a predictable and repeating pattern in how the Moon's appearance changes over time. They then use a computer simulation to collect, analyze, and interpret data to identify the causes of the cyclic pattern of the Moon's phases. In the final activity, students use a model that illustrates and explains why solar and lunar eclipses occur and why they do not occur each lunar cycle.

Accommodates unlimited classes, each with 8 groups of 4 students.

Kit No. 353S $274.50

ENGINEERING & DESIGN: MODELING AND MITIGATING STREAM PROCESSES

Kit #446S — Developed by SEPUP

Students model the phenomenon of sediment movement in a river using a unique mini stream table that provides evidence for how geoscience processes change Earth's surface. In Part A, students investigate how the changing energy of flowing water erodes and deposits sediments to create common landforms. Part B is an engineering design challenge where students use design criteria and constraints to design and test erosion-control structures. Based on the results of their initial testing, students redesign and retest their structures.

Accommodates two to three classes, each with 8 groups of 4 students.

Kit No. 446S $259.95

STEM LITERACY NONCONSUMABLE

PLATE TECTONICS: PLATE BOUNDARY COMPUTER SIMULATION

Kit #438S — Developed by SEPUP

In this investigation students use actual data and a computer simulation designed at the Lawrence Hall of Science to investigate the geology of plate boundaries. In Part 1, students compare and contrast continents with continental plates, draw plate boundaries from earthquake and volcano data, and label the major plates with their names and arrows indicating the direction the plates are moving. In Part 2, students use a computer simulation to explore what happens at plate boundaries over time. They investigate the changes that occur along divergent (spreading), transform (sliding), and convergent (colliding) plate boundary over different time periods. They then compare the geologic features of the three different kinds of plate boundaries and the Earth processes that cause them.

Accommodates unlimited classes with unlimited groups.

LITERACY

Kit No. 438S $39.05

NONCONSUMABLE

PLATE TECTONICS: EXAMINING EVIDENCE FOR CONTINENTAL DRIFT

Kit #445S — Developed by SEPUP

Student groups use specially designed and annotated puzzle pieces representing the Earth's continents to investigate the idea of continental drift. In Part One, an exploratory activity, students attempt to fit the puzzle pieces into one large continent using clues provided by the shape and the geologic evidence contained on each piece. In Part Two students read a selection of statements about continental drift and determine whether those statements are evidence or opinion and whether or not the evidence presented provides support for continental drift.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 445S	$44.40
Add a Group No. 445SEL	$7.65

LITERACY ADD A GROUP STEM NONCONSUMABLE

USING CHEMICAL REACTIONS TO REDUCE WASTE

Kit #441S — Developed by SEPUP

Students learn that wastes from many industrial processes contain toxic or valuable substances that can sometimes be reclaimed for recycling or safe disposal. Working in groups, students reclaim copper from a liquid waste containing dissolved copper chloride. They first measure then compare the effectiveness of three different metal replacement reactions at removing the copper from the waste. Cost and safety is also considered in deciding which metal would be the best to use for removing the copper from the waste.

Accommodates 12 groups of two students.

Kit No. 441S	$94.15
Add a Group No. 441SEL	$16.45

LITERACY STEM AG REFILLABLE ADD A GROUP

CORRELATING SEDIMENTARY STRATA

Kit #443S — Developed by SEPUP

Student groups use four unique Lab-Aids® Simulated Drill Cores, each representing a fictitious series of rock layers from a different location. They then use the evidence from each drill core to create a stratigraphic column - diagram of the rock layers and the fossils they contain - for each locality. Based on the fossils contained within the layers, students are asked to determine how the layers in each locality correlate to the layers from the other localities. They are then challenged to use this fossil evidence to construct a timeline showing the relative time spans of each species represented by the fossils.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 443S	$74.50
Add a Group No. 443SEL	$13.35

LITERACY ADD A GROUP STEM NONCONSUMABLE

USING REMOTE SENSING TO DETERMINE TOPOGRAPHY

Kit #444S — Developed by SEPUP

Students use a 3-D model to construct contour lines and create a topographic map of an area. This experience provides them with a basic understanding of the relationship between contour lines on a topographic map and the actual "lay of the land."

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 444S	$187.05
Add a Group No. 444SEL	$31.90

AG STEM ADD A GROUP LITERACY NONCONSUMABLE

COPPER MINING AND EXTRACTION

Kit #440S — Developed by SEPUP

Copper and other raw materials contribute to our technological lifestyle, but the by-products of extracting copper from ore are potential toxic wastes. In this activity, students explore the properties of copper and copper ore. They conduct two reactions used to extract and recover copper from the ore.

This process introduces single and double replacement reactions. Students also consider the wastes produced by the extraction process.

Accommodates 8 groups of four students.

Kit No. 440S	$117.55
Refill Kit No. 440S-RC	$41.45

LITERACY STEM AG REFILLABLE

INTRODUCTION TO RADIOACTIVITY AND HALF LIFE

Kit #450

The general concepts of radioactivity and half-life are explored using the material in this Lab-Aids kit. Using simulated plastic radioactive atoms, each student conducts a series of activities that provide graphable data.

Students then perform a series of calculations measuring Carbon 14, a radioactive carbon which has been used to date plant and animal remains. Students can easily grasp the general concept of radioactivity and half-life determination through this kit.

Accommodates unlimited classes, each with 15 groups of two students.

Kit No. 450	$120.35

STEM NONCONSUMABLE

WEATHER FORECASTING

Kit #480S — Developed by SEPUP

Students work together in teams to interpret weather maps from eight consecutive days. Each team initially interprets the map for a single day and constructs a weather report for that day. Teams assigned the same day then combine to prepare, and present their weather report to the class. Students then use the information for all eight days to forecast the weather for the unknown, ninth day.

Accommodates unlimited classes, each with 16 groups of two students.

Kit No. 480S	$47.35

LITERACY STEM AG NONCONSUMABLE

INTRODUCTION TO SOIL

Kit #1101

In this elementary school kit, students observe several different Earth materials with a magnifying lens and describe what they see. Their observations, including metric measurements, are used to help them understand how these materials are classified and identified. Students then apply the skills and understanding developed in the first activity to observe and describe soil samples completely enough to be identified by someone else. These observations and descriptions form the basis for agreeing upon a definition for soil.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 1101	$131.90
Add a Group No. 1101EL	$8.55

LITERACY ADD A GROUP AG NONCONSUMABLE

SOIL COMPOSITION AND STRUCTURE

Kit #1102

In this companion kit to Kit, students continue their exploration of soil In the first activity, they describe a soil sample, then identify the similarities and differences between their group's descriptions and those of other groups and develop a primary definition of soil. Activity 2 expands the investigation of soils by using a water column to separate soil samples into various components. This data provides more evidence on the types and proportions of the different materials in each soil and allows students to refine their previous definition of soil. Activity 3 is a reading which provides information that expands their personal experience and observations from the previous activities to deepen and refine their understanding of the composition, structure and development of soil.

Accommodates dozens of classes, each with 12 groups of two students.

Kit No. 1102	$161.20
Add a Group No. 1102EL	$15.40

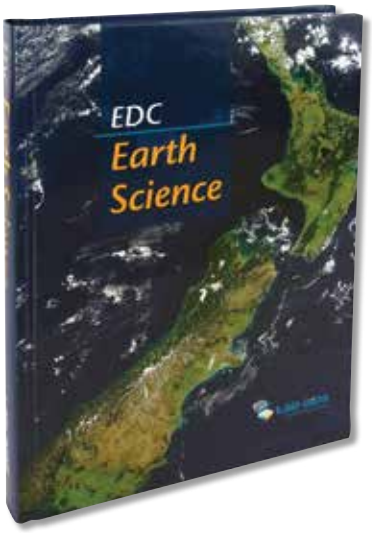
AG ADD A GROUP LITERACY REFILLABLE

ISSUES AND EARTH SCIENCE

MIDDLE SCHOOL | NGSS

How do earth features influence where people live? What policies should guide our use of earth's resources? How should we dispose of nuclear wastes? What kind of space exploration should we undertake in the future? Students explore phenomena and societal issues while engaging in argument from evidence to construct explanations and design solutions to these and related issues in **ISSUES AND EARTH SCIENCE**.

FOR MORE INFORMATION, SEE PAGES 18-22 AND 48-56 IN THE CURRICULUM SIDE OF THIS CATALOG



EDC HIGH SCHOOL EARTH SCIENCE

Big Data • Designed for NGSS • Equipment Included

Earth scientists get excited about making the unknown, known. Big data and technology have increased our ability to discover, model, and predict. Excite your students the same way as they predict locations of resources, model how earth systems react to changing conditions, and extrapolate past patterns to predict future ones.

ACTIVITY-DRIVEN • MULTI-DIMENSIONAL • CAREER INSPIRING

EDC Earth Science epitomizes our belief that students are capable of rigorous and in-depth explorations in science when given support, structure, and motivation for learning.

- 57 Earth Science labs that are relevant and motivating to students
- Students tackle real-world problems using Earth systems data
- First Earth science program guided by the *Next Generation Framework* and *Career and College Readiness Standards*
- Uses a Consider-Investigate-Process learning cycle, adapted from the 5E model

This course motivates students by challenging them with provocative investigations and questions they hear about in the news or at their family dining table.

EDC Learning transforms lives.

EDC Earth Science was developed by EDC's Oceans of Data Institute with support from the National Science Foundation. It is a full-year, activity-driven high school Earth science course and is fully aligned to *A Framework for Science Education*.

FOR MORE INFORMATION, SEE PAGES 94-101 IN THE CURRICULUM SIDE OF THIS CATALOG

QUALITATIVE INTRODUCTION TO WATER POLLUTION

Kit #19

This kit provides an unsophisticated but effective way to examine your region's natural and treated waters. The easy-to-perform chemical tests in this kit qualitatively identify many common water pollutants. While conducting these tests, students also learn about the different methods used in quality water testing methods, how to interpret results from these methods, and how to identify the pH of locally collected water.

Accommodates two classes, each with 12 groups of two students.

Individual test solution refills available. Call us or go to our website.

Kit No. 19	$221.70
Eng./Spn. Kit No. 19-BL	$223.85

AG REFILLABLE STEM SPANISH

NITRATE IN FRESH WATER TEST

Kit #19-1-NI

From an environmental stand-point, it is sometimes necessary to hold back the forces of nitrogen. The essential balance of life in a body of water can become disrupted if they aren't. Students become aware of the presence of nitrate when the tested water samples turn a light pink color.

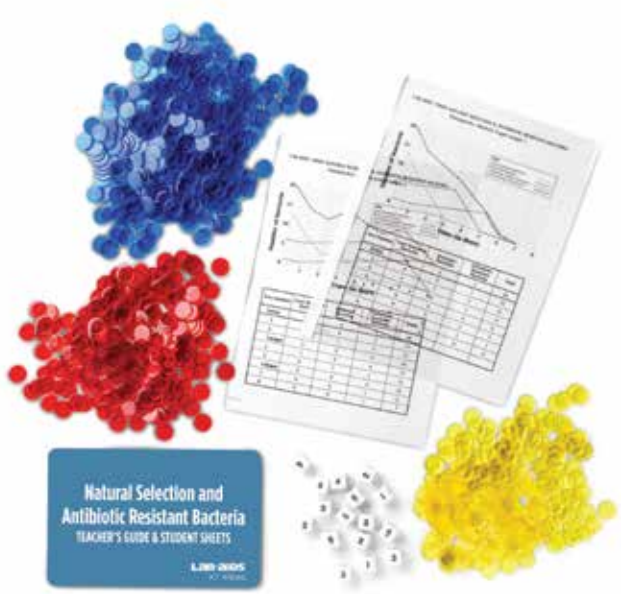
Accommodates 10 groups of students per class and a maximum of 150 tests.

Kit No. 19-1-NI	$83.65
Refill Kit No. 19-NI	$20.30

STEM AG REFILLABLE

NATURAL SELECTION AND ANTIBIOTIC RESISTANT BACTERIA

Kit #904S — Developed by SEPUP



Why is it important to take an antibiotic as prescribed? Students model the effects of antibiotics on the population of disease-causing bacteria during an infection. During the simulation, some groups complete the full course of antibiotics, while others miss doses. They then graph populations of more-resistant and less-resistant bacteria. Students observe the selection of more-resistant bacteria that can take place if antibiotic treatment is intermittent or discontinued prematurely. Through this activity, students learn why it's important to take "the full course" of antibiotics.

Accommodates unlimited classes, each with 16 groups of two students.

Kit No. 904S $86.35

STEM LITERACY AG NONCONSUMABLE

PHOSPHATE IN FRESH WATER TEST

Kit #19-1-PH

A major cause of water pollution is too much phosphate. Students begin to understand and appreciate why some areas of the country have restricted the use of detergents that contain phosphates, due to the problems caused by this "non-biodegradable" substance. The presence of phosphate is indicated in this qualitative test when the water sample turns blue.

Accommodates 10 groups of students per class and a maximum of 150 tests.

Kit No. 19-1-PH $64.20
Refill Kit No. 19-PH $20.30

STEM AG REFILLABLE

ADVANCED OWL PELLET STUDY

Kit #37-A

This advanced kit is designed for an in-depth study of owls and their prey. The kit provides extra identification materials such as illustrations of prey, bone sorting charts, and 15 keys to mammals commonly eaten by owls. Keys are especially valuable for identifying mammals by the fur found in the pellets. Definite species of voles and mice can be identified by the additional skeletal clues provided.

Accommodates one class with 15 groups of two students.

Kit No. 37-A	$115.15
Refill No. 37-OP (13 lg, 1 med, 1 sm)	$51.40
Refill No. 37-OPL Owl Pellets (12 lg)	$52.10
Refill No. 37-OPM Owl Pellets (30 med)	$93.65
Refill No. 37-OPS Owl Pellets (40 sm)	$82.85

LITERACY AG REFILLABLE

BASIC OWL PELLET STUDY

Kit #37

Students use illustrations to identify and classify the skulls and exoskeletons found in owl pellets. This kit is especially useful for lower grade students who are just learning about food chains and food webs.

Accommodates one class with 15 groups of two students.

Kit No. 37	$96.65
Kit No. 37-I (Individualized Owl Pellet Study)	$27.10
Refill No. 37-OP (13 lg, 1 med, 1 sm)	$51.40
Refill No. 37-OPL Owl Pellets (12 lg)	$52.10
Refill No. 37-OPM Owl Pellets (30 med)	$93.65
Refill No. 37-OPS Owl Pellets (40 sm)	$82.85

LITERACY AG REFILLABLE

NATURAL SELECTION EXPERIMENT

Kit #91

In the 1950s, Oxford University scientist Dr. Bernard Kettlewell studied the changes in England's peppered moth population. Using Dr. Kettlewell's study as the basis for experimentation, students conduct two simple quantitative lab activities that demonstrate the effects of environmental pollution on nature.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 91	$62.80
Eng./Spn. Kit No. 91-BL	$64.95

AG SPANISH
NONCONSUMABLE

PHOTOSYNTHESIS, PLANTS, AND FOOD

Kit #31

In the first activity, students build carbon dioxide and water molecules then "react" them to form sugar and oxygen molecules. To reinforce and extend these concepts, students then read about plants as producers and the process of photosynthesis, including the role of chloroplasts.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 31	$80.55
Add a Group No. 31EL	$13.85

LITERACY ADD A GROUP
AG NONCONSUMABLE

SIMULATING THRESHOLD EFFECTS OF SOIL pH ON HYDRANGEA

Kit #320

Students model how hydrangea plants are affected by soil pH. The use of a simulation allows students to determine the effect of agricultural lime on hydrangea flower color. Students use the data obtained from the simulation to determine the positive and negative threshold doses for "agricultural lime." They also reflect upon the results to decide whether they have sufficient data to recommend an optimal level of lime treatment to produce healthy plants with large, pink flowers.

Accommodates three classes, each with 6 groups of four students.

Kit No. 320	$122.50
Add a Group No. 320EL	$26.35

AG LITERACY REFILLABLE ADD A GROUP

BIOLOGY AND CHEMISTRY OF SOIL EXPERIMENT

Kit #32

Time to play in the dirt! Students use ordinary soil samples to conduct a thorough evaluation of soil. Simple, easy-to-follow techniques and staining procedures are introduced early in this series of activities. After performing a series of activities, students are asked to draw conclusions concerning a soil's ability to support plant growth. All tests are performed using either the patented Chemplate® or calibrated sample tubes.

Accommodates four classes, each with 12 groups of two students.

Kit No. 32	$110.15
Refill Kit No. 32-RC	$39.75

AG REFILLABLE

CLIMATE CHANGE: EARTH'S CHANGING ATMOSPHERE

Kit #483S — Developed by SEPUP

In Part 1 of this activity, students analyze and interpret data related to changes in Earth's atmosphere over time. Using cards describing the relative amounts of gases in the atmosphere at different times in Earth's history, they see that Earth's atmosphere has changed dramatically for a variety of reasons. In Part 2, students use a computer simulation (or cards) to analyze data from the past 100 years to investigate the causes of current global warming. They ask data-driven questions to figure out what the evidence does and does not indicate and to examine the influence of both natural and human-related factors.

Accommodates unlimited classes, each with 8 groups of students.

Kit No. 483S $94.95

LITERACY
NONCONSUMABLE

SOIL ORGANISM STUDY

Kit #33

With a simple, reusable apparatus, students easily extract, collect and study the characteristics of small arthropods in soil samples. This activity reveals the teeming multitudes of living organisms found in the smallest sample of common, garden-variety soil.

This kit also serves as a valuable extension to the Biology and Chemistry of Soil Experiment (Kit #32 on page 49) and the Nematode Study (Kit #34 below). This is a classroom investigation with open ended activities.

Accommodates two classes, each with 10 groups of four students.

Kit No. 33 $84.65
Eng./Spn. Kit No. 33-BL $86.85

LITERACY
AG SPANISH

NEMATODE STUDY

Kit #34

This kit offers students a very effective means for learning about living organisms. Students extract nematodes and explore their characteristics and structure. Sampling is easy as Nematodes can be extracted from almost any type of soil sample. Everything needed to extract nematodes is included in this kit.

Accommodates ten classes, each with 10 groups of four students.

Kit No. 34	$88.80
Refill Kit No. 34-RC	$15.35

AG REFILLABLE

POLLUTANT EFFECTS OF PHOSPHATES AND NITRATES

Kit #20

This kit is an excellent environmental pollution laboratory activity. Students use water samples from nearby fresh waterways to set up controlled experiments, make observations, and determine the effects on fresh water (both qualitative and quantitative) when phosphate and nitrate compounds are added. Over a period of ten days, students will observe the blooming of algae and bacteria.

Accommodates two classes, each with 5 groups of four students.

Kit No. 20	$69.05
Eng./Spn. Kit No. 20-BL	$71.35
Refill Kit No. 20-RC	$27.90

STEM AG REFILLABLE SPANISH LITERACY

MODELING AND COMPARING FOSSIL FUEL AND BIOFUEL COMBUSTION

Kit #38

In Part One of this activity, students use Lab-Aids® Molecular Models to build methane, ethanol, and octane molecules, and then "combust" them with oxygen molecules. "Combusting" the model molecules helps students determine the balanced chemical equations for the combustion reactions and compare the amount of carbon dioxide released when these three fuels are burned. In Part Two students use standard bond energies to calculate and compare the amount of energy released during the combustion reactions they modeled in Part One. They are then asked to use their data about the energy released and the CO_2 produced to choose which fuel they think is better.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 38	$144.15
Add a Group No. 38EL	$25.70

AG STEM ADD A GROUP LITERACY NONCONSUMABLE

BIOFUELS: INVESTIGATING ETHANOL PRODUCTION AND COMBUSTION

Kit #39S — Developed by SEPUP

This activity includes three major parts.

- Investigation One - students observe a demonstration of the fermentation of corn and cane sugar, the two food sources used most commonly to produce ethanol, and the distillation of the fermented stillage to produce fuel.
- Investigation Two - students investigate the energy released by the combustion of ethanol and kerosene and compare the results.
- Investigation Three - students measure and compare two by-products - CO_2 and particulate matter - of the two fuels. Students compare results and discuss the trade-offs of biofuels and fossil fuels as sources of energy.

Accommodates five classes, each with 6 groups of four students.

Kit No. 39S	$236.75
Add a Group No. 39SEL	$22.60

LITERACY STEM AG
REFILLABLE ADD A GROUP

PLANT CLONING: PROPAGATING CUTTINGS

Kit #60R

Specially designed materials make it easy to clone plants through the process known as asexual plant propagation. This activity requires no special facilities because the small, easy-to-use Lab-Aids® Greenhouses automatically control many environmental conditions and allow students to readily observe plant physiology.

Accommodates one class with 6 groups of four students.

Kit No. 60R	$109.40
Kit No. 60REL	$20.40

AG LITERACY
REFILLABLE ADD A GROUP

NATURAL SELECTION: VARIATION IN SPECIES AND NORMAL DISTRIBUTION

Kit #74R

Variation in species and normal distribution are brought to life with this Lab-Aids kit. Students use our exclusive Variation Profile Tubes to sort a variety of physical characteristics in sunflower seeds. They gain experience in constructing visual graphs, histograms, and linear graphs from data collected by the entire class. The idea that greater validity of information gathered from a large sample versus a smaller sample is illustrated beautifully by comparing class results in the Variation Profile Tubes to the student's own histograms and graphs.

Accommodates unlimited classes, each with 30 groups of one to two students.

Kit No. 74R	$92.15

AG LITERACY
NONCONSUMABLE

HEREDITY AND ENVIRONMENT

Kit #77

By germinating hybrid tobacco seeds first in darkness and then in light, students make interesting observations. Students set up controlled experiments that provide mathematical data to test their theoretical genetic hypotheses about heredity and the factors determined by the environment. They see how a recessive trait becomes evident. Students also germinate the hybrid tobacco seeds with one normal and one albino gene, stimulate shoot production, examine the relationship of the dominant gene (chlorophyll production) to the recessive gene, and make conclusions concerning the genotype relevant to a visible phenotype. This is an excellent Lab-Aids kit to correlate heredity with environmental influences.

Accommodates one class with 15 groups of two students.

Kit No. 77	$74.85
Refill Kit No. 77-RC	$28.20

LITERACY STEM AG REFILLABLE

pH MEASUREMENTS AND INDICATORS

Kit #81R

In this very popular Applied Science Concept Kit, students perform a series of colorful tests that help them to develop a better understanding of pH, its relationship to acids and bases, and its effect on indicator dyes. Using a Lab-Aids® Chemplate® and universal indicator, each student creates their own pH color guide. This color guide is then used to identify the pH of three unknown solutions, which are provided in this kit.

Accommodates three classes, each with 15 groups of two students.

Kit No. 81R	$117.45
Eng./Spn. Kit No. 81R-BL	$119.65
Refill Kit No. 81R-RC	$78.95

STEM SPANISH AG REFILLABLE

PROPERTIES OF ACIDS AND BASES EXPERIMENT

Kit #82

This Applied Science Concepts Kit provides a completely safe and convenient method for students to study, test, and observe the characteristic properties of acids and bases. Students perform a total of seven different activities. Activities incorporate the Lab-Aids® Chemplate®. This unique lab tool eliminates the need for glassware and provides a semi-micro environment in any classroom.

Accommodates three classes, each with 12 groups of two students.

Kit No. 82	$139.35
Eng./Spn. Kit No. 82-BL	$141.70
Refill Kit No. 82-RC	$86.60

STEM SPANISH AG REFILLABLE

IDENTIFICATION OF SUBSTANCES

Kit #83

In this kit, students are asked to identify common metallic and non-metallic ions. Through this identification process, they learn that each substance has distinctive properties. As a closing activity, students conduct chemical tests on four unknown substances. All test results are safe, clear, colorful, and unmistakable!

Accommodates three classes, each with 12 groups of two students.

Kit No. 83	$141.70
Refill Kit No. 83-RC	$89.25

STEM REFILLABLE

DENSITY: LAYERS OF LIQUIDS

Kit #114

This activity provides students with experiences that allow them to develop an operational definition of density. Students are provided with liquids of different viscosity and density and asked to observe and predict the relative density of each based on their observations. They then test their predictions and develop an understanding of density by preparing sequences of liquid layers. They are given values for the density of each liquid and asked to use this information to estimate the density of an unknown solid. Finally, there is an optional challenge to design and carry out an experiment to determine the density of a fourth liquid.

Accommodates two classes, each with 6 groups of four students.

Kit No. 114	$114.60
Add a Group No. 114EL	$20.55
Refill Kit No. 114-RC	$57.85

LITERACY STEM AG
REFILLABLE ADD A GROUP

INVESTIGATING HARD AND SOFT WATER

Kit #191

Using simple tests, students gain experience with ionization, precipitation, and solubility. This Lab-Aids kit is an excellent activity for studying water purification, water pollution, ecology, Earth science, and consumer education. Students study important concepts in a clear, meaningful, and relevant manner.

Accommodates two classes, each with 12 groups of two students.

Kit No. 191	$95.00
Eng./Spn. Kit No. 191-BL	$97.20
Refill Kit No. 191-RC	$53.30

AG SPANISH
LITERACY REFILLABLE

COMPARING THE ENERGY EFFICIENCY OF DIFFERENT LIGHT BULBS

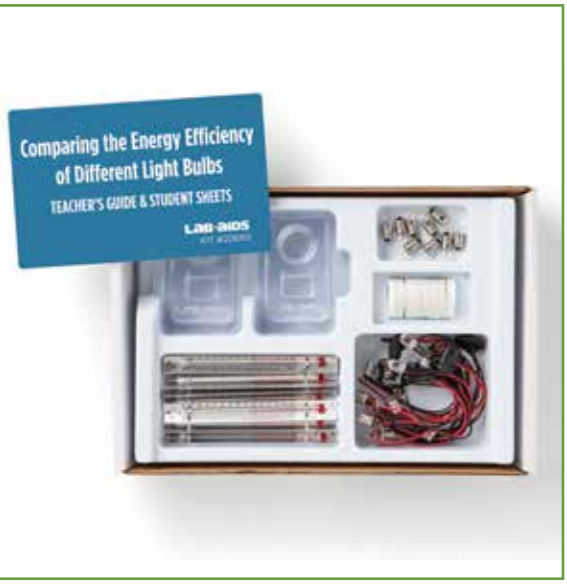
Kit #206RS — Developed by SEPUP

Students use a unique piece of equipment to collect data and compare the efficiencies of a small incandescent bulb and a small LED bulb. They use their measurements to calculate the efficiency of the bulbs to produce light by measuring how much "waste" thermal energy is produced. They also compare "lifetime costs" for different types of bulbs and consider the trade-offs involved when deciding which type of bulb to purchase.

Accommodates unlimited classes, each with 8 groups of four students.

Kit No. 206RS $156.25

STEM LITERACY NONCONSUMABLE



INVESTIGATING PHOTOVOLTAIC CELLS

Kit #220S — Developed by SEPUP

Students use photovoltaic cells to transform energy from sunlight into electrical energy as they investigate solar energy as an example of a renewable energy source. They explore how to power a motor using the photovoltaic cells and investigate some factors that affect the cells' ability to transform light energy into electricity. They then discuss the advantages and disadvantages of using solar energy.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 220S $160.90
Add a Group No. 220SEL $27.75

LITERACY ADD A GROUP AG STEM NONCONSUMABLE

SOIL NUTRIENTS AND FERTILIZERS

Kit #318S — Developed by SEPUP

Nitrogen is one of the essential plant nutrients found in soil. Students measure the amount of nitrogen in several different soils. They then examine the role of nitrogen in plant growth and consider the effect of excess nutrients in an ecosystem.

Accommodates 8 groups of four students.

Kit No. 318S $152.75
Refill Kit No. 318S-RC $49.50

STEM LITERACY AG REFILLABLE

INVESTIGATING MACRONUTRIENTS USING HYDROPONICS

Kit #36R

A uniquely designed Lab-Aids® transparent plastic culture chamber makes the study of hydroponics stimulating and fun. Students "clearly" view how various nutrient solutions affect plant growth and development.

Accommodates two classes, each with 6 groups of four students.

Kit No. 36R	$113.45
Kit No. 36REL	$20.40
Refill No. 36R-RC	$37.95

AG STEM LITERACY
REFILLABLE ADD A GROUP

CONTAMINANTS AND THE WATER CYCLE

Kit #434S — Developed by SEPUP

In this modeling activity, students follow a molecule of water as it travels through the water cycle. The activity can be used to model both the basic water cycle and the water cycle with biological and chemical contaminants that are picked up along the way.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 434S	$74.00
Add a Group No. 434SEL	$13.15

LITERACY ADD A GROUP
AG NONCONSUMABLE

COPPER MINING AND EXTRACTION

Kit #440S — Developed by SEPUP

Copper and other raw materials contribute to our technological lifestyle, but the by-products of extracting copper from ore are potential toxic wastes. In this activity, students explore the properties of copper and copper ore. They conduct two reactions used to extract and recover copper from the ore.

This process introduces single and double replacement reactions. Students also consider the wastes produced by the extraction process.

Accommodates one class with 8 groups of four students.

Kit No. 440S	$117.15
Refill Kit No. 440S-RC	$41.45

STEM LITERACY
AG REFILLABLE

CLIMATE CHANGE: ORGANISMS AS CLIMATE INDICATORS

Kit #481E — Developed by EDC

In this activity students examine simulated drill cores of recent and much older seafloor sediments that contain "fossils" of microscopic organisms called foraminifera (forams). Students sort the different forams contained in their sediment core and determine the percentage of a certain species with right-coiling shells. Knowing the age of the sediments and that the percentage of right-coiling shells correlates to the water temperature at the time, students create a graph showing how water temperature has changed over time.

Kit does not include stones for Sediment Filler. Use your own or EDC-B013.

Accommodates unlimited classes, each with 16 groups of two students.

Kit No. 481E $107.60
Optional Sediment Filler EDCE-B013 $16.67

STEM LITERACY AG NONCONSUMABLE

CLIMATE CHANGE: CARBON CYCLING

Kit #482E — Developed by EDC

Over the course of several class periods, students engage in four activities related to carbon and its movement through the carbon cycle. In Part One and B students build molecular models to better understand some of the everyday reactions that allow carbon atoms to form different molecules and move from one place to another. Part C ties the previous parts together as students are introduced to, and do a basic analysis of, Earth's major carbon sources, sinks, and associated fluxes. They also learn that when properly balanced, the carbon cycle helps maintain stable conditions, including average surface and ocean temperature.

Accommodates unlimited classes, each with 8 groups of four students.

Kit No. 482E $188.30

AG LITERACY NONCONSUMABLE

ECOLOGICAL SUCCESSION

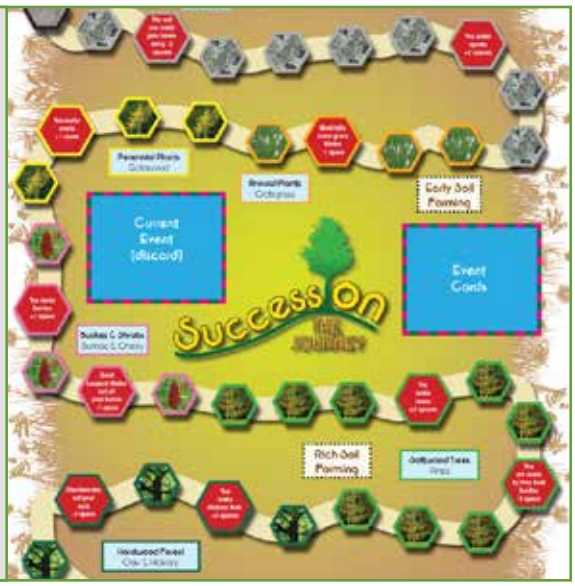
Kit #556

Students experience the stages of succession as they progress from bare rock to the climax community. Within each successional stage, students react to disturbance events and come to understand how disturbances affect the different communities in a successional series.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 556 $116.80
Add a Group No.556EL $22.15

LITERACY ADD A GROUP AG NONCONSUMABLE



RECYCLABLE PLASTICS: IDENTIFICATION USING RELATIVE DENSITY AND FLAMMABILITY

Kit #704

Besides having students identify polymers, this lab activity can be used as an enrichment unit on density.

Students use specially designed trays to identify recyclable plastics by determining their relative density. They also test the flammability of the plastics and their physical characteristics. Students attempt to identify unknown plastics using the information they have collected.

Accommodates two classes, each with 8 groups of four students.

Kit No. 704	$241.70
Refill Kit No. 704-RC	$115.00

STEM LITERACY AG REFILLABLE

MAKING AND MODELING POLYMERS

Kit #706S — Developed by SEPUP

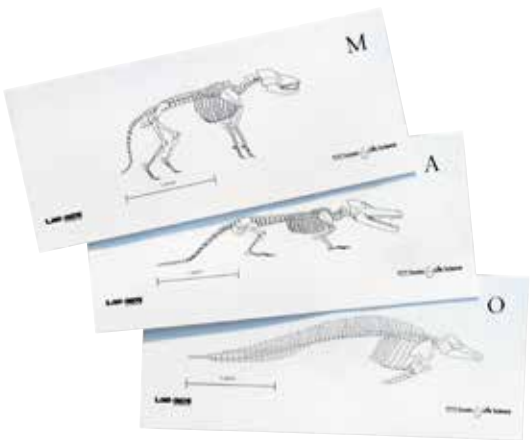
Every day, students use numerous products made of plastic. This kit introduces the structures and properties of the polymer molecules that make up all plastics.

Students first investigate the properties of the linear polymer found in white glue, and then add a cross-linker to explore the properties of the resulting cross-linked polymer. They then use paper clip models to investigate the molecular structures of monomers, polymers, and cross-linked polymers, and explore how their structural differences alter the properties of the molecules.

Accommodates one class with 16 groups of two students.

Kit No. 706S	$91.75
Refill Kit No. 706S-RC	$25.30

STEM LITERACY AG REFILLABLE



EVOLUTION: EXAMINING FOSSIL AND DNA EVIDENCE

Kit #903S — Developed by SEPUP

In Activity 1, students investigate how whale fossils provide a line of evidence in support of the theory of evolution. Students then apply the theory of natural selection to whale evolution, using anatomical adaptations to infer the habitats and lifestyles of extinct species. In Activity 2, students examine classification from an evolutionary perspective. They compare DNA sequences from a number of vertebrates and create an evolutionary tree.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 903S	$55.55
Add a Group No. 903SEL	$9.75

LITERACY ADD A GROUP AG STEM NONCONSUMABLE

INVESTIGATING SELECTIVE BREEDING

Kit #905

In this series of two activities students explore inherited traits. They use Lab-Aids® simulated corn ears and Punnett squares to gather data on, interpret, and predict the probability of traits being passed from parent to offspring. They then read about "survival of the fittest," natural selection, selective breeding, and the relationships between these concepts.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 905	$45.45
Add a Group No. 905EL	$7.65

LITERACY ADD A GROUP AG NONCONSUMABLE

TRACKING THE SPREAD OF INFECTIOUS DISEASES

Kit #906

Contagious diseases can spread very quickly through a population. If an infected individual mingles with healthy individuals, random contact can cause many more to become infected. This activity simulates the transmission of a contagious disease and the steps epidemiologists take to try to determine its source and limit its spread. Two scenarios are provided—one for an infection spreading among humans and another among livestock. If desired, the kit materials can also be used to simulate different "trackable" spreading event scenarios such as an invasive species or an outbreak of food poisoning. This activity also introduces the concept of exponential growth.

Accommodates dozens of classes, each with 24 students. Add only cups for larger class sizes.

Kit No. 906	$34.60

LITERACY STEM AG REFILLABLE

ANIMAL HEALTH AND FOOD SAFETY: CHICKEN LITTLE, CHICKEN BIG

Kit #907S — Developed by SEPUP

Medical and dietary supplement products, such as vitamins, are often given to humans and other animals to improve health, growth, or performance. In this activity, students analyze data from a fictitious study on the effects of a chicken growth supplement. Students are introduced to toxicology and the design of clinical trials, find threshold doses, and then grapple with the trade-offs involved with determining an optimum dose.

Accommodates unlimited classes, each with 16 groups of two students.

Kit No. 907S	$112.50

STEM LITERACY AG NONCONSUMABLE

DECOMPOSITION

Kit #35

What do the terms “biodegradeable” and “decomposition” mean, and how do they happen? These are just two of the questions explored in this activity and are both important concepts in the study of life cycles. Students investigate the effect of various factors on decomposition and biodegradability.

Students use an inquiry method to set up a series of experiments which focus on determining the rate of decomposition, the effect of soil type on decomposition, and the different types of substances which decompose.

Accommodates four classes, each with 12 groups of two students.

Kit No. 35	$126.70
Eng./Spn. Kit No. 35-BL	$128.85
Refill Kit No. 35-RC	$70.70

AG LITERACY SPANISH REFILLABLE

ORGANISMS AS INDICATORS OF ECOSYSTEM HEALTH

Kit #555S — Developed by SEPUP

Students examine simulated samples of aquatic macroinvertebrates from the same river collected at three different points in time. They calculate the relative proportion of macroinvertebrates that are intolerant to pollution compared with the total catch. These proportions are an indicator of water quality. They then identify patterns in the data and construct arguments for possible cause-and-effect relationships.

Accommodates unlimited classes, each with 8 groups of students.

Kit No. 555S	$64.50

LITERACY STEM AG NONCONSUMABLE

ENGINEERING & DESIGN: MODELING AND MITIGATING STREAM PROCESSES

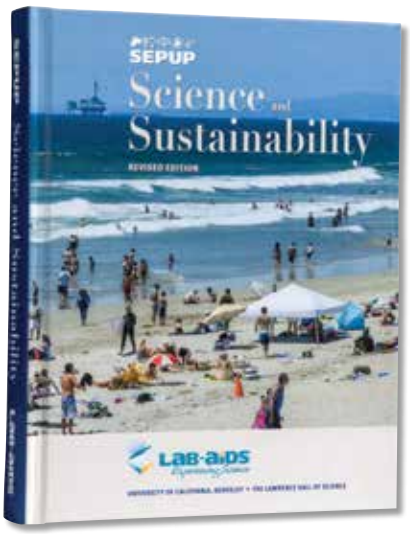
Kit #446S — Developed by SEPUP

Students model the phenomenon of sediment movement in a river using a unique mini stream table that provides evidence for how geoscience processes change Earth’s surface. In Part A, students investigate how the changing energy of flowing water erodes and deposits sediments to create common landforms. Part B is an engineering design challenge where students use design criteria and constraints to design and test erosion-control structures. Based on the results of their initial testing, students redesign and retest their structures.

Accommodates two to three classes, each with 8 groups of 4 students.

Kit No. 446S	$259.95

LITERACY STEM NONCONSUMABLE



SCIENCE AND SUSTAINABILITY
REVISED EDITION

Want your students to investigate energy use, biotech, and other current events?

This is a course of big questions. **SCIENCE AND SUSTAINABILITY** uses themes and activities related to sustainability to engage key concepts from life, earth, and physical sciences.

If you find yourself thinking:

- I want to integrate life, earth, and physical science in meaningful ways within a single course.
- How can I prepare adequately for this new course I've been given?
- It's hard to keep everyone's opinions informed by primary evidence.
- I want my kids to do more themselves yet I still find myself lecturing a lot.

Motivate your students to care about more than just paper vs. plastic. Get your students collecting data, analyzing risks, assessing trade-offs, supporting decisions with data, and applying scientific concepts to an array of current real-world situations.

Material World, a companion student resource book, is a magnificent portrait of families and their material possessions from 30 different countries across the world. The pictures will challenge your perceptions of how people live in developed and developing nations. It's an excellent resource for taking your students on a "field trip" to investigate global issues.

FOR MORE INFORMATION, SEE PAGES 88-91 IN THE CURRICULUM SIDE OF THIS CATALOG

MODELING MOLECULES OF LIFE

Kit #505

In the Complete Molecules of Life kit, students study the chemistry of carbohydrates, fats, and proteins. Durable, color-coded plastic atoms are assembled, disassembled, and reassembled quickly and easily into 3-D molecules that provide highly graphic and extremely motivating learning experiences. Carbohydrates, lipids, and proteins can be completed as a series of lab activities, or as separate units. Students can also work independently for enrichment or remedial study. Each module can be systematically subdivided into smaller sections so students can do the work when most appropriate.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 505	$143.55
Eng./Spn. Kit No. 505-BL	$145.70
Add a Group No. 505EL	$13.20

AG LITERACY SPANISH NONCONSUMABLE ADD A GROUP

BASIC BLOOD TYPING

Kit #1-32

These foundation activities introduce students to the study of blood. Students first draw samples of their own blood to:

- Determine their own blood groups
- Observe tissue incompatibility.

Then, they type themselves using the agglutination method which enables them to better understand the four basic blood groups. Besides their personal involvement in the experiment, students receive valuable experience in collecting and comparing data. Individual color coded sterile components help to simplify the procedure and guarantee results.

Accommodates one class with 32 students.

Kit No. 1-32	$91.90

REFILLABLE

DNA, RNA PROTEIN SYNTHESIS MODELING

Kit #72

Demystify the DNA/RNA connection in protein synthesis. Following step-by-step directions, students will:

- build and replicate an eight-rung DNA molecule.
- use half the DNA ladder to build mRNA (messenger RNA).
- simulate mRNA movement by placing the mRNA on a ribosome.
- simulate translation by matching the mRNA and its codons to the tRNA (transfer RNA) and its anti-codons.
- disconnect the protein chain so the process can continue.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 72	$214.60
Eng./Spn. Kit No. 72-BL	$216.75
Add a Group No. 72EL	$28.80

LITERACY SPANISH ADD A GROUP NONCONSUMABLE

Rh BLOOD TYPING

Kit #1A-32

The significance of the Rh factor becomes clear as students type their own blood to determine if they are Rh Positive or Rh Negative. In the first part of this activity, students determine their own Rh blood type. This is done by typing their blood and observing tissue incompatibility. Next, they mix a blood sample with Rh serum. Finally, the students observe the resulting film for agglutination. If agglutination occurs, the red cells possess the Rh factor and the individual is considered to be Rh+. If agglutination doesn't occur, they are Rh-. No warming of the serum or light box is necessary.

Accommodates one class with 32 students.

Kit No. 1A-32	$63.75

REFILLABLE

SIMULATED BLOOD TYPING

Kit #1-S

The simulated blood typing kit lets students practice ABO blood typing while avoiding the risks associated with real blood. The clumping of simulated blood cells by corresponding simulated antibodies is done through chemical precipitation. Students observe the antigen-antibody relations of artificial bloods and sera. No human or animal blood or blood products are used because the reactions are based on chemical solubility.

Accommodates four classes, each with 15 groups of two students

Kit No. 1-S $73.65

REFILLABLE

BLOOD SMEAR: EXAMINING BLOOD CELLS

Kit #1B

This three-step experiment provides students with a clear understanding of lab techniques and an opportunity for self discovery. Students draw samples of their own blood with individualized sterile lancets and prepare smears by applying Wright's stain. Using a microscope, they examine the smears to identify different cell types (erythrocytes, polymorphonuclears, eosinophiles, basophiles, lymphocytes and platelets).

Accommodates two classes, each with 25 groups of two students.

Kit No. 1B $47.15

REFILLABLE

PLANT CLONING: PROPAGATING CUTTINGS

Kit #60R

Specially designed materials make it easy to clone plants through the process known as asexual plant propagation. This activity requires no special facilities because the small, easy-to-use Lab-Aids® Greenhouses automatically control many environmental conditions and allow students to readily observe plant physiology.

Accommodates one class with 6 groups of four students.

Kit No. 60R	109.40
Add a Group No. 60REL	$20.40

AG LITERACY REFILLABLE ADD A GROUP

ABO AND RH BLOOD TYPING

Kit #1C-32

This popular Lab-Aids kit combines all the features of the Basic Blood Typing (Kit #1-32) and the Rh Blood Typing (Kit# 1A-32) with a specially designed Slide Guide®.

This kit also provides information on several different subjects related to blood typing:

- the history of the blood factors.
- a discussion of hereditary determination.
- information concerning individual typing techniques.
- comparisons of blood types in world populations.
- blood typing birth problems.

Accommodates one class with 32 students.

Kit No. 1C-32	$121.10
Eng./Spn. Kit No. 1C-BL	$124.00

LITERACY REFILLABLE

BIOFUELS: INVESTIGATING ETHANOL PRODUCTION AND COMBUSTION

Kit #39S — Developed by SEPUP

This activity includes three major parts:

- Investigation One is a demonstration of the fermentation of corn and cane sugar, the two food sources used most commonly to produce ethanol, and the distillation of the fermented stillage to produce fuel.
- Investigation Two - students investigate the energy released by the combustion of ethanol and kerosene and compare the results.
- Investigation Three - students measure and compare two by-products - CO_2 and particulate matter - of the two fuels. Students compare results and discuss the trade-offs of biofuels and fossil fuels as sources of energy.

Accommodates five classes, each with 6 groups of four students.

Kit No. 39S	$236.75
Add a Group No. 39SEL	$22.60

LITERACY STEM AG
REFILLABLE ADD A GROUP

BLOOD CLOTTING EXPERIMENT

Kit #2

How does blood clot? Students examine their own blood to better understand the clotting process. Students discover their own clotting times by studying coagulation rates and bleeding times. They observe the formation of fibrin threads in clotting and study the effects of calcium on blood clotting.

Individualized worksheets and sterile components make this a highly motivational lab activity.

MICROSCOPES ARE NEEDED.

Accommodates two classes, each with 25 students.

Kit No. 2	$74.85

LITERACY REFILLABLE

BODY SYSTEMS, STRUCTURES, AND FUNCTIONS

Kit #804S — Developed by SEPUP

Students learn about major organs and systems in the human body. First, they complete an activity that exposes their current knowledge and ideas about the sizes and locations of specific organs. Then, they group Organ and Structure Cards and explore the functions of several human body systems. Next, students create a three-dimensional model of selected body systems. Finally, they color the organ systems on a diagram and test their knowledge of systems and organs as they revisit their earlier ideas. This kit takes approximately 5 class periods to complete.

Accommodates unlimited classes, each with 8 groups of four students.

Kit No. 804S $317.50

LITERACY
NONCONSUMABLE

AIDS AND STD TRANSMISSION AND CONTROL SIMULATION

Kit #3

This kit presents an outstanding simulation of how diseases can be transmitted through the exchange of "body fluids." This very relevant hands-on activity illustrates how easily sexually transmitted diseases such as Hepatitis B and AIDS, can infect teenage populations. Students also explore the permeability and effectiveness of latex barriers in the prevention of sexually transmitted diseases.

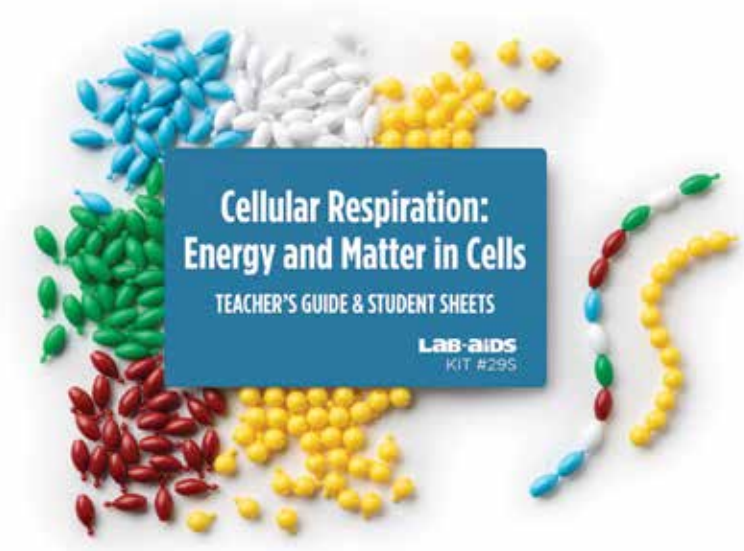
Accommodates 30 students.

Kit No. 3 $228.60
Eng./Spn. Kit No. 3-BL $230.95
Refill Kit No. 3-RC $120.15

STEM LITERACY
SPANISH REFILLABLE

CELLULAR RESPIRATION: ENERGY AND MATTER IN CELLS

Kit #29S — Developed by SEPUP

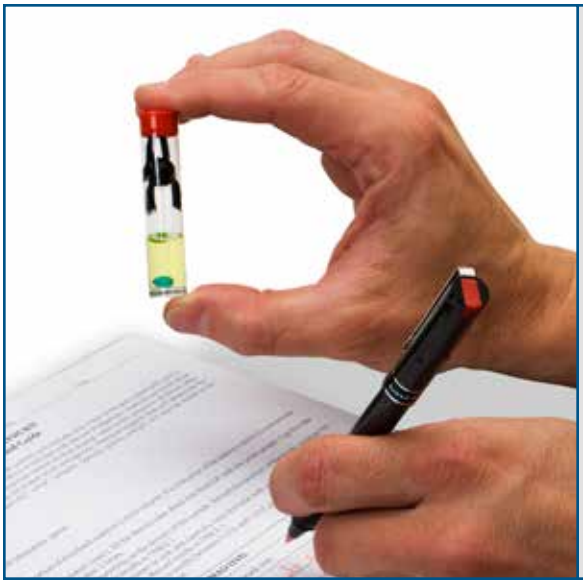


Students develop physical models of proteins and carbohydrates and use these models to explore the breakdown of food during digestion. They explore how the subunits of the food proteins and carbohydrates become building blocks for human proteins (in the case of amino acids) or for generating usable energy (in the case of sugars). Based on their investigation of the physical models, draw models to represent the use of food as a source for matter and energy.

Accommodates unlimited classes, each with 8 groups of 4 students.

Kit No. 29S $77.20

STEM LITERACY
AG NONCONSUMABLE



URINALYSIS SIMULATION

Kit #4

Students analyze simulated urine samples to understand the procedures used in urinalysis and the potential applicability of urinalysis as a diagnostic tool. By adding different reagents to urine samples, students observe how each reacts with substances in the urine, providing useful evidence for identifying different substances. Students test simulated urine samples for pH, density, glucose, phosphates and chlorides.

Accommodates two classes, each with 15 groups of two students.

Kit No. 4 $143.95
Eng./Spn. Kit No. 4-BL $146.10
Refill Kit No. 4-RC $92.65

STEM LITERACY
SPANISH REFILLABLE

WHAT IS A SPECIES?

Kit #545S — Developed by SEPUP

Students learn about the biological species concept by developing a definition of the term species and using this understanding to examine where new species are in the process of separation from closely related species. Student groups then investigate case studies to explore the factors that lead to reproductive isolation of species.

Accommodates unlimited classes, each with 8 groups of 4 students.

Kit No. 545S $107.60

STEM LITERACY AG NONCONSUMABLE

CHEESE MAKING

Kit #5

Students will love making cheese using basic modern science concepts and the ancient scientific principles of enzymes and cheese making. Students first prepare milk for the curdling process by adding a viable, non-toxic bacteria to it.

This critical step adjusts the pH and enhances the flavor. The milk clotting enzyme is a fermentation derived product and is extremely effective in this process. Students also have a chance to study live harmless bacteria in an important food process as well as the live bacteria.

Accommodates one class with 15 groups of two students.

Kit No. 5 $67.95
Eng./Spn. Kit No. 5-BL $70.10

AG LITERACY STEM SPANISH REFILLABLE

MODELING THE EFFECTS OF AN INTRODUCED SPECIES

Kit #547S — Developed by SEPUP

Students work in groups to use a set of cards to develop a food web model for one of four ecosystems. Students are then given an additional card representing an introduced species. They then consider the effects this new organism will have on the ecosystem and revise their models to explain how the flow of energy and cycling of matter are disrupted by the introduced species.

Accommodates unlimited classes, each with 8 groups of 4 students.

Kit No. 547S $53.75

STEM LITERACY AG NONCONSUMABLE

FOOD ANALYSIS

Kit #6

Using simple and safe chemical tests, students can very quickly and easily identify the major nutrients in common foods. Students use step-by-step instructions to test common foods for the presence of carbohydrates, proteins, and lipids. They also perform qualitative (detect a presence) and quantitative (how much) tests of Vitamin C by using a very simple drop-by-drop titration process. Over 100 tests for unknowns can be performed on each food group. This kit does not use corrosive agents or toxic substances.

Accommodates five classes, each with 10 groups of three students.

Kit No. 6 $80.60
Refill Kit No. 6-RC $59.15

STEM AG REFILLABLE

CELL DIFFERENTIATION AND GENE EXPRESSION

Kit #606S — Developed by SEPUP

Q: If all human body cells have the same genome, how does this lead to so many different types of cells and cell products?

A: The expression of specific genes regulates cell differentiation and cell functions.

In this highly illustrative activity, students investigate and model gene expression as it relates to cell differentiation. They consider how various physiological events affect gene expression in each of four different cell types.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 606S	$134.45
Add a Group No. 606SEL	$24.70

LITERACY ADD A GROUP AG NONCONSUMABLE

FOOD NUTRIENT ANALYSIS

Kit #6A

This kit is a variation of the Food Analysis kit (Kit #6). However, in this kit tests are performed using pure samples of the nutrients in order to standardize the tests. Working in teams, students are asked to test for, and identify, five classes of nutrients: sugar, starch, lipid, protein and Vitamin C.

This is an outstanding kit to demonstrate scientific methods, practices, and processes.

Accommodates five classes, each with 15 groups of two students.

Kit No. 6A	$110.55
Eng./Spn. Kit No. 6A-BL	$112.75

STEM AG SPANISH REFILLABLE

INDIVIDUAL DNA AND NUCLEIC ACID MODELING

Kit #71-513

This kit allows a student to construct a model of an 8-rung ladder segment of a DNA molecule and then build a molecular model of the basic components of the nucleotides of RNA and DNA. This kit combines the features of the Molecular Model of DNA and Its Replication (Kit #71) and Nucleic Acid Molecular Structure (Kit #513) for an individual student. All the components are reusable and the nucleotides (when using more than one kit) can be linked together to form a DNA model.

Accommodates unlimited classes, each with 1 group of students.

Kit No. 71-513 $27.70

LITERACY STEM REFILLABLE AG

HUMAN GENETICS EXPERIMENT

Kit #7

An excellent activity to introduce students to Mendelian genetics!

The experiment is based on the transmission of a single inherited trait - the ability to taste harmless PTC (phenylthiocarbamide). The goal is for students to determine if they have this gene. They first collect data by testing family members for this trait. Next, they correlate and pool the PTC data for the entire class. Finally, the students calculate the random segregation data according to the Hardy-Weinberg Law. Background information about the Hardy-Weinberg Law is provided in a supplementary section. It also includes information about calculating gene frequency and the genetics of ABO blood typing.

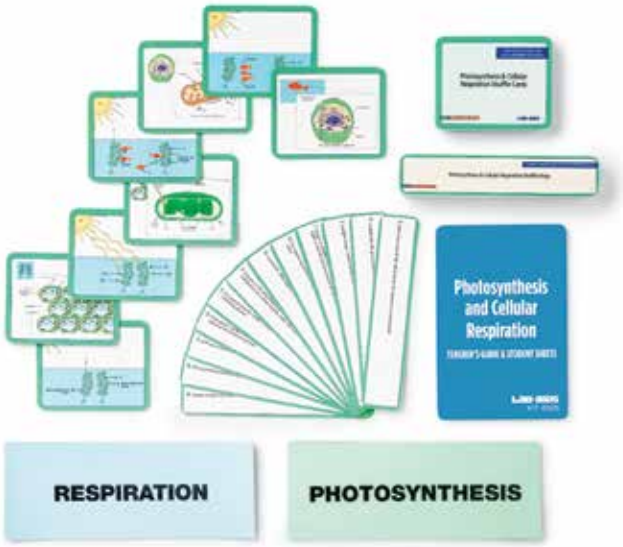
Accommodates two classes, each with 25 students.

Kit No. 7 $30.45

STEM REFILLABLE

PHOTOSYNTHESIS AND CELLULAR RESPIRATION

Kit #30S — Developed by SEPUP



Part One is an investigation into the reactions of photosynthesis and cellular respiration using a series of images and statements. Students then discuss these processes relative to ecosystems and the carbon cycle. In Part Two, students read about the details of photosynthesis and cellular respiration, including light and dark reactions, glycolysis, the Krebs cycle, and the electron transport chain.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 30S	$90.60
Add a Group No.30SEL	$15.40

LITERACY ADD A GROUP AG NONCONSUMABLE

NORMAL MITOSIS

Kit #9

Using this outstanding kit, students will first identify the phases of plant mitosis, then observe chromosomal development. They gain hands-on experience with the micro-techniques by staining and mounting their own slides. Finally students prepare their own plant cells by treating scientifically grown onion root tips cells with a mild acid, then staining the cells. A stained section of cells is then squashed onto a slide and smeared into a single layer for microscopic study.

MICROSCOPES ARE NEEDED.

Accommodates two classes, each with 15 groups of two students.

Kit No. 9	$171.65
Refill Kit No. 9-RC	$109.25

AG LITERACY REFILLABLE

GENES, MUTATIONS, EVOLUTION, AND SICKLE CELL

Kit #902S

In this two-part activity, students follow the inheritance of a hemoglobin mutation (sickle cell) that leads to changes in protein structure and function. Initially, students identify patterns over two generations, investigate the cause-and-effect relationship between environmental conditions and the frequency of a trait, then construct explanations for how changes to a gene can influence an organism's ability to survive and reproduce. In Part 2, students use a computer simulation to extend their investigation through 30 generations. The simulation allows students to adjust the environmental conditions to see how access to resources and the prevalence of malaria influence the distribution of the hemoglobin gene over time.

Accommodates unlimited classes, each with eight groups of students.

Kit No. 902S $89.50

STEM LITERACY NONCONSUMABLE

COLONY COUNTER

Kit #10

Counting is made easy with this reasonably priced Colony Counter. The viewing screen is made of translucent plastic and is printed in standard Wolffhuegel rulings that form 1 cm squares. The diagonal rows are subdivided into nine equal squares. This versatile counter accommodates petri dishes up to 125 mm in diameter.

This kit includes bulb, power cord with in-line on/off switch, and a detailed instruction booklet. This is a must for students in any lab using microorganisms.

Accommodates unlimited classes with one group of students.

Kit No. 10 $125.95

STEM AG NONCONSUMABLE

CANCER AND THE CELL CYCLE

Kit #908S — Developed by SEPUP

Students play a board game that simulates the cell cycle, with each student in a group of four taking the role of a specific type of cell. As they progress through the cycle, students learn about the complete sequence of phases and events of the cycle, from the end of one cell division to the end of the next. While playing, they discover that some types of cells, including blood and skin cells, divide more often than other types, such as liver and nerve cells. They also model the relationship between cancer and cell division.

Accommodates unlimited classes, each with eight groups of students.

Kit No. 908S	$150.00

STEM LITERACY AG NONCONSUMABLE

HUMAN SENSES EXPERIMENT

Kit #8

This outstanding Lab-Aids kit explores the human sensory system simply and thoroughly. It provokes a personal interest as students identify response areas on their bodies. They become aware of their sensory perceptions and the physiological characteristics of the body receptors

Accommodates 1 one class with 5 groups of two students.

Kit No. 8	$124.95
Eng./Spn. Kit No. 8-BL	$127.10
Refill Kit No. 8-RC	$80.65

LITERACY STEM REFILLABLE SPANISH

ORGANISMS AS INDICATORS OF ECOSYSTEM HEALTH

Kit #555S — Developed by SEPUP

Students examine simulated samples of aquatic macroinvertebrates from the same river collected at three different points in time. They calculate the relative proportion of macroinvertebrates that are intolerant to pollution compared with the total catch. These proportions are an indicator of water quality. They then identify patterns in the data and construct arguments for possible cause-and-effect relationships.

Accommodates unlimited classes, each with eight groups of students.

Kit No. 555S $64.50

STEM LITERACY AG NONCONSUMABLE

GENES, PROTEINS, TRAITS, MUTATIONS, AND LIVESTOCK

Kit #607AS — Developed by SEPUP

This kit introduces the concept that a gene encodes for a protein with a specific structure and function in the cell and that protein function manifests as observable traits. In Part 1, students build physical models as they explore how a gene's DNA sequence codes for a protein sequence and how the protein sequence determines the protein structure and function. In Part 2, students begin with an introduction TO different types of mutations - deletions, additions, and substitutions - and concludes when students apply their knowledge by explaining cause-and-effect relationships between gene sequence, protein function, gene mutations, and the health and productivity of livestock." Add hyphen after "substitutions" for consistency.

Accommodates unlimited classes with 8 groups of students.

Kit No. 607AS $109.50

STEM LITERACY AG NONCONSUMABLE

OSMOSIS AND DIFFUSION

Kit #22

Can studying the basic life processes of osmosis and diffusion stimulate your students' curiosity? It can with this hands-on lab experience. Students observe first-hand the characteristics of a differentially permeable membrane.

Some substances will pass through the membrane and some won't. Some will actually pass through the membrane in both directions simultaneously. Simple color changes help students visualize this biological-physiological phenomenon.

Accommodates one class with 12 groups of two students.

Kit No. 22	$111.15
Add a Group No. 22EL	$19.50
Eng./Spn. Kit No. 22-BL	$112.90

SPANISH AG STEM LITERACY REFILLABLE ADD A GROUP

DIALYSIS EXPERIMENT

Kit #23

Chemical and biological theories come to life in this natural continuation to the study of osmosis and diffusion (Kit #22).

In this activity, students use a colloidal solution of starch and sodium chloride to vividly observe dialysis. They also observe diffusion of a solute through a semi permeable membrane. Students then remove an inorganic salt from a colloid and test for the presence of chloride ions and starch with simple color tests.

Accommodates one class with 12 groups of two students.

Kit No. 23	$111.15
Refill Kit No. 23-RC	$69.90

LITERACY REFILLABLE

ENZYMES AS CATALYSTS FOR STARCH DIGESTION

Kit #25R

The basic concept behind this engaging kit is that all living organisms must alter nutrients in order to make them usable. Colorful controlled experiments let students observe factors affecting enzyme activity while studying catalysis in an organic reaction. Tests are performed in drop quantities using the Lab-Aids® Chemplate®.

Accommodates one class with 12 groups of two students.

Kit No. 25R	$143.15
Add a Group No. 25REL	$24.15
Refill Kit No. 25R-RC	$96.85

AG STEM REFILLABLE LITERACY ADD A GROUP

INVESTIGATING LACTOSE INTOLERANCE

Kit #802

Students are introduced to lactose intolerance and its cause. They then work in pairs to test whole milk and lactose-free milk for the presence of glucose to find that glucose is present in lactose-free milk but is not present in whole milk. They then add lactase to the whole milk, retest it for glucose, and discover that it now contains glucose.

Accommodates one class with 16 groups of 2 students.

Kit No. 802	$107.60

LITERACY STEM REFILLABLE AG

PHOTOSYNTHESIS, PLANTS, AND FOOD

Kit #31

In the first activity, students build carbon dioxide and water molecules then "react" them to form sugar and oxygen molecules. To reinforce and extend these concepts, students then read about plants as producers and the process of photosynthesis, including the role of chloroplasts.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 31	$80.55
Add a Group No.31EL	$13.85

AG ADD A GROUP LITERACY NONCONSUMABLE

BIOLOGY AND CHEMISTRY OF SOIL EXPERIMENT

Kit #32

Time to play in the dirt! Students use ordinary soil samples to conduct a thorough evaluation of soil. Simple, easy-to-follow techniques and staining procedures are introduced early in this series of activities. After performing a series of activities, students are asked to draw conclusions concerning a soil's ability to support plant growth.

All tests are performed using either the patented Chemplate® or calibrated sample tubes.

Accommodates two classes, each with 12 groups of two students.

Kit No. 32	$110.15
Eng./Spn. Kit No. 32-BL	$112.65
Refill Kit No. 32-RC	$39.75

AG SPANISH REFILLABLE

SOIL ORGANISM STUDY

Kit #33

With a simple, reusable apparatus, students easily extract, collect and study the characteristics of small arthropods in soil samples. This activity reveals the teeming multitudes of living organisms found in the smallest sample of common, garden-variety soil.

This kit also serves as a valuable extension to the Biology and Chemistry of Soil Experiment (Kit #32) and the Nematode Study (Kit #34). This is a classroom investigation with open ended activities.

Accommodates two classes, each with 10 groups of four students.

Kit No. 33	$84.65
Eng./Spn. Kit No. 33-BL	$86.85

AG LITERACY SPANISH REFILLABLE

NEMATODE STUDY

Kit #34

This kit offers students a very effective means for learning about living organisms. Students extract nematodes and explore their characteristics and structure. Sampling is easy as nematodes can be extracted from almost any type of soil sample. Everything needed to extract nematodes is included in this kit.

Accommodates ten classes, each with 10 groups of four students.

Kit No. 34	$88.80
Refill Kit No. 34-RC	$15.35

AG REFILLABLE

DECOMPOSITION

Kit #35

What do the terms “biodegradeable” and “decomposition” mean, and how do they happen? These are just two of the questions explored in this activity, and are both very important concepts in the study of life cycles. Students investigate the effect of various factors on decomposition and biodegradability.

Students use an inquiry method to set up a series of experiments which focus on determining the rate of decomposition, the effect of soil type on decomposition and the different types of substances which decompose.

Accommodates four classes, each with 12 groups of two students.

Kit No. 35	$126.70
Refill Kit No. 35-RC	$70.70
Eng./Spn. Kit No. 35-BL	$128.85

AG LITERACY SPANISH REFILLABLE

INVESTIGATING MACRONUTRIENTS USING HYDROPONICS

Kit #36R

A uniquely designed Lab-Aids® transparent plastic culture chamber makes the study of hydroponics stimulating and fun. Students "clearly" view how various nutrient solutions affect plant growth and development.

Accommodates two classes, each with 6 groups of four students.

Kit No. 36R	$113.45
Add a Group No. 36REL	$20.40
Refill Kit No. 36R-RC	$37.95

LITERACY STEM AG
REFILLABLE ADD A GROUP

BASIC OWL PELLET STUDY

Kit #37

Students use illustrations to identify and classify the skulls and exoskeletons found in owl pellets. This kit is especially useful for lower grade students who are just learning about food chains and food webs.

Accommodates one class with 15 groups of two students.

Kit No. 37	$96.65
Kit No. 37-I (Individualized Owl Pellet Study)	$27.10
Refill Kit No. 37-OP (13 lg, 1 med, 1 sm)	$51.40
Refill No. 37-OPL Owl Pellets (12 lg)	$52.10
Refill No. 37-OPM Owl Pellets (30 med)	$93.65
Refill No. 37-OPS Owl Pellets (40 sm)	$82.85

LITERACY AG
REFILLABLE

ADVANCED OWL PELLET STUDY

Kit #37-A

This advanced kit is designed for an in-depth study of owls and their prey. The kit provides extra identification materials such as illustrations of prey, bone sorting charts, and 15 keys to mammals commonly eaten by owls. Keys are especially valuable for identifying mammals by the fur found in the pellets. Definite species of voles and mice can be identified by the additional skeletal clues provided.

Accommodates one class with 15 groups of two students.

Kit No. 37-A	$115.15
Refill Kit No. 37-OP (13 lg, 1 med, 1 sm)	$51.40
Refill No. 37-OPL Owl Pellets (12 lg)	$52.10
Refill No. 37-OPM Owl Pellets (30 med)	$93.65
Refill No. 37-OPS Owl Pellets (40 sm)	$82.85

LITERACY AG
REFILLABLE

DENDROCHRONOLOGY – TREE RING DATING

Kit #52

Your students will learn the important effects of climate on living things as they unravel secrets about the age and history of trees. They will also be asked to estimate the climate of a particular year in the distant past by carefully studying a tree's annual rings. Students can also infer similar information by using various wooden objects.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 52	$57.55
Add a Group No. 52EL	$9.65
Eng./Spn. Kit No. 52-BL	$59.85

SPANISH ADD A GROUP AG NONCONSUMABLE

METABOLISM EXPERIMENT

Kit #55

This kit introduces students to the study of metabolism by measuring the rate of oxygen consumption of small organisms, such as insects, snails, worms and germinating seeds. Using Lab-Aids® Metabolism Chambers, students observe the organisms (not included) and draw correlations between size of an organism, the temperature of the environment, and oxygen consumption. They are also asked to calculate an organism's respiratory rate in cubic cm of oxygen per kg per hour, measure total gas change in a closed environment, and determine an organism's metabolic relationship to total gas in a closed environment.

Accommodates one class with 2 groups of students.

Kit No. 55	$96.95
Eng./Spn. Kit No. 55-BL	$99.95
Refill Kit No. 55-RC	$12.90

STEM SPANISH AG REFILLABLE

MOLECULAR MODEL OF DNA AND ITS REPLICATION

Kit #71

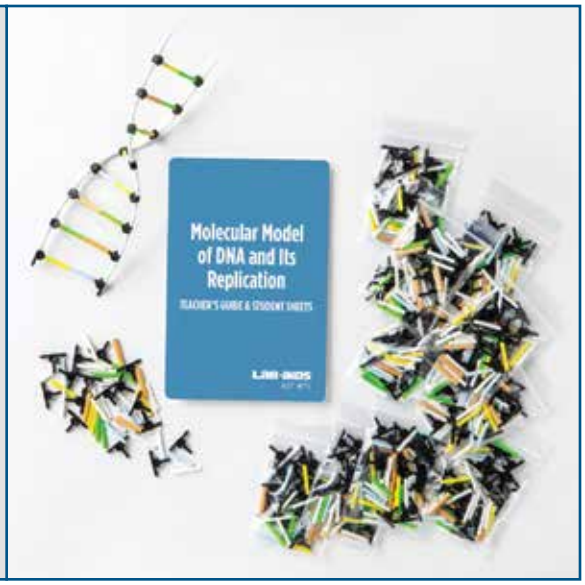
In the Modeling Molecules of Life kit this basic introduction to the double helix model of DNA uses simple components developed exclusively by Lab-Aids®. Those unique components include:

- double nitrogen pyrimidine bases that are constructed proportionately larger in diameter than the single nitrogen purine bases.
- bases that are linked by a unique hydrogen bond.
- the deoxyribose sugar is pentagon-shaped deoxyribose sugar, representing its actual molecular structure.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 505	$143.55
Eng./Spn. Kit No. 505-BL	$145.70
Add a Group No. 505EL	$13.20

SPANISH LITERACY ADD A GROUP NONCONSUMABLE



PLANT CELL STUDY

Kit #61

Students prepare slides using the pre-cut monocot and dicot plant cross-sections and macerated stem tissue. After staining and mounting the samples, students then view their slides through a microscope (not provided).

Clearly diagramed cell guides and individualized student worksheets are provided to help the students through this fascinating activity.

In addition to observing and studying stem cells, students develop an understanding of the art of slide preparation, a skill necessary in future life science and biology classes.

MICROSCOPES ARE NEEDED.

Accommodates two classes, each with 15 groups of two students.

Kit No. 61	$151.50
Refill Kit No. 61-RC	$118.90

AG LITERACY REFILLABLE

STUDY OF THE STRUCTURE AND FUNCTION OF MITOCHONDRIA

Kit #62

This unique kit uses celery to vividly present the study of mitochondria to your students. Normal preparation methods tend to destroy the mitochondria. The Lab-Aids® method utilizes a special stain that acts as a hydrogen acceptor. Students "observe" mitochondria oxidizing food. The stain on the slides gradually loses color as hydrogen is removed.

In this activity, students prepare microscope slides and observe mitochondria, both as cytoplasmic particles and as centers of enzyme activity - the "energy producers" in cells. Very fresh celery and microscopes, required for this activity, are not provided.

Accommodates three classes, each with 15 groups of two students.

Kit No. 62	$84.00

LITERACY REFILLABLE

DIFFERENTIATION OF CELLS EXPERIMENT

Kit #63

Cell differentiation is a process by which the development of a living organism is achieved. Through a series of progressive changes, a generalized cell transforms into a specialized cell. The more specialized the cell becomes, the less likely it is to divide. After the seeds germinate, students prepare slides, then watch the living material differentiate before their eyes.

Students will also observe generalized cellular divisions in meristematic root cap tissue and isolate specialized cells. In the final activity, students diagram and label the differentiated cells.

MICROSCOPES ARE NEEDED.

Accommodates three classes, each with 15 groups of two students.

Kit No. 63	$65.60

AG LITERACY REFILLABLE

SIMPLE STAIN FOR PLANT TISSUE

Kit #64

This simple procedure permits students to obtain impressive results in differentiating many cell types and tissue structures.

It provides excellent discrimination among structures with a high density of different cell types such as root tip or bud. Students hand-cut, mount, and stain a section of material.

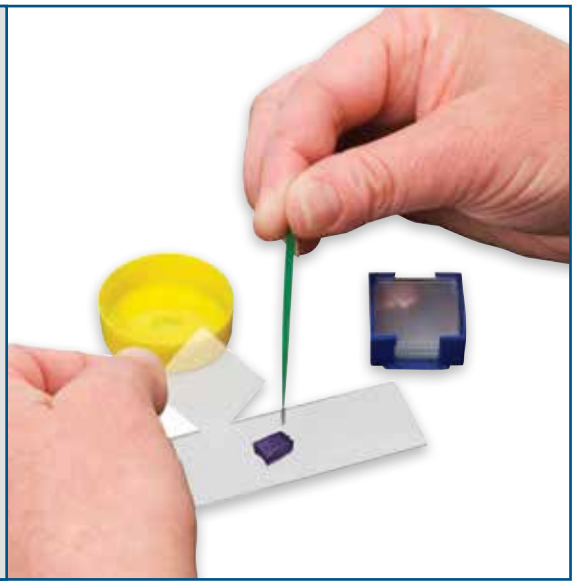
Their observations become more meaningful since they provide their own specimens. Almost any fresh plant material can be used to complete this activity.

Accommodates three classes, each with 15 groups of two students.

MICROSCOPES ARE NEEDED.

Kit No. 64	$74.00

REFILLABLE



SEED STRUCTURE AND ENZYME ACTION

Kit #65

An excellent activity for middle school through college, this kit focuses on the structure of dicot and monocot seeds. Students first examine and dissect two representative types of seeds -dicotyledons and monocotyledons. After diagramming and labeling seed structures, they study the action of enzymes in the germination process and the fate of each part of the germinating seed. Finally, students draw conclusions about the enzymatic process.

Accommodates two classes, each with 15 groups of two students.

Kit No. 65	$86.30
Refill Kit No. 65-RC	$45.75

AG REFILLABLE

SEED STAINING

Kit #66

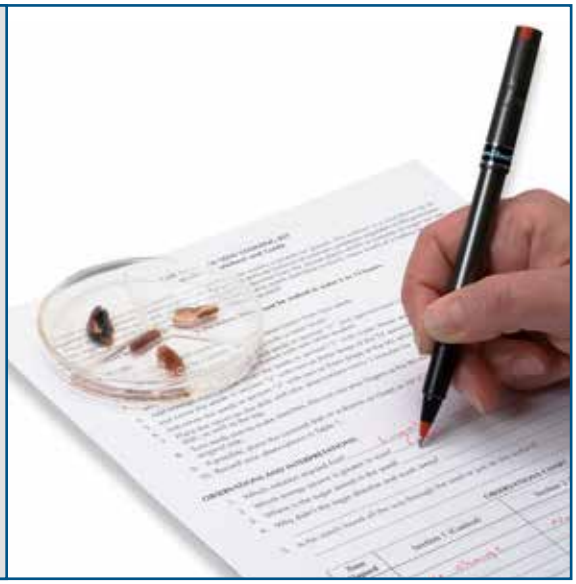
In this engaging and fun kit, students learn how to differentiate between plant food stored as a simple sugar and food stored as a starch. Using a step-by-step procedure, students first dissect the seeds, and then treat them with reagents.

This helps to determine the quantity and location of the sugar and starch. The individualized, open-ended worksheets provide additional investigations for student exploration.

Accommodates one class with 15 groups of two students.

Kit No. 66	$70.45
Refill Kit No. 66-RC	$31.35

AG REFILLABLE



EFFECTS OF GIBBERELLIC ACID

Kit #68

This fascinating lab exercise studies the effects of gibberellic acid on plants. Gibberellic acid, when applied to plants, causes them to respond differently and at times unpredictably. This is an excellent activity for introducing your students to the study of growth hormones and also allows them to experiment with growth behavior. It also provides for special projects and additional explorations.

Accommodates two classes, each with 15 groups of two students.

Kit No. 68	$129.00
Refill Kit No. 68-RC	$44.40

AG STEM REFILLABLE

GENETICS CONCEPTS

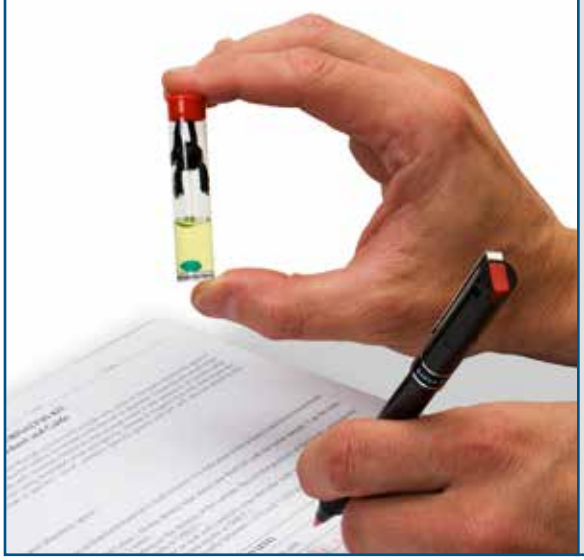
Kit #70

Through a series of simulated experiments, students experience the same problems encountered by the "Father of Genetics." Students "rediscover" his Law of Genetics using specially designed GAM-ETO-DISCS® and TETRADICE® to simulate Gametogenesis and fertilization. These unique Lab-Aids® items produce random genotype combinations that are statistically consistent, as if done with living organisms. This lab activity was developed in a game format to achieve a high level of interest and involvement by the students.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 70	$96.65
Eng./Spn. Kit No. 70-BL	$99.00

SPANISH LITERACY NONCONSUMABLE



VETERINARY URINALYSIS SIMULATION

Kit #4A

Since one of the top career choices is "to be a veterinarian," your students will be engaged with this kit! Working in pairs, they analyze simulated dog urine and use their results to help diagnose the health of several dogs. Students learn and practice the procedures used in urinalysis and observe how various reagents react with substances in the urine. Students test simulated urine samples for pH, density, glucose, phosphates, and chlorides. A hot plate, Bunsen burner, and test tubes are needed, but not included.

Accommodates two classes, each with 15 groups of 2 students.

Kit No. 4A	$134.55
Add a Group No. 4-RC	$92.65

STEM LITERACY AG REFILLABLE

ADVANCED MOLECULAR MODEL OF DNA AND ITS REPLICATION

Kit #71-A

This advanced modeling kit explains DNA's double helix model in greater detail, and emphasizes construction of the nucleotides (the phosphate group, deoxyribose sugar, and one of four bases). While replication is observed, protein synthesis, transcription, and translation are not illustrated. Twelve, nine-rung models can be constructed with each kit.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 71-A $115.45

STEM LITERACY NONCONSUMABLE

NATURAL SELECTION: VARIATION IN SPECIES AND NORMAL DISTRIBUTION

Kit #74R

Variation in species and normal distribution are brought to life with this kit. Students use our exclusive Variation Profile Tubes to sort a variety of physical characteristics in sunflower seeds. They gain experience in constructing visual graphs, histograms, and linear graphs from data collected by the entire class. The idea that greater validity of information gathered from a large sample versus a smaller sample is illustrated beautifully by comparing class results in the Variation Profile Tubes to the student's own histograms and graphs.

Accommodates unlimited classes, each with 30 groups of one student.

Kit No. 74R $92.15

AG LITERACY NONCONSUMABLE

DNA FINGERPRINTING DIAGNOSTICS (REPLICATION, PCR AND RFLP)

Kit #75

This timely kit introduces biotechnology, forensic science, or AP Biology students to the concepts of DNA replication and how it relates to PCR (Polymerase Chain Reaction) and RFLP (Restriction Fragment Length Polymorphism) analysis of DNA. They also observe how DNA analysis can be used to diagnose disease.

This activity is a great introduction or review if you are fortunate enough to have the equipment and materials to do gel electrophoresis and DNA fingerprinting.

Accommodates 10 groups of three students.

Kit No. 75 $238.35
Eng./Spn. Kit No. 75-BL $240.65

STEM LITERACY SPANISH REFILLABLE

GENETIC EQUILIBRIUM AND NATURAL SELECTION

Kit #76

Students study the principles of genetic equilibrium and natural selection as a process of evolution using this interesting kit. A simulation is used to develop insights about the genetic process involved when natural selection operates within a population in genetic equilibrium. Students use the data collected in the Hardy-Weinberg Equilibrium to better understand the actual complexity of natural selection.

Accommodates unlimited classes, each with 15 groups of two students.

Kit No. 76	$85.80
Eng./Spn. Kit No. 76-BL	$87.90

SPANISH LITERACY AG NONCONSUMABLE

HEREDITY AND ENVIRONMENT

Kit #77

By germinating hybrid tobacco seeds first in darkness and then in light, students make interesting observations using this challenging kit. Students set up controlled experiments that provide mathematical data to test their theoretical genetic hypotheses about heredity and the factors determined by the environment. They see how a recessive trait becomes evident. Students also germinate the hybrid tobacco seeds with one normal and one albino gene, stimulate shoot production, examine the relationship of the dominant gene (chlorophyll production) to the recessive gene and make conclusions concerning the genotype relevant to a visible phenotype. This is an excellent kit to correlate heredity with environmental influences.

Accommodates one class with 15 groups of two students.

Kit No. 77	$74.85
Refill Kit No. 77-RC	$28.20

STEM LITERACY AG REFILLABLE

STRAWBERRY DNA EXTRACTION

Kit #79

Teach biotechnology without the technology in your classroom. This kit is a "low-tech", hands-on solution to presenting some high-tech topics. Extract DNA from strawberries and examine some physical properties. This complete classroom kit provides everything needed (except strawberries) along with specially prepared cell lysating solutions and DNA precipitating. This allows students to easily extract DNA by first crushing the strawberry, then lysing to release the cell components and finally precipitating and viewing the DNA after spooling the DNA on a splint.

Accommodates two classes, each with 8 groups of four students.

Kit No. 79	$99.40
Refill Kit No. 79-RC	$49.45

AG LITERACY REFILLABLE

NATURAL SELECTION EXPERIMENT

Kit #91

In the 1950s, Oxford University scientist Dr. Bernard Kettlewell studied the changes in England's peppered moth population. Using Dr. Kettlewell's study as the basis for experimentation, students conduct two simple quantitative lab activities that demonstrate the effects of environmental pollution on nature.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 91	$62.80
Eng./Spn. Kit No. 91-BL	$64.95

AG SPANISH NONCONSUMABLE

IMMUNOLOGY AND EVOLUTION EXPERIMENT

Kit #92

The focus of this highly motivating kit is on determining the evolutionary closeness of organisms based on antigen-antibody blood analysis. Using synthetic blood serum, students have the opportunity to see textbook theory come alive in a dramatic lab exercise. As the students observe the immunological differences, they identify various animals' relationships to humans. With this kit, students learn firsthand about relationships among organisms, common ancestry, even the identification of blood from unknown sources and techniques of blood immunology.

Accommodates two classes, each with 12 groups of two students.

Kit No. 92	$85.00
Eng./Spn. Kit No. 92-BL	$87.15
Refill Kit No. 92-RC	$49.75

STEM LITERACY SPANISH REFILLABLE

BACTERIA STUDY

Kit #160

Students conduct the classic Leeuwenhoek bacteria experiment in this individualized, self-paced kit. Paralleling methods performed over 300 years ago, students observe and identify bacteria using a microscope.

Requires microscopes.

Accommodates two different classes, each with 15 groups of two students.

Kit No. 160	$107.00
Eng./Spn. Kit No. 160-BL	$110.50

AG SPANISH REFILLABLE

DNA STAINING

Kit #170

This highly engaging kit is based on the Feulgen reaction where DNA in plant cells are stained purple for easy viewing. Students macerate, stain, and mount specially grown root tips (provided in the kit). Then, they locate and diagram DNA in the cells. Finally, the students are asked to observe and draw the various stages of cell division. This enables the students to develop a better understanding of the hereditary material in plant chromosomes. All aspects of the lab activity are performed by the individual student.

Requires microscopes.

Accommodates two classes, each with 15 groups of two students.

Kit No. 170	$124.10
Refill Kit No. 170-RC	$99.25

REFILLABLE

SIMULATING THRESHOLD EFFECTS OF SOIL pH ON HYDRANGEA

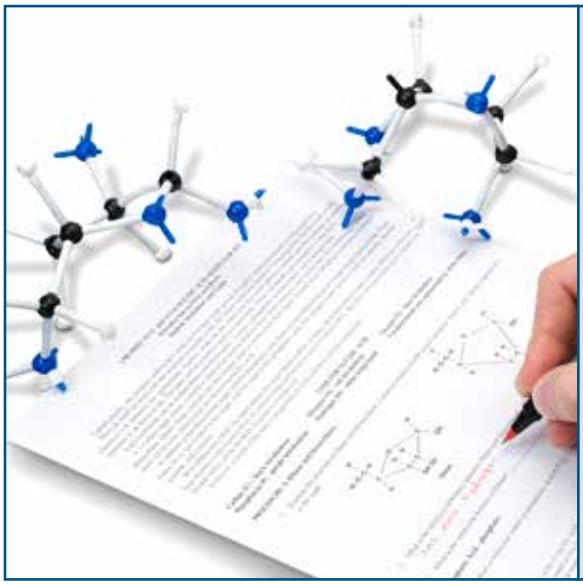
Kit #320

Students model how hydrangea plants are affected by soil pH. The use of a simulation allows students to determine the effect of agricultural lime on hydrangea flower color. Students use the data obtained from the simulation to determine the positive and negative threshold doses for "agricultural lime." They also reflect upon the results to decide whether they have sufficient data to recommend an optimal level of lime treatment to produce healthy plants with large, pink flowers.

Accommodates three classes, each with 6 groups of four students.

Kit No. 320	$122.50
Add a Group No. 320EL	$26.35

AG LITERACY REFILLABLE ADD A GROUP



NUCLEIC ACID MOLECULAR STRUCTURE

Kit #513

In this engaging kit, students model nucleic acids, the largest molecules found in living organisms. It is an excellent compliment to The Molecular Model of DNA and its Replication (Kit #71). In this activity, the basic components of RNA and DNA are constructed. Students build the nucleotide which is composed of three parts: a five-carbon sugar, a phosphoric acid derivative called phosphate, and a substance known as a nitrogen base. The parts are then linked together to form a DNA model. Twelve complete sets of molecular model components are provided.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No.513	$133.85
Add a Group No. 513EL	$12.90

ADD A GROUP LITERACY NONCONSUMABLE

MOLECULES OF METABOLISM: UNDERSTANDING DIGESTION AND RESPIRATION

Kit #520

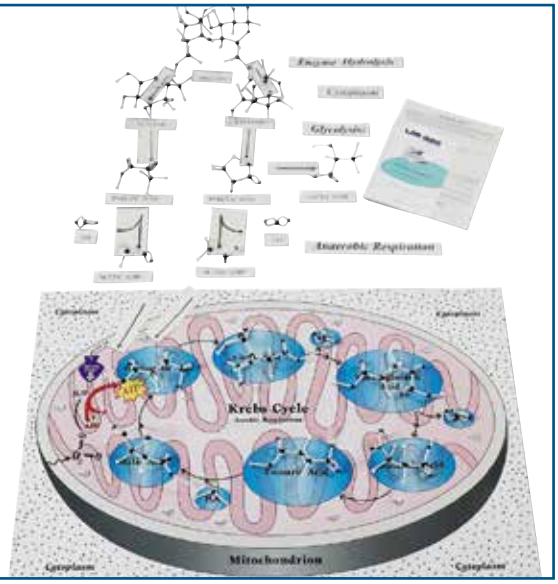
Students will be able to see and appreciate how large molecules are converted to smaller molecules that the body can use. Cellular respiration is addressed by illustrating how Adenosine Triphosphate (ATP) the energy molecule of life is formed by the systematic release of potential energy trapped in the chemical bonds in food molecules.

The major molecules of the Kreb's Cycle (aerobic respiration) are also illustrated in this kit.

Accommodates unlimited classes with 1 group of students.

Kit No. 520 $73.65
Add a Group No. 520EL $51.60

AG LITERACY ADD A GROUP NONCONSUMABLE



CLASSIFYING ANIMALS

Kit #550S — Developed by SEPUP

Students work together to arrange a set of 18 Animal Cards into groups and then adjust their groupings as they learn how scientists classify animals into phyla. By identifying the common features of animals within each phylum, students learn what kinds of characteristics define the major animal phyla. Each card provides a color photo of an organism as well as relevant information about skeletal, circulatory, and respiratory systems. Students review the relationship between kingdom and phyla by placing the Animal Cards within a set of Classification Cards that summarize five major kingdoms.

Accommodates unlimited classes, each with 8 groups of four students.

Kit No. 550S $70.95

STEM LITERACY NONCONSUMABLE

ECOLOGICAL SUCCESSION

Kit #556

Students experience the stages of succession as they progress from bare rock to the climax community. Within each successional stage, students react to disturbance events and come to understand how disturbances affect the different communities in a successional series.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 556 $116.80
Add a Group No. 556EL $22.15

AG ADD A GROUP LITERACY NONCONSUMABLE

INVESTIGATING AND APPLYING GENETICS

Kit #603S — Developed by SEPUP

Students build their understanding of selective breeding for desired traits in crops such as corn. They investigate the outcomes of crosses of hybrid and dihybrid corn plants for two unlinked genetic traits: corn kernel color and sweetness. They use Punnett squares to predict the ratio of phenotypes that will be produced by different crosses and analyze the actual ratio of phenotypes of the second generation offspring. A reading describes traditional selective breeding and modern genetic engineering approaches to improving crops.

Accommodates unlimited classes, each with 16 groups of two students.

Kit No. 603S	$84.85

LITERACY NONCONSUMABLE

CELL DIFFERENTIATION AND GENE EXPRESSION

Kit #606S — Developed by SEPUP

Q: If all human body cells have the same genome, how does this lead to so many different types of cells and cell products?

A: The expression of specific genes regulates cell differentiation and cell functions.

In this highly illustrative activity, students investigate and model gene expression as it relates to cell differentiation. They consider how various physiological events affect gene expression in each of four different cell types.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 606S	$134.45
Add a Group No. 606SEL	$24.70

LITERACY ADD A GROUP AG NONCONSUMABLE

INVESTIGATING HUMAN RESPIRATION

Kit #803S — Developed by SEPUP

Students explore the role of the respiratory system in the regulation of gases in the blood. Students qualitatively investigate the use of bromthymol blue (BTB) as an indicator. They then quantitatively measure the amount of carbon dioxide in their exhaled breath by using the indicator to perform a simple titration.

Accommodates one class with 8 groups of four students.

Kit No.803S	$153.30
Refill Kit No. 803S-RC	$59.15

STEM LITERACY REFILLABLE

MODELING PROTEIN STRUCTURE & ITS RELATIONSHIP TO TRAITS

Kit #607S — Developed by SEPUP

This kit introduces the concept that a gene encodes for a protein with a specific structure and function in the cell and that protein function manifests as observable traits. In Part 1, students build physical models as they explore how a gene's DNA sequence codes for a protein sequence and how the protein sequence determines the protein structure and function. In Part 2, students begin with an introduction to the different types of mutations — deletions, additions, and substitutions — and concludes when students apply their knowledge by explaining cause-and-effect relationships between gene sequence, protein function, gene mutations, health and changes in body function.

Accommodates unlimited classes, each with 8 groups of students.

Kit No. 607S $109.50

STEM LITERACY NONCONSUMABLE

EVOLUTION: EXAMINING FOSSIL AND DNA EVIDENCE

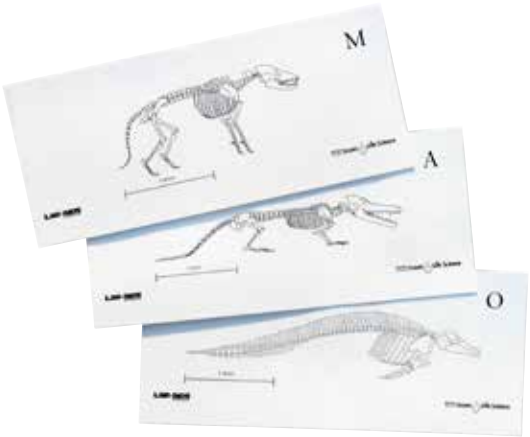
Kit #903S — Developed by SEPUP

In Activity 1, students investigate how fossil whales provide a line of evidence in support of the theory of evolution. Students then apply the theory of natural selection to whale evolution, using anatomical adaptations to infer the habitats and lifestyles of extinct species. In Activity 2, students examine classification from an evolutionary perspective. They compare DNA sequences from a number of vertebrates and create an evolutionary tree.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 903S $55.55
Add a Group No.903SEL $9.75

AG STEM LITERACY ADD A GROUP NONCONSUMABLE



NATURAL SELECTION AND ANTIBIOTIC RESISTANT BACTERIA

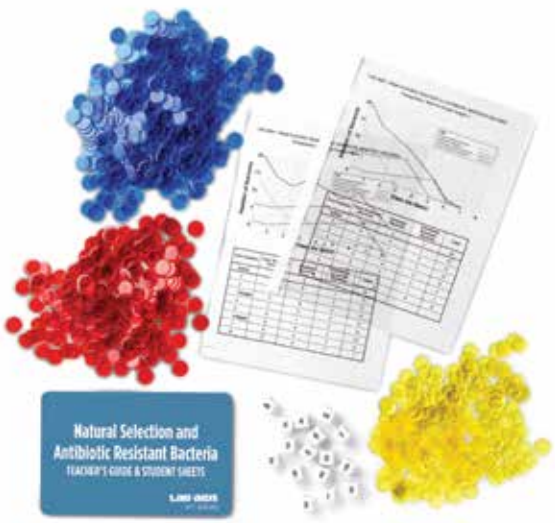
Kit #904S — Developed by SEPUP

Why is it important to take an antibiotic as prescribed? Students model the effects of antibiotics on the population of disease-causing bacteria during an infection. During the simulation, some groups complete the full course of antibiotics, while others miss doses. They then graph populations of more-resistant and less-resistant bacteria. Students observe the selection of more-resistant bacteria that can take place if antibiotic treatment is intermittent or discontinued prematurely. Through this activity, students learn why it's important to take "the full course" of antibiotics.

Accommodates unlimited classes, each with 16 groups of two students.

Kit No. 904S $86.35

STEM LITERACY AG NONCONSUMABLE



INVESTIGATING SELECTIVE BREEDING

Kit #905

In this series of two activities students explore inherited traits. They use Lab-Aids® simulated corn ears and Punnett squares to gather data on, interpret, and predict the probability of traits being passed from parent to offspring. They then read about "survival of the fittest," natural selection, selective breeding, and the relationships between these concepts.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 905	$45.45
Add a Group No.905EL	$7.65

AG ADD A GROUP LITERACY NONCONSUMABLE

TRACKING THE SPREAD OF INFECTIOUS DISEASES

Kit #906

Contagious diseases can spread very quickly through a population. If an infected individual mingles with healthy individuals, random contact can cause many more to become infected. This activity simulates the transmission of a contagious disease and the steps epidemiologists take to try to determine its source and limit its spread. Two scenarios are provided, one for an infection spreading among humans and another among livestock. If desired, the kit materials can also be used to simulate different "trackable" spreading event scenarios such as an invasive species or an outbreak of food poisoning. This activity also introduces the concept of exponential growth.

Accommodates dozens of classes, each with 24 students. Add only cups for larger class sizes.

Kit No. 906	$34.60

STEM LITERACY AG REFILLABLE

INVESTIGATING HUMAN HEREDITY

Kit #1270

Students study selected human traits that are controlled by a single pair of genes and then expand that study to include their lab partners, classmates and family members. The investigations begin by having students determine their phenotypes of several traits. Then, they determine genotypes for these same traits. In the next investigation, they interpret the genotypes of individuals in a pedigree. Finally, they construct a pedigree diagram for a single inherited trait in their family by means of a controlled experiment for that trait. The students discover relationships between dominant and recessive traits.

Accommodates one class with 30 students.

Kit No. 1270	$57.00

STEM LITERACY REFILLABLE

FORENSIC SCIENCE: INTRODUCTION TO DNA FINGERPRINTING

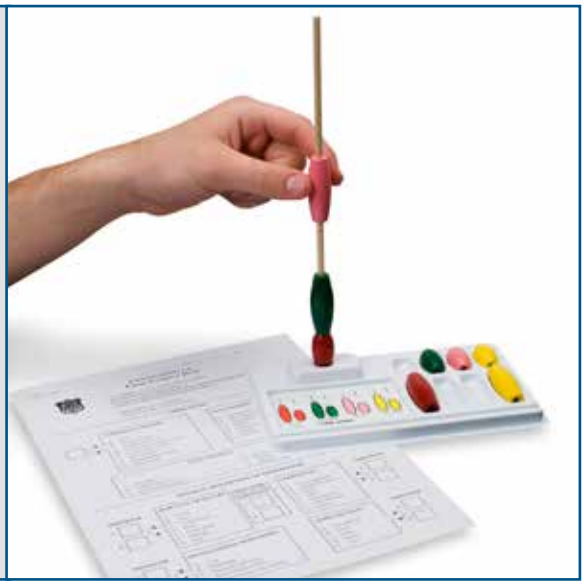
Kit #1271

Students get a real feel for what it takes to be a modern day detective in this basic introduction to forensic science. The first activity begins with a crime scene and the identification of suspects based on an eyewitness report and "video stills" of the crime in progress. "Physical evidence" found at the scene of the crime is scientifically analyzed. This kit provides an introduction to cells, cell structure and magnification. Students use this information to construct a "chromosome" model with color-coded "genes" representing some physical traits of the suspects. The process of DNA mapping and DNA fingerprinting is carefully explained. Students then read simulated DNA x-ray films to positively identify the perpetrators of the crime.

Accommodates unlimited classes, each with 15 groups of two students.

Kit No. 1271 $230.60
Eng./Spn. Kit No. 1271-BL $232.80

STEM LITERACY SPANISH NONCONSUMABLE



INVESTIGATING SENSE OF TASTE

Kit #1280

This Lab-Aids kit is a highly motivating and fun filled series of activities that allows students to discover a variety of concepts about themselves through their own sense of taste. Using simple activities and working in teams, students study the relationship of smell to taste and how closely tied they are to each other. They then locate and "map," as well as identify, the areas of the tongue which detect the taste sensations of sweet, salty, bitter and sour. They discover that all taste buds are not sensitive to the same taste.

Accommodates one class with 30 students.

Kit No. 1280 $120.35

AG LITERACY REFILLABLE

LAB-AIDS® ELECTROPHORESIS CHAMBER

Kit #SGI-P011

This gel electrophoresis unit chamber is designed to run two gels simultaneously. The kit includes the electrodes, gel combs, gel trays, and AC power adapter.

Accommodates unlimited classes, each with 2 groups of students.

Kit No. SGI-P011 $250.00

AG STEM NONCONSUMABLE

ISSUES AND LIFE SCIENCE

MIDDLE SCHOOL CURRICULUM | NGSS

Students will find that many of the issues they will study in **ISSUES AND LIFE SCIENCE** appear frequently in the media. IALS allows students to explore different phenomena and societal issues, while giving them the opportunities to ask questions, engage in argument, and construct their own explanations to these relevant storylines. These issues provide a framework for student work and reflection and a context in which to understand concepts.

FOR MORE INFORMATION, SEE PAGES 23-28 AND 58-66 IN THE CURRICULUM SIDE OF THIS CATALOG

IDENTIFICATION OF CHEMICAL REACTIONS

Kit #84

Looking for activities that help students hone their deductive reasoning and observation interpretation skills? Then take a close look at this!

Students first mix seven known solutions into any of twenty-one possible combinations, using standard lab procedures. They then observe and make notations as to how the chemicals react.

After recording their observations, students must decide whether a chemical reaction has taken place, and provide evidence to support their deductions.

Accommodates three classes, each with 12 groups of two students.

Kit No. 84	$113.45
Eng./Spn. Kit No. 84-BL	$115.60
Refill Kit No. 84-RC	$65.60

STEM SPANISH REFILLABLE

CHEESE MAKING

Kit #5

Students will love making cheese using basic modern science concepts and the ancient scientific principles of enzymes and cheese making. Students first prepare milk for the curdling process by adding a viable, non-toxic bacteria to it.

This critical step adjusts the pH and enhances the flavor. The milk clotting enzyme is a fermentation derived product and is extremely effective in this process. Students also have a chance to study live harmless bacteria in an important food process as well as the live bacteria.

Accommodates 15 groups of two students.

Kit No. 5	$67.95
Eng./Spn. Kit No. 5-BL	$70.10

STEM LITERACY AG REFILLABLE SPANISH

FOOD NUTRIENT ANALYSIS

Kit #6A

This Lab-Aids kit is a variation of the Food Analysis kit (Kit #6). In this kit however, tests are performed using pure samples of the nutrients in order to standardize the tests. Working in teams, students are asked to test for, and identify, five classes of nutrients: sugar, starch, lipid, protein and Vitamin C.

This is an outstanding kit to demonstrate scientific methods, practices and processes.

Accommodates five classes, each with 15 groups of two students.

Kit No. 6A	$110.55
Eng./Spn. Kit No. 6A-BL	$112.75

STEM AG REFILLABLE SPANISH

FOOD ANALYSIS

Kit #6

Using simple and safe chemical tests, students can very quickly and easily identify the major nutrients in common foods. Students use step-by-step instructions to test common foods for the presence of carbohydrates, proteins, and lipids. They also perform qualitative (detect a presence) and quantitative (how much) tests of Vitamin C by using a very simple drop-by-drop titration process. Over 100 tests for unknowns can be performed on each food group. This kit does not use corrosive agents or toxic substances.

Accommodates five classes, each with 10 groups of three students.

Kit No. 6	$80.60
Refill Kit No. 6-RC	$59.15

STEM AG REFILLABLE

INVESTIGATING THE DESIGN AND OUTPUT OF WET CELL BATTERIES

Kit #205S — Developed by SEPUP

This kit introduces students to the concept of energy conversion through the study of a simple electrochemical cell connected to an electric motor. Students design and conduct an experiment that uses the unique Lab-Aids® Wet Cell Chamber to determine which combination of different metals works best to convert the potential chemical energy into electric energy. Their results allow them to rank the metals tested in order of reactivity. They also investigate how the distance between the metals, the direction of current flow, and the amount of metal surface area impacts the electrical output of the wet cell..

Accommodates 6 groups of four students.

Kit No. 205S	$176.45
Add a Group No. 205SEL	$29.80

AG LITERACY STEM REFILLABLE ADD A GROUP

BASIC CHROMATOGRAPHY

Kit #15

In this exceptional introduction to paper chromatography, students learn how chromatography can identify the makeup of organic and inorganic substances. Students perform experiments to compare the effects of different solvents on the separation of chlorophyll extract and dyes into their constituent components.

Accommodates two classes, each with 15 groups of two students.

Kit No. 15	$120.35
Refill Kit No. 15-RC	$58.15

STEM REFILLABLE

LAB-AIDS® CHEMPLATE, PACKAGE OF 10

Kit #800

The Lab-Aids Chemplate is a clear plastic tray about the size of an index card. It has changed thousands of science teachers' ideas of how to conduct labs. Using the inexpensive Chemplate eliminates the need for glassware and provides a semi-micro environment for conducting many experiments.

Molded into the high impact transparent plastic tray are 12 large numbered cavities, an additional jumbo-sized cavity plus a snap-off cap and snap-off measuring spatula.

Accommodates unlimited classes, each with 10 groups of two students.

Kit No. 800	$16.05
Kit No. 800-GT Gas Collecting Tubes (12/pkg.)	$8.80

STEM AG NONCONSUMABLE

THIN LAYER CHROMATOGRAPHY

Kit #17

This inexpensive, simple, and very accurate Lab-Aids kit illustrates the principles of Thin Layer Chromatography (TLC). The lab techniques involve silica-gel coated plastic slides, indicators, developers and chromatography chambers. Each student runs chromatograms of five different sample dye solutions in order to establish Rf (Rate of flow) standards. They also run chromatograms of two "unknowns," which are identified for the teacher in the instruction booklet.

Accommodates two classes, each with 12 groups of two students.

Kit No. 17	$242.00
Refill Kit No. 17-RC	$184.95

STEM LITERACY REFILLABLE

FAMILIES OF ELEMENTS EXPERIMENT

Kit #110R

Students learn how to classify elements by observing the behavior of compounds in the Halogen Family (Group VIIA). The chemical properties of this group are very similar despite the marked differences in their physical properties.

As students perform a series of experiments, they discover that the elements form remarkably similar compounds with silver. Also, that the formulas of the compounds are similar, and that the elements are indeed in the same family.

Accommodates two classes, each with 15 groups of two students.

Kit No. 110R	$127.80
Eng./Spn. Kit No. 110R-BL	$130.15
Refill Kit No. 110R-RC	$83.45

STEM LITERACY SPANISH REFILLABLE

MODELING AND COMPARING FOSSIL FUEL AND BIOFUEL COMBUSTION

Kit #38

In Part One of this activity, students use Lab-Aids® Molecular Models to build methane, ethanol, and octane molecules then "combust" them with oxygen molecules. "Combusting" the model molecules helps students determine the balanced chemical equations for the combustion reactions and compare the amount of carbon dioxide released when these three fuels are burned. In Part Two students use standard bond energies to calculate and compare the amount of energy released during the combustion reactions they modeled in Part One. They are then asked to use their data about the energy released and the CO_2 produced to choose which fuel they think is better.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 38	$144.15
Add a Group No. 38EL	$25.70

AG STEM ADD A GROUP LITERACY NONCONSUMABLE

SUBLEVEL ORBITALS OF ATOMS

Kit #140

Using specialty-designed components to simplify rather abstract concepts, students assemble their own spatial three-dimensional models. The models demonstrate the position and number of electrons along the x, y and z axes. They also demonstrate the orbitals of the sublevels of the major energy levels.

As students assemble the models, they review the four quantum numbers and Pauli's Exclusion Principle. They also identify the number and position of electrons in various atoms.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 140 $92.10

LITERACY NONCONSUMABLE

BIOFUELS: INVESTIGATING ETHANOL PRODUCTION AND COMBUSTION

Kit #39S

This activity includes three major parts.

- Investigation One - students observe a demonstration of the fermentation of corn and cane sugar, the two food sources used most commonly to produce ethanol, and the distillation of the fermented stillage to produce fuel.
- Investigation Two - students investigate the energy released by the combustion of ethanol and kerosene and compare the results.
- Investigation Three - students measure and compare two by-products - CO_2 and particulate matter - of the two fuels. Students compare results and discuss the trade-offs of biofuels and fossil fuels as sources of energy.

Accommodates 6 groups of four students.

Kit No. 39S $236.75

Add a Group No. 39SEL $22.60

LITERACY STEM AG REFILLABLE ADD A GROUP

INTRODUCTION TO pH MEASUREMENT
Kit #80

This series of simple, highly visual lab activities introduce students to the effects of acids and bases on litmus indicators, indicator solutions, and natural indicators. The activities begin by discussing the differences between acids and bases. It then moves to a discussion on the use of pH test paper and the interpretation of their results. Students are also introduced to the concept that acid and base discussions are not limited to chemistry but also extend to applications in biology and the study of the human body.

Accommodates three classes, each with 12 groups of two students.

Kit No. 80	$67.95
Eng./Spn. Kit No. 80-BL	$70.10
Refill Kit No. 80-RC	$26.95

SPANISH
REFILLABLE

pH MEASUREMENTS AND INDICATORS
Kit #81R

In this very popular Applied Science Concept Kit, students perform a series of colorful tests that help them to develop a better understanding of pH, its relationship to acids and bases, and its effect on indicator dyes. Using a Lab-Aids® Chemplate® and universal indicator, each student creates their own pH color guide. This color guide is then used to identify the pH of three unknown solutions, which are provided in this kit.

Accommodates three classes, each with 15 groups of two students.

Kit No. 81R	$117.45
Eng./Spn. Kit No. 81R-BL	$119.65
Refill Kit No. 81R-RC	$78.95

STEM SPANISH
AG REFILLABLE

IDENTIFICATION OF SUBSTANCES
Kit #83

In this kit, students are asked to identify common metallic and non-metallic ions. Through this identification process, they learn that each substance has distinctive properties. As a closing activity, students conduct chemical tests on four unknown substances. All test results are safe, clear, colorful, and unmistakable!

Accommodates three classes, each with 12 groups of two students.

Kit No. 83	$141.70
Refill Kit No. 83-RC	$89.25

STEM
REFILLABLE

DETERMINATION OF CHEMICAL FORMULAS

Kit #85

Relating chemical formulas to actual substances can often be a confusing and difficult challenge for students. In this kit, abstract theories are made concrete, as students learn to predict the formula of a compound based on the compound's reaction to different solutions.

Students use a chemical analysis method to determine percent composition and molecular weight of a molecular substance.

For ionic substances, students will determine the relative number of each of the ions in substance's composition.

Accommodates three classes, each with 12 groups of two students.

Kit No. 85	$91.55
Eng./Spn. Kit No. 85-BL	$93.75
Refill Kit No. 85-RC	$49.75

STEM SPANISH REFILLABLE

INVESTIGATING THE CHEMISTRY OF CORROSION

Kit #86S — Developed by SEPUP

This is a two-part investigation into the chemical concepts that underlie corrosion and our attempts to inhibit it. In the laboratory portion of this activity, students investigate the corrosion of iron, steel, aluminum, and zinc metal. They investigate the impact of factors such as salinity, coatings, and contact with other metals on rust and corrosion. Students also complete a reading that describes some conditions that affect the rate of corrosion of iron and steel and several chemical principles associated with these conditions. The activity concludes with a discussion of the impact of corrosion on materials and the environment.

Accommodates up to four classes, each with 6 groups of four students.

Kit No. 86S	$123.15
Add a Group No. 86SEL	$22.60

STEM LITERACY REFILLABLE ADD A GROUP

CHANGING OF EQUILIBRIUM (LE CHATELIER'S PRINCIPLE)

Kit #87

In this series of activities, students put Le Chatelier's Principle to the test. They learn the four important factors that can disturb the equilibrium of a chemical reaction: concentration, pressure, temperature, and light. Your students will discover that chemical reactions do not always go to completion and that all are somewhat reversible. Students encourage one of two simultaneous chemical reactions which cause the equilibrium of the mixture to change.

Accommodates three classes, each with 12 groups of two students.

Kit No. 87	$92.10
Eng./Spn. Kit No. 87-BL	$94.25
Refill Kit No. 87-RC	$47.40

LITERACY SPANISH REFILLABLE

INTRODUCTION TO OXIDATION AND REDUCTION

Kit #88

Students place pieces of zinc, lead, and copper in solutions of metallic ions to test their relative reducing ability. Then, they compare and determine the relative oxidizing strength of certain halogen elements: chlorine, bromine, and iodine.

This highly visible and safe activity is an excellent introduction to a very important chemical concept.

Accommodates two classes, each with 12 groups of two students.

Kit No. 88	$139.35
Eng./Spn. Kit No. 88-BL	$141.70
Refill Kit No. 88-RC	$95.85

SPANISH REFILLABLE

MODELING CHEMICAL EQUILIBRIUM

Kit #89

Students use an innovative Lab-Aids® model to simulate the simultaneous occurrence of forward and reverse reactions. This mechanical system provides a simple look at dynamic equilibrium and allows students to collect data that helps develop the concept of chemical equilibrium and the equilibrium constant (K_{eq}). They then use their understanding of K_{eq} to calculate the predicted results for other "reactions."

Accommodates dozens of classes, each with 6 groups of four students.

Kit No. 89	$103.60
Add a Group No. 89EL	$17.45

ADD A GROUP LITERACY REFILLABLE

ELEMENTS AND THE PERIODIC TABLE

Kit #109S — Developed by SEPUP

This kit contains two activities. In Activity 1, students compare pre-selected data on physical and chemical properties of 14 elements and sort the elements into groups based on common properties. Then they compare their classifications with groups, or families of elements, as defined by scientists. In Activity 2, students are introduced to the Periodic Table of the Elements and read about its history and organization. The reading introduces the difference between elements and compounds as well as atoms, molecules, and chemical formulas.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 109S	$77.20
Add a Group No. 109SEL	$13.95

LITERACY STEM AG NONCONSUMABLE ADD A GROUP

FLAME TESTS AND EMISSION SPECTROSCOPY

Kit #111

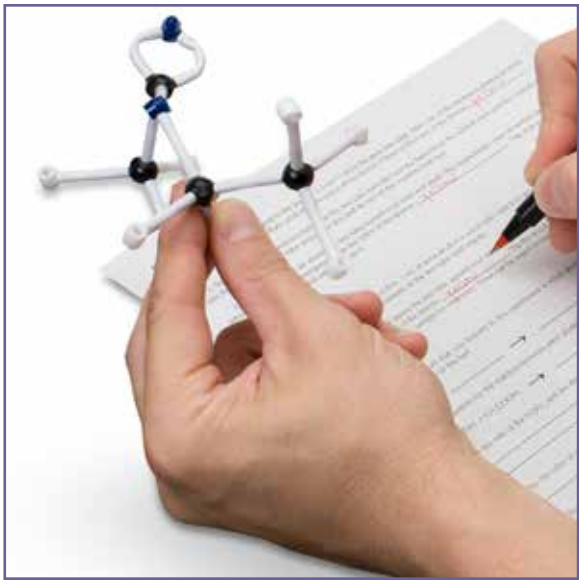
The concept of spectrum analysis is introduced with this Lab-Aids kit. Bunsen Burners are all you need to enable students to conduct these dramatically colorful, spectroscopy experiments.

Students spray fine mists of water-based solutions, which contain various amounts of salts, into a Bunsen burner flame. They first observe the color that various metallic elements impart to a Bunsen flame. Then, the students view the flame through a spectroscope and observe the spectra of each of the elements that are visible to the human eye.

Accommodates two classes, each with 12 groups of two students.

Kit No. 111	$111.15
Eng./Spn. Kit No. 111-BL	$113.25
Refill Kit No. 111-RC	$37.55

SPANISH REFILLABLE



SOLID ALCOHOL AND ESTERIFICATION

Kit #113

In this kit, students synthesize chemical substances that are normally found in nature. The four lab activities create a bridge from organic chemical concepts to their practical applications.

Students first make their own heating "unit." A solid alcohol is ignited to provide energy for synthesizing three different esters, Ethyl acetate, Methyl salicylate (oil of winter green) and Amyl acetate (banana oil). Students are asked to describe the odor and color of each ester. In the last part of this activity, they create a molecular model of ethyl acetate using Lab-Aids® molecular model parts. Each student saturates his worksheet with samples produced (oil of wintergreen and banana oil) from the experiment.

Accommodates two classes, each with 12 groups of two students.

Kit No. 113	$161.25
Eng./Spn. Kit No. 113-BL	$163.40
Refill Kit No. 113-RC	$75.30

SPANISH REFILLABLE

DENSITY: LAYERS OF LIQUIDS

Kit #114

This activity provides students with experiences that allow them to develop an operational definition of density. Students are provided with liquids of different viscosity and density and asked to observe and predict, based on their observations, the relative density of each. They then test their predictions and develop an understanding of density by preparing sequences of liquid layers. They are given values for the density of each liquid and asked to use this information to estimate the density of an unknown solid. Finally, there is an optional challenge to design and carry out an experiment to determine the density of a fourth liquid.

Accommodates two classes, each with 6 groups of four students.

Kit No. 114	$114.60
Add a Group No. 114EL	$20.55
Refill Kit No. 114-RC	$57.85

LITERACY STEM AG REFILLABLE ADD A GROUP

INDIVIDUAL ELEMENTARY MOLECULAR MODEL SET

Kit #124-1

Build models of carbon, oxygen, hydrogen, nitrogen, and chlorine, plus more than twenty different molecules made from these atoms. Three-dimensional models can be assembled and disassembled repeatedly without falling apart during use. This kit is designed for either teacher demonstration or use by individual students. It includes a detailed instruction manual.

Accommodates unlimited classes with 1 group of students.

Kit No. 124-1 $25.90

NONCONSUMABLE

INDIVIDUAL BASIC STUDENT MOLECULAR MODEL SET

Kit #125

This basic molecular model kit is ideal for teacher demonstrations or individual student activities. Construct ten different molecular models, including methane, water, ammonia, hydrogen sulfide, ethane, and propane. The kit contains 191 components plus a self-pace instruction book.

Accommodates unlimited classes with 1 group of students.

Kit No. 125 $25.05

NONCONSUMABLE

INDIVIDUAL ORGANIC STUDENT MOLECULAR MODEL

Kit #125-1

Designed for teacher-directed activities in organic chemistry, this kit visually demonstrates homology, isomerism, functional groups, and nomenclature. Because the covalent bonds are flexible, construction of double and triple bonds is simplified. After constructing their models, students will be able to write structural formulas for several organic compounds. It includes a detailed instruction manual.

Accommodates unlimited classes with 1 group of students.

Kit No. 125-1 $18.40

NONCONSUMABLE

FIRST INTRODUCTION TO MOLECULAR MODELS

Kit #129

Understanding molecular models is made easy with this specially designed two-part kit. Students first study electron characteristics using the Bohr model for electron structure of the atom. They progress to a study of atoms gaining, losing, or sharing electrons in order to form molecules of a substance.

The next activity deals with the three-dimensional structure of the atom. Similarities in molecules are readily observed as students connect atoms to similar atoms, such as by forming hydrocarbons. Bonding is illustrated in constructing molecules with different atoms.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 129	$128.70
Add a Group No. 129EL	$21.60

LITERACY ADD A GROUP NONCONSUMABLE

MOLECULAR MODELS AND LEWIS DIAGRAMS

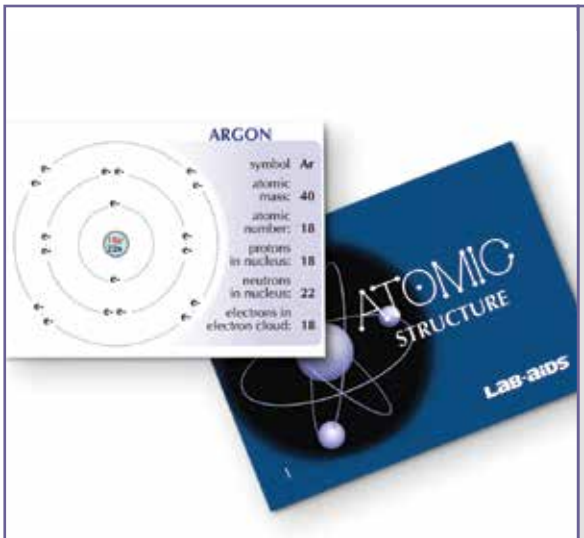
Kit #130

Colorful, easy-to-assemble models help students visualize the construction of different molecules. Top quality reusable components mean that comparison models can be made simultaneously, then disassembled to make other models. Introductory classroom kit includes twelve packets of color-coded molecular model components.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 130	$112.35
Eng./Spn. Kit No. 130-BL	$114.55
Add a Group No. 130EL	$11.30

SPANISH LITERACY ADD A GROUP NONCONSUMABLE



ATOMIC STRUCTURE AND CHEMICAL INTERACTIONS

Kit #141

Students are introduced to models of atomic structure and use the planetary model to visualize the number of valence electrons. They discover that the row of the Periodic Table (chemical family) in which the element belongs is related to the element's number of outer shell electrons. They also discover that the total number of electrons in the outer shell of chemical compounds is a multiple of eight.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 141	$74.90
Add a Group No. 141EL	$13.45

STEM ADD A GROUP LITERACY NONCONSUMABLE

CONSERVATION OF MATTER

Kit #142

Students compare the same gas-producing chemical reaction in both a closed and an open system. They observe that the mass decreases in an open system but remains the same in a closed system. This data confirms the Law of Conservation of Mass and reinforces the molecular nature of all matter, including gases.

REQUIRES BALANCE(S) WITH 0.1 g MIN PRECISION

Accommodates five classes, each with 6 groups of four students.

Kit No. 142	$84.90
Add a Group No. 142EL	$14.35
Refill Kit No. 142-RC	$29.00

LITERACY STEM REFILLABLE ADD A GROUP

ASPIRIN STUDY

Kit #180

Aspirin (acetylsalicylic acid) is probably the most used and abused non-prescription drug. Using aspirin tablets brought from home, students analyze and compare them with the Brand "X" aspirin included in this kit. They determine the percentage of aspirin and the "filler" components in a tablet, check pH, and calculate the per aspirin cost. Students draw conclusions concerning which aspirins are better, which are safer, and which do nothing at all. This kit makes science more interesting because it brings "real world" questions into the classroom.

Requires balances and boiling water bath.

Accommodates two classes, each with 15 groups of two students.

Kit No. 180	$106.55

LITERACY STEM REFILLABLE

UNDERSTANDING AND COMPARING ANTACIDS

Kit #181

This kit makes science more interesting and meaningful by dealing with fundamental chemical principles and applying them to products found at home.

Most antacids are composed of bases or alkalizing agents. Students are able to take actual over-the-counter antacids (Rolaids, Mylanta, etc.) brought from home and perform a neutralizing activity which determines how much acid can be neutralized by a particular brand. After conducting the activities, students make comparisons and draw conclusions about the different brands tested.

Accommodates two classes, each with 8 groups of four students.

Kit No. 181	$144.45
Refill Kit No. 181-RC	$68.85

STEM LITERACY REFILLABLE

KITCHEN CHEMISTRY (USING PROPERTIES TO ID SUBSTANCES)

Kit #190

This fun activity emphasizes experimental observation and scientific reasoning skills. The primary purpose of this kit is not to identify the common kitchen chemicals, but to observe how they react. Students first explore some physical and chemical properties of several common kitchen substances (four powders). Then, they determine some properties of the powders by using three liquid indicators.

After determining the physical and chemical properties, students attempt to identify some of the mystery powders provided using the results from their experimental observation.

Accommodates two classes, each with 12 groups of two students.

Kit No. 190	$96.50
Eng./Spn. Kit No. 190-BL	$98.60
Refill Kit No. 190-RC	$60.75

LITERACY SPANISH REFILLABLE

INVESTIGATING HARD AND SOFT WATER

Kit #191

Using simple tests, students gain experience with ionization, precipitation, and solubility. This Lab-Aids kit is an excellent activity for studying water purification, water pollution, ecology, earth science, and consumer education. Students study important concepts in a clear, meaningful, and relevant manner.

Accommodates two classes, each with 12 groups of two students.

Kit No. 191	$95.00
Eng./Spn. Kit No. 191-BL	$97.20
Refill Kit No. 191-RC	$53.30

AG LITERACY SPANISH REFILLABLE

PROPERTIES OF ACIDS AND BASES EXPERIMENT

Kit #82

This kit provides a completely safe and convenient method for students to study, test and observe the characteristic properties of acids and bases. Students perform a total of seven different activities. Activities incorporate the Lab-Aids® Chemplate®. This unique lab tool eliminates the need for glassware and provides a semi-micro environment in any classroom.

Accommodates three classes, each with 12 groups of two students.

Kit No. 82	$139.35
Eng./Spn. Kit No. 82-BL	$141.70
Refill Kit No. 82-RC	$86.60

STEM SPANISH AG REFILLABLE

9-LEVEL CONDUCTIVITY METER

Kit #300M

The Lab-Aids® 9 Level Conductivity Meter shows the relative conductivity/resistance of liquids and solids. As the conductivity of the tested material increases, the number of glowing red LEDs (light emitting diodes) will increase to a maximum of 8, which indicates a very good conductor. There will be zero glowing red LEDs if the material being tested has a very low electrical conductivity (is a good insulator). The kit includes a 12 well Chemplate for testing multiple items conveniently.

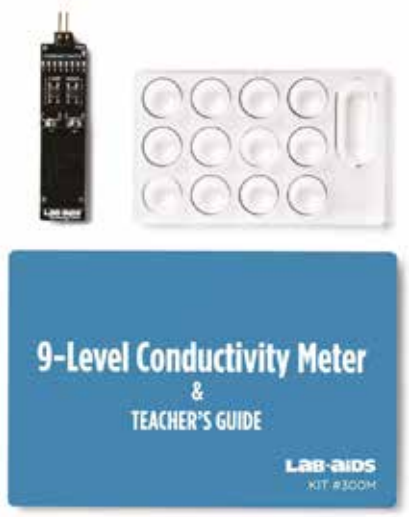
9V battery is required, but is not included with the kit.

Accommodates unlimited classes with 1 group of students.

Kit No. 300M	$32.80
Kit No. 300M-U (no Chemplate)	$29.85

STEM AG

NONCONSUMABLE



AUDIBLE CONDUCTIVITY INDICATOR

Kit #301

The Lab-Aids Audible Conductivity Indicator is a qualitative alternative to the 9-Level Conductivity Meter. If the material being tested is a conductor there is an audible tone that increases in volume and intensity as conductivity increases. If a non-conducting material is tested there is no tone. The kit includes a 12 well Chemplate for testing multiple items conveniently.

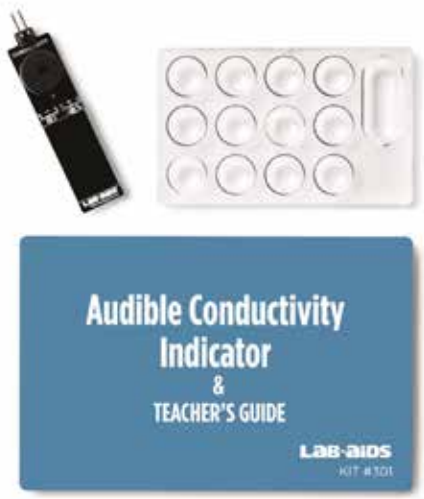
A 9-volt battery is required, but not included

Accommodates unlimited classes with 1 group of students.

Kit No. 301	$32.80

STEM

NONCONSUMABLE



CONDUCTIVITY OF SOLUTIONS

Kit #313

Students study the principles of ionization by differentiating between strong electrolytes, weak electrolytes and non-electrolytes. They also learn to differentiate between strong and weak acids and strong and weak bases.

Performing a series of fun activities, students observe and discover dramatic results which lead to a better understanding of the principles of ionization.

Conductivity Indicators are required for these activities, but are not included with this kit.

Accommodates 15 groups of two students.

Kit No. 313	$118.40
Refill Kit No. 313-RC	$67.75
Kit No. 300M-U (no Chemplate)	$29.85

LITERACY

REFILLABLE

SOIL NUTRIENTS AND FERTILIZERS

Kit #318S — Developed by SEPUP

Nitrogen is one of the essential plant nutrients found in soil. Students measure the amount of nitrogen in several different soils. They then examine the role of nitrogen in plant growth and consider the effect of excess nutrients in an ecosystem.

Accommodates 8 groups of four students.

Kit No. 318S	$152.75
Refill Kit No. 318S-RC	$49.50

STEM LITERACY AG REFILLABLE

SIMULATING THRESHOLD EFFECTS OF SOIL pH ON HYDRANGEA

Kit #320

Students model how hydrangea plants are affected by soil pH. The use of a simulation allows students to determine the effect of agricultural lime on hydrangea flower color. Students use the data obtained from the simulation to determine the positive and negative threshold doses for "agricultural lime." They also reflect upon the results to decide whether they have sufficient data to recommend an optimal level of lime treatment to produce healthy plants with large, pink flowers.

Accommodates three classes, each with 6 groups of four students.

Kit No. 320	$122.50
Add a Group No. 320EL	$26.35

AG LITERACY REFILLABLE ADD A GROUP

COPPER MINING AND EXTRACTION

Kit #440S — Developed by SEPUP

Copper and other raw materials contribute to our technological lifestyle, but the byproducts of extracting copper from ore are potential toxic wastes. In this activity, students explore the properties of copper and copper ore. They conduct two reactions used to extract and recover copper from the ore.

This process introduces single and double replacement reactions. Students also consider the wastes produced by the extraction process.

Accommodates 8 groups of four students.

Kit No. 440S	$117.15
Refill Kit No. 440S-RC	$41.45

STEM LITERACY AG REFILLABLE

USING CHEMICAL REACTIONS TO REDUCE WASTE

Kit #441S — Developed by SEPUP

Students learn that wastes from many industrial processes contain toxic or valuable substances that can sometimes be reclaimed then recycled or disposed of safely. Working in groups, students reclaim copper from a liquid "waste" containing dissolved copper chloride. They measure the effectiveness of three different metal replacement reactions at removing the copper from the "waste." They then compare the effectiveness, cost, and safety information for each replacement reaction and decide which metal would be the best to use for removing the copper from the "waste."

Accommodates 12 groups of two students.

Kit No. 441S	$94.15	LITERACY STEM AG
Add a Group No. 441SEL	$16.45	REFILLABLE ADD A GROUP

CHEMILUMINISCENCE: TEACHER DEMONSTRATION

Kit #701

Students prepare two stock solutions from the materials provided in this kit. When the solutions are poured into the tubes, energy is released as a luminescent blue color. The color lasts for several minutes. Students are introduced to an oxidation-reduction reaction as well as reaction rates in this unique chemical to light energy change.

Accommodates 18 demonstrations.

Kit No. 701	$57.55

REFILLABLE

CHEMILUMINISCENCE: STUDENT ACTIVITY

Kit #701A

Students conduct a series of simple, safe, and dramatic activities that produce light energy (chemiluminescence). They are introduced to an oxidation-reduction reaction as well as rates of reaction. Students also calculate the ratios of chemicals used in the reaction and the effects of temperature on chemiluminescence. Students working in teams use calibrated tubes and the Lab-Aids® environment cups to complete the activity. Easy-to-follow instructions are provided.

Accommodates 8 groups of four students.

Kit No. 701A	$199.25	STEM LITERACY
Refill Kit No. 701A-RC	$133.50	REFILLABLE

DESIGN-YOUR-OWN CUSTOM MOLECULAR MODEL SET

Kit #530A

This complete assortment of color coded atoms and bonds allow the flexibility to create individualized models and molecules. Just like the standard model kits, atoms are molded in polypropylene with flexible vinyl connectors to represent the bond "linkages." Double and triple bonds are easily constructed. The models are easy to assemble, well constructed and come apart only when you want them to come apart.

This Lab-Aid contains an extensive assortment of 480 atoms plus 300 bonds.

Accommodates unlimited classes.

Kit No. 530A $95.00

NONCONSUMABLE

RECYCLABLE PLASTICS: IDENTIFICATION USING RELATIVE DENSITY AND FLAMMABILITY

Kit #704

Besides having students identify polymers, this lab activity can be used as an enrichment unit on density.

Students use specially designed trays to identify recyclable plastics by determining their relative density. They also test the flammability of the plastics and their physical characteristics. Students attempt to identify unknown plastics using the information they have collected.

Accommodates two classes, each with 8 groups of four students.

Kit No. 704 $241.70
Refill Kit No. 704-RC $115.00

STEM LITERACY AG REFILLABLE

MAKING AND MODELING POLYMERS

Kit #706S — Developed by SEPUP

Every day students use numerous products made of plastic. This kit introduces the structures and properties of the polymer molecules that make up all plastics.

Students first investigate the properties of the linear polymer found in white glue, and then add a cross-linker to explore the properties of the resulting cross-linked polymer. They then use paper clip models to investigate the molecular structures of monomers, polymers, and cross-linked polymers, and explore how their structural differences alter the properties of the molecules.

Accommodates 16 groups of two students.

Kit No. 706S $91.75
Refill Kit No. 706S-RC $25.30

STEM LITERACY AG REFILLABLE

SEPUP TRAYS, PACKAGE OF 16

Kit #SP-1CT

The SEPUP tray can be thought of as 9 test tubes and 5 beakers. They rinse quickly, dry easily and stack for storage. The tray is transparent and exceptionally durable but cannot be used with an open flame or some organic solvents. Many science teachers use SEPUP trays instead of fragile, dangerous expensive glassware and these trays are an integral part of many SEPUP products.

Accommodates unlimited classes, each with 16 groups of two students.

Kit No. SP-1CT $84.50

STEM AG NONCONSUMABLE

LAB-MASTER SYSTEM

Kit #NAC-LM-TS

The Lab-Master® is a unique, easy-to-use probeware system consisting of an integrated RGB spectrophotometer, temperature probe, voltage probe, and a safe control-point heater. Using standard cuvettes students learn the principals of colorimetry and understand how these important measurements are performed in industry.

The Lab-Master can be used for weeks on a single charge (the heating unit requires wall AC), and will output data in comma-separated values to a standard SD card.

Accommodates unlimited classes, each with 1 group of students.

Kit No. NAC-LM-TS $748.05

STEM AG NONCONSUMABLE

LAB-AIDS® SINKLESS CONDENSER

Kit #SS-1P11

This economical distillation apparatus uses ice water to cool and condense hot gases and is ideal for non-lab settings because it does not require a sink with a water supply and a drain. It can be used to separate substances whose boiling points differ by at least 3-5 Fahrenheit degrees.

Kit No. SS-1P11 $33.00

SINKLESS CONDENSER PACKAGE

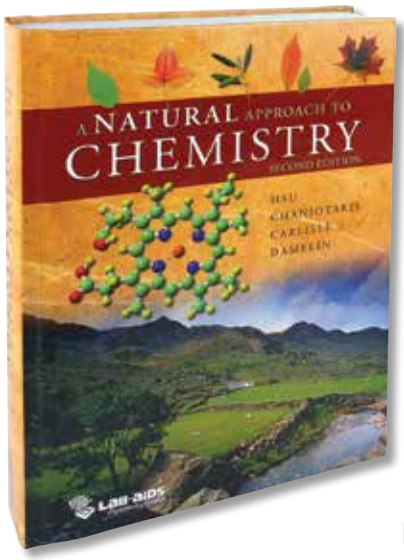
Kit #39S-C

To make set-up that much easier, this package includes one Sinkless Condenser plus one #7 2-hole and one #3 1-hole rubber stopper, one 18" and one 9" length of plastic tubing and two 3" lengths of glass tubing.

Kit No. 39S-C $44.15

Accommodates unlimited classes, each with 1 group of students.

AG STEM NONCONSUMABLE



A NATURAL APPROACH TO CHEMISTRY

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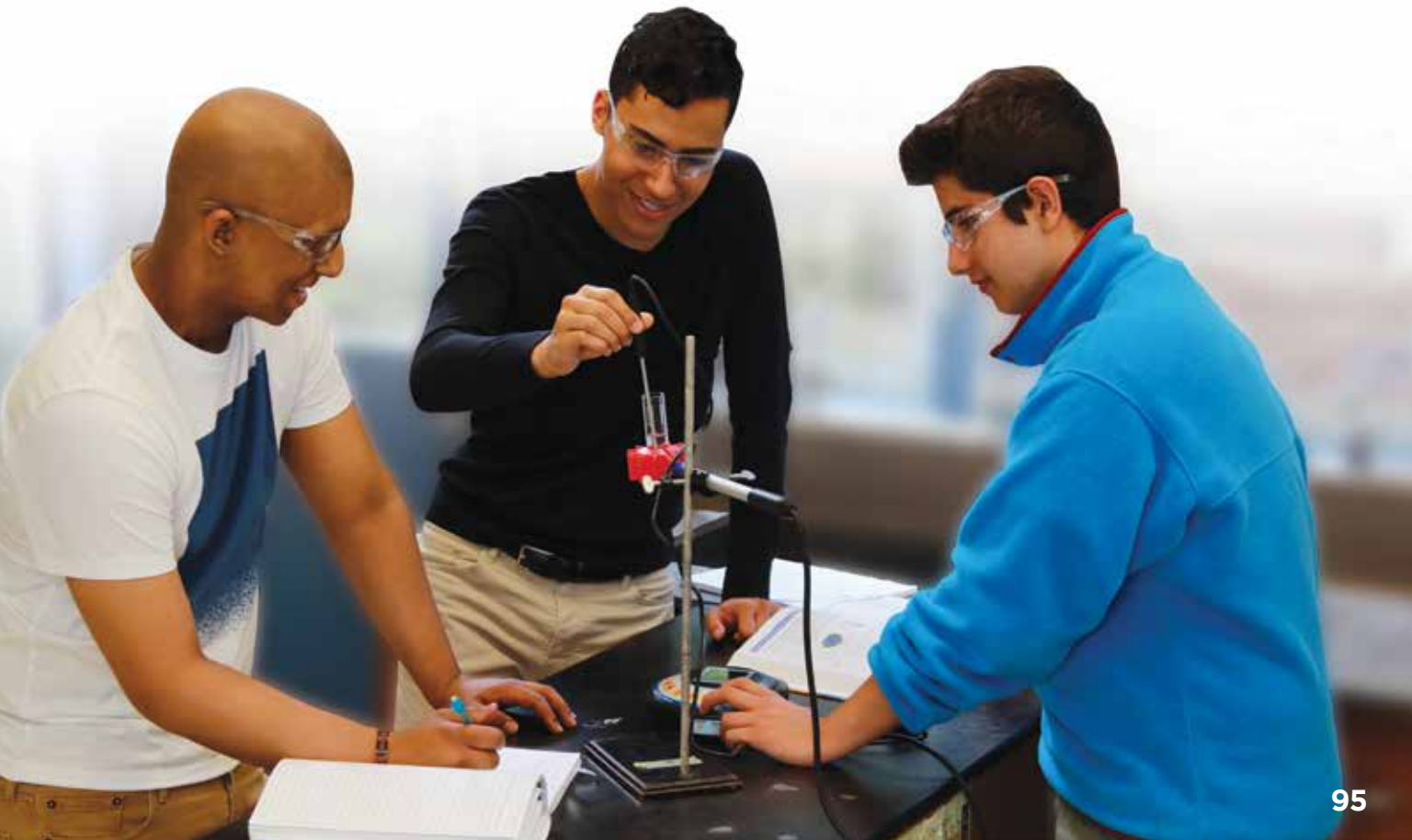
- GREEN: Only small quantities of easily disposable chemicals used
- Safe and durable with easy organization!
- Online Teacher Portal resources include PowerPoints, Podcasts, Instructional Videos, and differentiated skill sheets

FOR MORE INFORMATION, SEE PAGES 104-108 IN THE CURRICULUM SIDE OF THIS CATALOG



ENERGY TRANSFER: WAVES, SOUND AND LIGHT

Kit #211

Students produce both longitudinal and transverse mechanical waves and compare their similarities and differences. As an introduction, they use water and springs to observe wavelength and frequency. Their exploration of waves continues through investigating vibrations and the production of sound waves. Using an elasticized string allows them to create and observe different pitch notes and relate the sounds produced to the frequency of the vibrations. They then read about the wave nature of different energy forms, including light and sound, and are introduced to the fundamental features common to all waves.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 211	$99.10
Add a Group No. 211EL	$16.95

LITERACY ADD A GROUP NONCONSUMABLE

DENSITY: LAYERS OF LIQUIDS

Kit #114

This activity provides students with experiences that allow them to develop an operational definition of density. Students are provided with liquids of different viscosity and density and asked to observe and predict, based on their observations, the relative density of each. They then test their predictions and develop an understanding of density by preparing sequences of liquid layers. They are given values for the density of each liquid and asked to use this information to estimate the density of an unknown solid. Finally, there is an optional challenge to design and carry out an experiment to determine the density of a fourth liquid.

Accommodates two classes, each with 6 groups of four students.

Kit No. 114	$114.60
Add a Group No. 114EL	$20.55
Refill Kit No. 114-RC	$57.85

LITERACY STEM AG REFILLABLE ADD A GROUP

CONVERTING GRAVITATIONAL POTENTIAL ENERGY TO KINETIC ENERGY

Kit #207S — Developed by SEPUP

This kit introduces students to the concepts of kinetic and gravitational potential energy and the conversion of one form of energy into another. Students design and conduct an experiment to quantitatively test how the variables of mass and height affect the energy carried by a metal cylinder. The investigation in this activity allows students to explore energy transfer, the relationship of gravitational potential energy to mass and height, and the transformation of potential energy to kinetic energy.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 207S	$103.00
Add a Group No. 207SEL	$19.95

STEM ADD A GROUP LITERACY NONCONSUMABLE

EXPLORING NEWTON'S FIRST LAW: INERTIA

Kit #351S — Developed by SEPUP

Using the specially-designed track, students investigate inertia by observing a marble's motion. They observe a marble in motion around a circular track then predict what path it will follow when a section of the track is removed, allowing the marble to roll unconstrained across the table top. They discover that once the marble leaves the confines of the track, it moves in a straight line path. Students also investigate how changing the mass of the marble affects the motion of the marble on the track. In Part 2 they complete a reading about inertia and Newton's First Law of Motion.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 351S	$70.95
Add a Group No. 351SEL	$12.30

LITERACY ADD A GROUP NONCONSUMABLE

ENERGY TRANSFER: MOTORS, GENERATORS, AND SOURCES OF ELECTRICITY

Kit #213

Students explore the relationship between, and practical applications of, electricity and magnets. They use a battery, a magnet, and a coiled wire to build a simple electric motor and then use a pre-assembled electric motor to generate electric current. In Activity 2, students read about how electricity is generated for home and commercial use. They compare the methods and equipment needed to convert energy carried by renewable and nonrenewable resources into electric current.

Six D-cell batteries required but not included with the kit.
Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 213	$197.15
Add a Group No. 213EL	$33.40

AG STEM ADD A GROUP LITERACY NONCONSUMABLE

COMPARING THE ENERGY EFFICIENCY OF DIFFERENT LIGHT BULBS

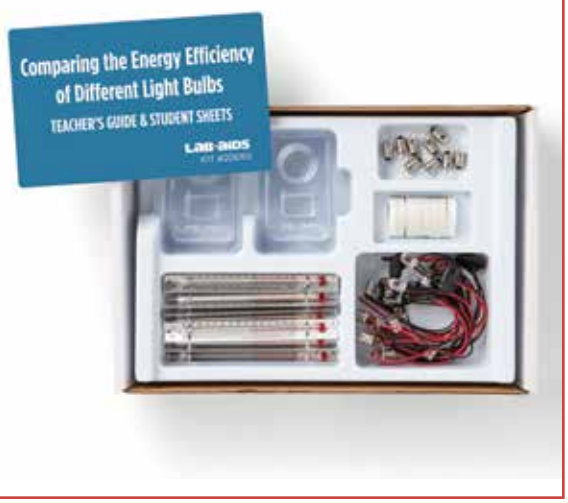
Kit #206RS — Developed by SEPUP

Students use a unique piece of equipment to collect data and compare the efficiencies of a small incandescent bulb and a small LED bulb. They use their measurements to calculate the efficiency of the bulbs to produce light by measuring how much "waste" thermal energy is produced. They also compare "lifetime costs" for different types of bulbs and consider the trade-offs involved when deciding which type of bulb to purchase.

Accommodates unlimited classes, each with 8 groups of four students.

Kit No. 206RS	$156.25

STEM LITERACY NONCONSUMABLE



MODELING CONVECTION CURRENTS

Kit #436S — Developed by SEPUP

Small groups of students use unique materials to investigate convection currents in water. They use their experiences to develop an operational understanding of the relationship between water temperature and its movement. This knowledge is then applied to geology as students analyze data about the Earth's layers and convection currents in the lithosphere. The hands-on experience with convection in water coupled with the knowledge of Earth's interior is combined to explain the motion of the earth's tectonic plates.

Accommodates dozens of classes, each with 6 groups of four students.

Kit No. 436S	$94.65
Add a Group No. 436SEL	$9.65

ADD A GROUP LITERACY REFILLABLE

ENERGY TRANSFER: MOTION OF A PENDULUM

Kit #212

Students first investigate how the physical characteristics of a pendulum affect the period of a pendulum. They are given several variables to test and are then asked to design and carry out an experiment to test the effect of another variable of their own choosing. Once the data is collected, they analyze the cyclic transfer between kinetic and potential energy that occurs as a pendulum swings.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 212	$158.65
Add a Group No. 212EL	$26.75

STEM ADD A GROUP LITERACY NONCONSUMABLE

INVESTIGATING THE DESIGN AND OUTPUT OF WET CELL BATTERIES

Kit #205S — Developed by SEPUP

This kit introduces students to the concept of energy conversion through the study of a simple electrochemical cell connected to an electric motor. Students design and conduct an experiment that uses the unique Lab-Aids® Wet Cell Chamber to determine which combination of different metals works best to convert the potential chemical energy into electric energy. Their results allow them to rank the metals tested in order of reactivity. They also investigate how the distance between the metals, the direction of current flow, and the amount of metal surface area impacts the electrical output of the wet cell.

Accommodates 6 groups of four students.

Kit No. 205S	$176.45
Add a Group No. 205SEL	$29.80

AG LITERACY STEM

INVESTIGATING PHOTOVOLTAIC CELLS

Kit #220S — Developed by SEPUP

Students use photovoltaic cells to transform energy from sunlight into electrical energy as they investigate solar energy as an example of a renewable energy source. They explore how to power a motor using the photovoltaic cells and investigate some factors that affect the cells' ability to transform light energy into electricity. They then discuss the advantages and disadvantages of using solar energy.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 220S	$160.90
Add a Group No. 220SEL	$27.75

AG STEM ADD A GROUP
LITERACY NONCONSUMABLE

THE ELECTROMAGNETIC SPECTRUM

Kit #209S — Developed by SEPUP

This kit provides a multi-day, three-part learning experience about the electromagnetic spectrum, applications of infrared energy, and ways that humans have used electromagnetic energy to extend their sensory capabilities. Students observe how visible light can be separated into different colors, use unique Lab-Aids® equipment to collect evidence about the amount of energy carried by different colors of visible light, then read about the classic experiments that established the existence of infrared and ultraviolet radiation.

Accommodates unlimited classes, each with 8 groups of 4 students.

Kit No. 209S $269.05

STEM LITERACY NONCONSUMABLE

LAB-AIDS® LIGHT STATION PLUS

Kit #810

The Lab-Aids® Light Station is a safe, compact, easy-to-use light source, suitable for use in middle and high schools. It provides a cost-effective way for your students to study light and its interactions with matter. The light station is constructed of sturdy, high-impact polystyrene, which folds flat for storage.

The kit includes: light station and power supply, a 15W V-filament light bulb, and one each of the following filters: single slit, three slit, diffusing filter mask, tri-color, red, blue, and green.

Accommodates unlimited classes, each with 1 group of four students.

Kit No. 810 $116.90

STEM NONCONSUMABLE

SIMPLE MACHINES

Kit #214

Students measure the force required to lift objects using different simple machines. Each successive activity introduces new, more complex concepts that build upon and extend student understanding of force and motion. They calculate work input, work output, and mechanical advantage and are introduced to friction, efficiency, and the second law of thermodynamics.

Accommodates unlimited classes with 1 group of four students.

Kit No. 214 $71.65

10% discount for purchase of 2 to 5 kits and 15% discount for 6 or more.

STEM LITERACY AG NONCONSUMABLE

MAGNETIC FIELDS AND FORCES
Kit #217

The two activities included explore magnets and magnetic fields, particularly Earth's magnetic field. Students first develop operational definitions of magnets, magnetic poles, and magnetic fields then continue their exploration by examining naturally magnetic rocks and the behavior of navigational compasses.

Accommodates unlimited classes, each with 6 groups of four students.

Kit No. 217	$136.15
Add a Group No. 217EL	$23.65

LITERACY ADD A GROUP AG NONCONSUMABLE

INVESTIGATING MIRRORS
Kit #1150

This kit is an excellent tool for introducing students to the concept of light traveling in a straight line. It also introduces the uses and properties of mirrors.

Students explore and discover concepts with minimal teacher direction as they manipulate plastic mirrors and mirror holders to create images.

Accommodates unlimited classes, each with 10 groups of four students.

Kit No. 1150	$153.15

LITERACY NONCONSUMABLE

LIGHT: REFLECTION AND MIRRORS
Kit #P104-S03

Students use plane and curved mirrors to observe and measure the angles of incident and reflected rays. Using their data, students apply their understanding of Snell's Law and straight-line travel to explain how mirrors can focus light and produce reversed images.

Accommodates unlimited classes, each with 1 group of four students.

Kit No. P104-S03	$112.90

LITERACY NONCONSUMABLE

UNDERSTANDING AND USING ENERGY AND TECHNOLOGY

Kit #P300A

This unit contains three activities designed to increase student understanding of energy and how we use it, energy of motion, and energy and technology. A companion unit, Using Energy Effectively in Lighting and Life (Kit # P300B), helps students to investigate energy efficiency in home lighting, patterns of energy use in the home, and renewable sources of energy.

Accommodates unlimited classes, each with 8 groups of students.

Kit No. P300A $249.00

STEM LITERACY AG NONCONSUMABLE

USING ENERGY EFFECTIVELY IN LIGHTING AND LIFE

Kit #P300B

This unit contains three activities designed to increase student understanding of energy efficiency in home lighting, patterns of energy use in the home, and renewable sources of energy. A companion unit, Understanding and Using Energy and Technology (Kit #P300A), helps students investigate energy and how we use it, the energy of motion, and energy and technology.

Accommodates unlimited classes, each with 8 groups of students.

Kit No. P300B $395.00

STEM LITERACY AG NONCONSUMABLE

LIGHT: REFRACTION AND LENSES

Kit #P104-S04

Using both convex and concave lenses, students compare images and magnification produced by lenses, measure the focal length, and then figure out how to construct a simple camera.

Accommodates unlimited classes, each with 1 group of four students.

Kit No. P104-S04 $138.25

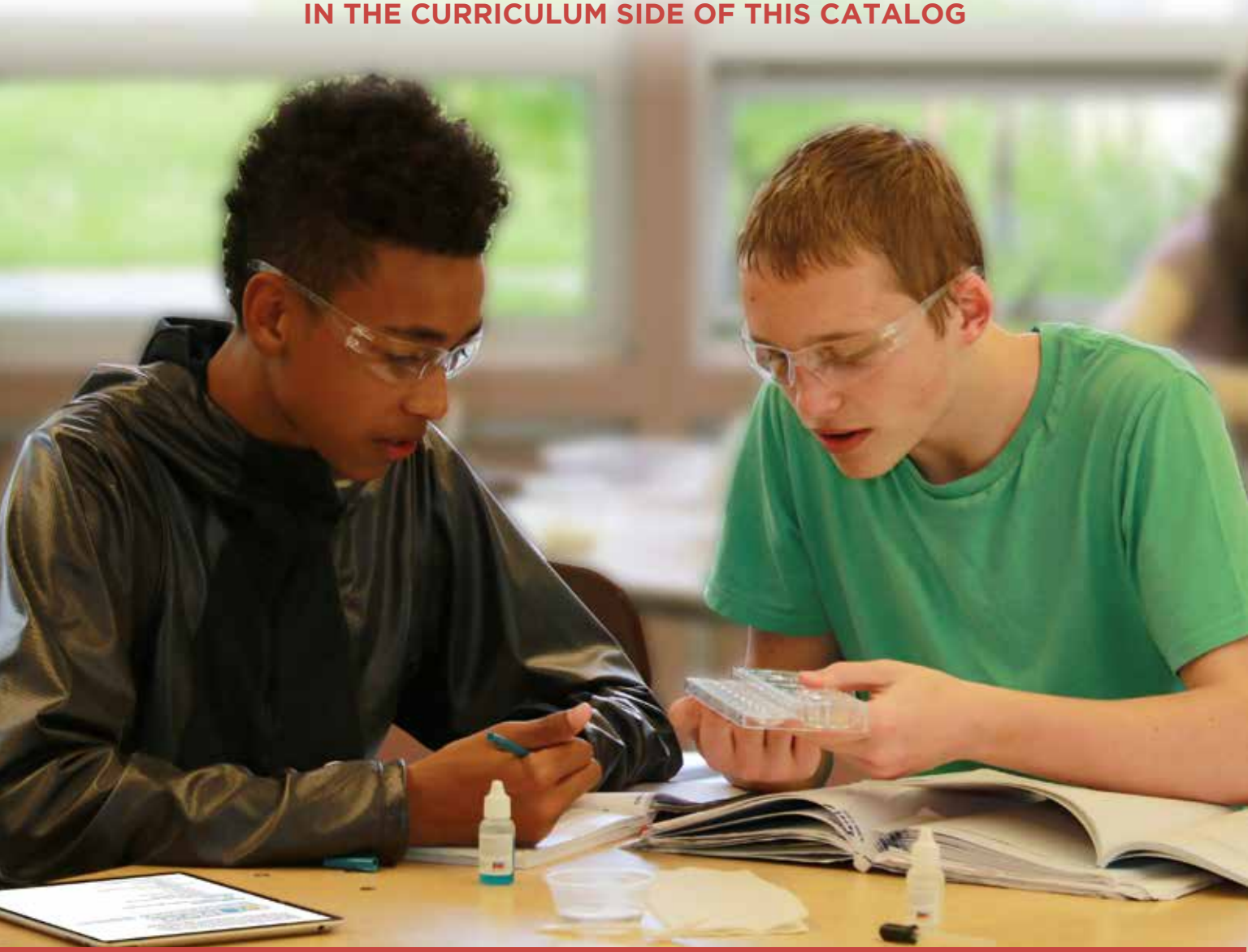
LITERACY NONCONSUMABLE

ISSUES AND PHYSICAL SCIENCE

Middle School Curriculum | NGSS

All students need to develop an understanding of science and technology to make informed personal and community decisions. Using **ISSUES AND PHYSICAL SCIENCE**, students learn how to gather and interpret scientific evidence about issues of interest to them and their community. As a result, they begin to appreciate the power and also some of the limitations of science. They also begin to recognize that science is much more than a set of answers to be learned, but rather, a way of asking questions.

FOR MORE INFORMATION, SEE PAGES 29-34 AND 68-75 IN THE CURRICULUM SIDE OF THIS CATALOG



OB-SCERTAINER®: A BETTER BLACK BOX

Kit #100

Engaging and fun are two expressions often used to describe this kit. The concise lab activities emphasize behavioral reaction and observation. This exceptional Lab-Aid introduces students to the scientific method of problem solving.

Students use indirect observations to develop and test hypotheses about the inner configurations of twelve different Ob-Scertainers®.

The activities in this kit are suitable for all science curriculums and grade levels. They can be completed in a single lab period.

Accommodates unlimited classes, each with 24 groups of two students.

Kit No. 100	$93.50
Eng./Spn. Kit No. 100-BL	$95.70

LITERACY STEM SPANISH NONCONSUMABLE

COLONY COUNTER

Kit #10

Counting is made easy with this reasonably priced Colony Counter. The viewing screen is made of translucent plastic and is printed in standard Wolffhuegel rulings that form 1 cm squares. The diagonal rows are subdivided into nine equal squares. This versatile counter accommodates petri dishes up to 125 mm in diameter.

This is a must for students in any lab using microorganisms.

Includes bulb, power cord with in-line on/off switch, and a detailed instruction booklet.

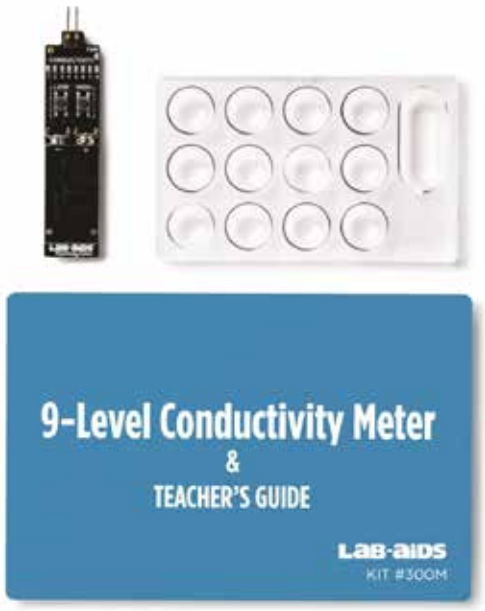
Accommodates unlimited classes with one group of students.

Kit No. 10	$125.95

STEM AG NONCONSUMABLE

9-LEVEL CONDUCTIVITY METER

Kit #300M



The Lab-Aids® 9 Level Conductivity Meter shows the relative conductivity/resistance of liquids and solids. As the conductivity of the tested material increases, the number of glowing red LEDs (light emitting diodes) will increase to a maximum of 8, which indicates a very good conductor. There will be zero glowing red LEDs if the material being tested has a very low electrical conductivity (is a good insulator). The kit includes a 12 well Chemplate® for testing multiple items conveniently.

A 9-volt battery is required, but is not included.

Accommodates unlimited classes with 1 group of students.

Kit No. 300M	$32.80
Kit No. 300M-U (no Chemplate)	$29.85

STEM AG NONCONSUMABLE

ATOMIC STRUCTURE, VALENCE, AND BONDING

Kit #145N

In this kit, students perform three activities using an innovative model of atomic structure. Initially, each group of students uses three atom models to visualize the arrangement of subatomic particles within an atom and compare the atomic structure of different elements. They then connect the different atomic structures shown by the models to an element's position on the Periodic Table and use the models to "see" the role of valence electrons in chemical bonding.

145N-1 (for 1 group)	$160.00

LITERACY STEM NONCONSUMABLE

DESIGN-YOUR-OWN CUSTOM MOLECULAR MODEL SET

Kit #530A

This complete assortment of color-coded atoms and bonds allow the flexibility to create individualized models and molecules. Just like the standard model kits, atoms are molded in polypropylene with flexible vinyl connectors to represent the bond "linkages." Double and triple bonds are easily constructed. The models are easy to assemble, well constructed and come apart only when you want them to come apart.

This Lab-Aids kit contains an extensive assortment of 480 atoms plus 300 bonds.

Accommodates unlimited classes.

Kit No. 530A	95.00

NONCONSUMABLE

CONCEPTS OF CLASSIFICATION

Kit #50

This lab activity provides a controlled environment for exploring a rather complex concept: the classification of things different and similar at the same time. Students learn that 20 different objects can be assigned to different groups based on color, shape, size, type of edge, structure and number of sides. With these materials, they are able to grasp the general concept of characteristics and order. Students can comprehend the importance of these characteristics in the identification process.

Accommodates unlimited classes, each with 12 groups of two students.

Kit No. 50	$45.90
Eng./Spn. Kit No. 50-BL	$48.05
Add a Group No. 50EL	$9.65

SPANISH ADD A GROUP LITERACY NONCONSUMABLE

LAB-AIDS® CHEMPLATE, PACKAGE OF 10

Kit #800

The Lab-Aids® Chemplate® is a clear plastic tray about the size of an index card. It has changed thousands of science teachers' ideas of how to conduct labs. Using the inexpensive Chemplate® eliminates the need for glassware and provides a semi-micro environment for conducting many experiments.

Molded into the high impact transparent plastic tray are 12 large numbered cavities, an additional jumbo-sized cavity plus a snap-off cap and snap-off measuring spatula.

Accommodates unlimited classes, each with 10 groups of two students.

Kit No. 800 $16.05

STEM AG NONCONSUMABLE

INTRODUCTION AND USE OF DICHOTOMOUS KEYS

Kit #51

Scientists use dichotomous, or taxonomic, keys to identify both living organisms and non-living specimens. All dichotomous keys are developed the same way and similarities and differences in characteristics and traits are observed and recorded.

In this game-like activity, students focus on the physical attributes of an imaginary organism. Students identify the specimen and draw two organisms that match the organism's description.

Accommodates unlimited classes, each with 30 groups of two students.

Kit No. 51 $48.30

LITERACY NONCONSUMABLE

NATURAL SELECTION: VARIATION IN SPECIES AND NORMAL DISTRIBUTION

Kit #74R

Variation in species and normal distribution are brought to life with this kit. Students use our exclusive Variation Profile Tubes to sort a variety of physical characteristics in sunflower seeds. They gain experience in constructing visual graphs, histograms, and linear graphs from data collected by the entire class. The idea that greater validity of information gathered from a large sample versus a smaller sample is illustrated beautifully by comparing class results in the Variation Profile Tubes to the student's own histograms and graphs.

Accommodates unlimited classes, each with 30 groups of one to two students.

Kit No. 74R $92.15

LITERACY AG NONCONSUMABLE

SCIENTIFIC METHOD PROBLEM SOLVING

Kit #100-A

Instead of learning how to solve problems, students are all too often expected to simply "do" activities.

In this creative problem-solving kit, students are presented with a "situation" that requires them to:

- Analyze the situation • Identify the problem • Formulate a hypothesis • Conduct experiments to test the hypothesis

The result? Students learn "how to inquire," not just "do." Lab activities, suitable for all science curriculums, can be completed in approximately sixty minutes.

Accommodates two classes, each with 15 groups of two students.

Kit No. 100-A $92.10
Refill Kit No. 100-A-RC $58.40

LITERACY STEM REFILLABLE

ONE IN A MILLION: LARGE AND SMALL NUMBERS

Kit #101

Help your students grasp an understanding of what one in a thousand or one in a million means. Using pennies and the "power of 10" in this simple and interesting activity, students visualize that a million is a very large number. They conduct two different serial dilution activities that will impress upon them how very small numbers can have potential significance.

Accommodates dozens of classes, each with 16 groups of two students.

Kit No. 101 $100.20

LITERACY STEM REFILLABLE

MEASURING EXPERIMENTS

Kit #102

This diverse Lab-Aids kit provides a series of individualized activities that require students to perform increasingly sophisticated measurements. The primary focus on length over a wide range of dimensions provides ample opportunities to practice using metric units. This kit is a "must have" for science students at any level.

Accommodates unlimited classes with 24 students.

Kit No. 102 $106.45

LITERACY NONCONSUMABLE

AUDIBLE CONDUCTIVITY INDICATOR

Kit #301

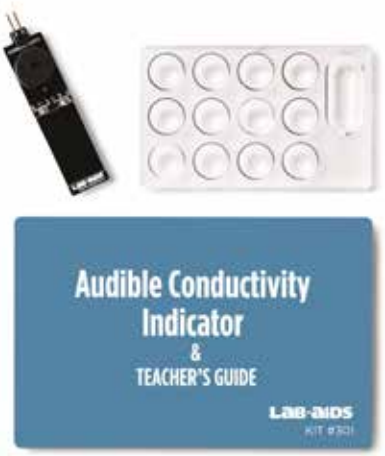
The Lab-Aids Audible Conductivity Indicator is a qualitative alternative to the 9-Level Conductivity Meter. If the material being tested is a conductor there is an audible tone that increases in volume and intensity as conductivity increases. If a non-conducting material is tested there is no tone. The kit includes a 12 well Chemplate for testing multiple items conveniently.

A 9-volt battery is required, but not included

Accommodates unlimited classes with 1 group of students.

Kit No. 301 $32.80

STEM SPANISH NONCONSUMABLE



ENGINEERING & DESIGN: MECHANICAL HANDS

Kit #490S — Developed by SEPUP

In this multi-day activity, students use the approach of biomimicry to design, test, evaluate, and redesign a mechanical gripping device to meet criteria. Working in small groups, students use the engineering design process to design a mechanical grabber that can pick up and move an object. They then use an iterative process to optimize the device in one of two ways. In doing so, they investigate the relationship between structure and function of the device and how the technology they developed can be applied.

Accommodates one class, with eight groups of students.

Kit No. 490S $84.50

STEM LITERACY REFILLABLE

UNDERSTANDING AND USING ENERGY AND TECHNOLOGY

Kit #P300A

This unit contains three activities designed to increase student understanding of energy and how we use it, energy of motion, and energy and technology. A companion unit, Using Energy Effectively in Lighting and Life (Kit # P300B), helps students to investigate energy efficiency in home lighting, patterns of energy use in the home, and renewable sources of energy.

Accommodates unlimited classes, each with 8 groups of students.

Kit No. P300A $249.00

STEM LITERACY AG NONCONSUMABLE

USING ENERGY EFFECTIVELY IN LIGHTING AND LIFE

Kit #P300B

This unit contains three activities designed to increase student understanding of energy efficiency in home lighting, patterns of energy use in the home, and renewable sources of energy. A companion unit, Understanding and Using Energy and Technology (Kit #P300A), helps students investigate energy and how we use it, the energy of motion, and energy and technology.

Accommodates unlimited classes, each with 8 groups of students.

Kit No. P300B $395.00

STEM LITERACY AG NONCONSUMABLE

ENGINEERING & DESIGN: MODELING AND MITIGATING STREAM PROCESSES

Kit #446S — Developed by SEPUP

Students model the phenomenon of sediment movement in a river using a unique mini stream table that provides evidence for how geoscience processes change Earth's surface. In Part A, students investigate how the changing energy of flowing water erodes and deposits sediments to create common landforms. Part B is an engineering design challenge where students use design criteria and constraints to design and test erosion-control structures. Based on the results of their initial testing, students redesign and retest their structures.

Accommodates unlimited classes, each with 8 groups of 4 students.

Kit No. 446S $259.95

LITERACY STEM NONCONSUMABLE

SEPUP TRAYS, PACKAGE OF 16

Kit #SP-1CT

The SEPUP tray can be thought of as 9 test tubes and 5 beakers. They rinse quickly, dry easily and stack for storage. The tray is transparent and exceptionally durable but cannot be used with an open flame or some organic solvents. Many science teachers use SEPUP trays instead of fragile, dangerous expensive glassware and these trays are an integral part of many SEPUP products.

Accommodates unlimited classes, each with 16 groups of two students.

Kit No. SP-1CT $84.50

STEM AG NONCONSUMABLE

LAB-AIDS® LAB-MASTER SYSTEM

Kit #NAC-LM-TS

The Lab-Master® is a unique, easy-to-use, probeware system consisting of an integrated RGB spectrophotometer, temperature probe, voltage probe, and a safe control-point heater. Using standard cuvettes students learn the principals of colorimetry and understand how these important measurements are performed in industry.

The Lab-Master® can be used for weeks on a single charge (the heating unit requires wall AC), and will output data in comma-separated values to a standard SD card.

Accommodates unlimited classes, each with 1 group of students.

Kit No. NAC-LM-TS $748.05
Kit No. NAC-M-TSP (Lab-Master Safety Package) $912.50

STEM AG NONCONSUMABLE

LAB-AIDS® SINKLESS CONDENSER

Kit #SS-1P11

This economical distillation apparatus uses ice water to cool and condense hot gases and is ideal for non-lab settings because it does not require a sink with a water supply and a drain. It can be used to separate substances whose boiling points differ by at least 3-5 Fahrenheit degrees.

Kit No. SS-1P11 $33.00

SINKLESS CONDENSER PACKAGE

Kit #39S-C

To make set-up that much easier, this package includes one Sinkless Condenser plus one #7 2-hole and one #3 1-hole rubber stopper, one 18" and one 9" length of plastic tubing and two 3" lengths of glass tubing.

Kit No. 39S-C $44.15

Accommodates unlimited classes, each with 1 group of students.

AG STEM NONCONSUMABLE

LAB-AIDS® ELECTROPHORESIS CHAMBER

Kit #SGI-P011

This gel electrophoresis unit includes two chambers for running two gels simultaneously. The unit includes the electrodes, gel combs, and AC power adapter.

Accommodates unlimited classes, each with 2 groups of students.

Kit No. SGI-P011	$250.00

STEM AG

NONCONSUMABLE

MINI STREAM TABLE

Kit #442-ST

One complete Lab-Aids® Mini Stream Table setup includes stream bed, catch basin, stand, rainmaker, and sand.

This kit does not include any activity write-ups.

Accommodates dozens of classes, each with 1 group of two students.

Kit No. 442-ST	$34.95
Kit No. 442-ST8 (Set of 8)	$205.95
Kit No. 442-ST16 (Set of 16)	$360.45

STEM AG

REFILLABLE

LAB-AIDS® LIGHT STATION PLUS

Kit #810

The Lab-Aids® Light Station is a safe, compact, easy-to-use light source, suitable for use in middle and high schools. It provides a cost-effective way for your students to study light and its interactions with matter. The light station is constructed of sturdy, high-impact polystyrene, which folds flat for storage.

The kit includes: The light station and power supply, a 15W V-filament light bulb, and one each of the following filters: single slit, three slit, diffusing filter mask, tri-color, red, blue, and green.

Accommodates unlimited classes with 1 group of students.

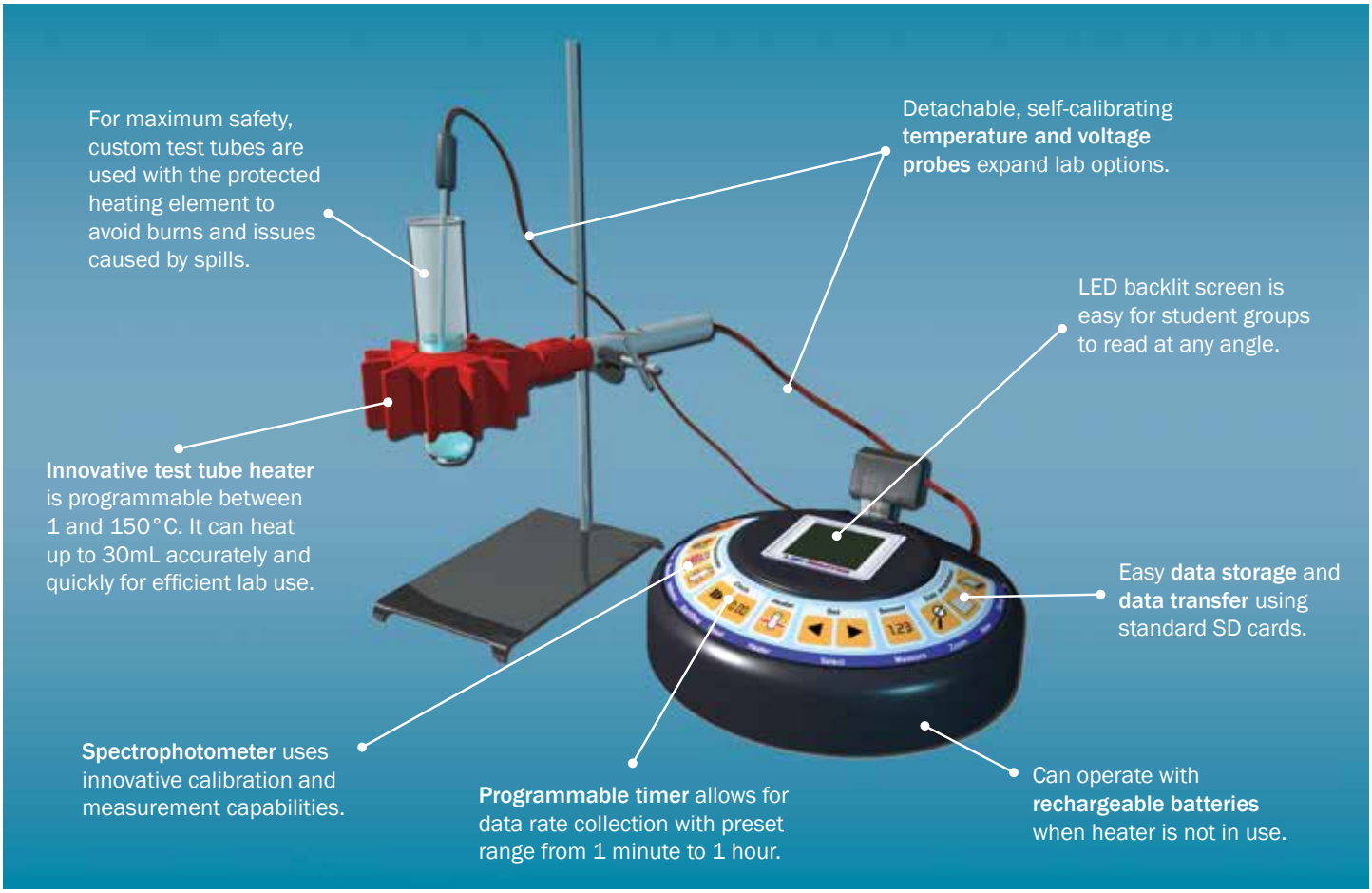
Kit No. 810	$116.90
Kit No. P100 (2 Light Stations, no filters)	$178.50
Kit No. P100-2 (4 Light Stations, no filters)	$334.00

STEM AG

NONCONSUMABLE

SAFETY CONCERNS? CUT THE FLAME, NOT THE LABS

The Lab-Master® is an innovative, easy-to-use, probeware system consisting of an integrated RGB spectrophotometer, temperature probe, and voltage probe. Instead of an open flame the Lab-Master system uses a safe, electric control-point heater to heat test tubes.



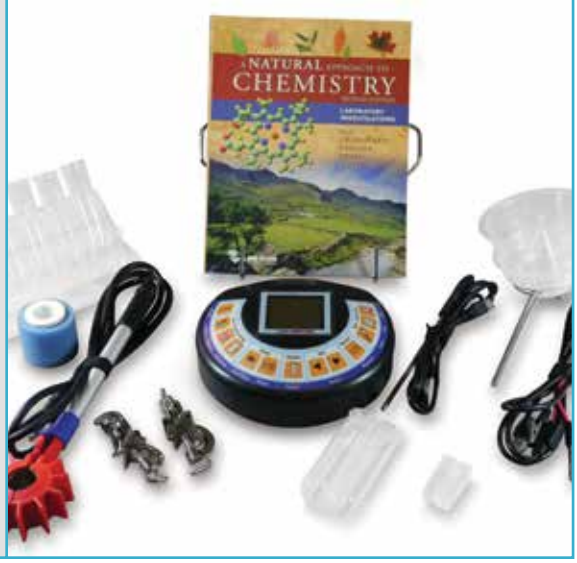
LAB-AIDS® LAB-MASTER SAFETY PACKAGE

Kit #NAC-M-TSP

The complete Lab-Master® Safety Package includes Lab-Master Control Unit: data logger - spectrophotometer, Lab-Master Control point heater, Lab-Master Temperature Probe, Lab-Master Voltage Probe, Lab-Master Power Adapter and Power cable (6 ft.), Insulation ring, Condenser unit, Extension ring, 2 clamps, 6 Cuvettes, 6 Test tubes (glass, 25x100mm), Cuvette-Test Tube Holder and Lab-Master Desiccator. The full A Natural Approach to Chemistry, Laboratory Investigations and 7 year access to My Lab-Aids Bookshelf for Teachers; A Natural Approach to Chemistry, 2nd Edition, is also included.

Accommodates 1 group of 4 students for unlimited classes.

Kit No. NAC-M-TSP (Lab-Master Safety Package)	$912.50
Kit No. NAC-LM-TS (Lab-Master System on page 104)	$748.05
A Natural Approach to Chemistry Full Program	see page 121



breannabregel
@breannabregel1

What causes nitrates and phosphates in water and how can we fix it? We learned more about this real-world issue today at #nataa19 I can see this lesson fitting into my curriculum very easily. @LabAids @NAAE

12:31 AM · Jul 17, 2019

SudzinaScience
@SudzinaScience

#CHEMISTRY Solubility lab looking at precipitates forming and indicating a double replacement reaction. Students used well plates to test 25 different chemical combinations to infer solubility rules. #GrahamGreat @LabAids

11:26 AM · Apr 15, 2019

Carrie Fredal-Estapa
@cfredal

Q:How can a manufacturing by-product such as waste copper chloride safely be disposed? Analyzing Metal Replacement #scmsrocks #SEPUP

10:25 PM · May 30, 2019

Kelly Garcia
@Mrsklgarcia

Today, we are using @LabAids mini-stream tables to explore what happens when it rains...

12:18 PM · Sep 24, 2019

"#nataa19 day 3 is off to a great start! We performed urinalysis to help determine what was wrong with 5 shelter dogs. Another fun lab that I know my students are going to love. @NAAE @CortevaUS @LabAids"

— Breanna Bregel
@breannabregel1

Stefanie T Goblet
@stgoblet

This past week has been one full of learning and memories made in Oklahoma with the NAAE's National Agriscience Teacher Ambassador Academy. I am thankful for the opportunity to experience the educational growth with my professional organization. #nataa19 @NAAE @CortevaUS @LabAids

8:50 PM · Jul 23, 2019

Wes Crawford
@wes_crawford

Getting powered up with #solar at #nataa19 – So MANY different great questions and variable tests! @CortevaUS @LabAids @NAAE

12:57 PM · Jul 16, 2019

Michala Forrest
@forrest_m40

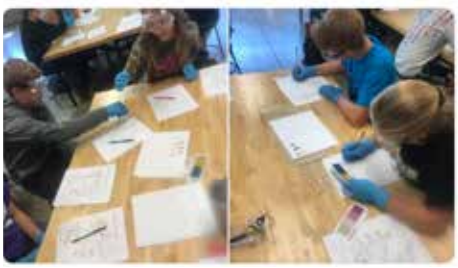
EQ: How is the process of extracting DNA applied in agriscience?

Ss extracted DNA from a strawberry and discussed how this process is applied to the food we eat on a daily basis. #TeachAg @OAUpdate @OAMSIndians @LabAids #nataa18

9:33 AM · Sep 10, 2019

RayeAnn
@RayeAnn14

Water pollution. What do you think caused Jaffery Lake to become polluted? @NAAE @CortevaUS @LabAids



6:21 PM · Sep 26, 2019

"I want so many things from @LabAids"

— Jodye Pool
@Jodyepool

Lab-Aids Applied Science Concept kits and modules, our CASE material packages, and SEPUP products address key agriscience and STEM content through relevant real-world issues. This approach both motivates students and enhances understanding, while preparing them for critical thinking in college, career, and life.

With Lab-Aids students have the opportunity to **experience agriscience** by using:

- inquiry strategies to collect and process scientific evidence.
- evidence to make informed decisions and evaluate trade offs.
- real-world issues that encourage development of analytical trade-offs and critical thinking.
- innovative methods for integrating science, mathematics, literacy, and technology.
- STEM problem-solving skills.
- materials that illustrate agriscience's important role in a sustainable future.

Many of our products are aligned to the updated Agriculture, Food, and Natural Resources (AFNR) Pathways (NCAE 2015).

NATIONAL AGRISCIENCE TEACHER AMBASSADOR ACADEMY (NATAA)
- a partnership that supports agricultural education -

We are proud of our 14 year partnership with DuPont, the National Association of Agricultural Educators (NAAE) and the National FFA Foundation that supports it. Lab-Aids has been recognized as a valuable DuPont partner, primarily for our long-standing role as a curriculum partner and our initial help in program and workshop design.

NATAA has trained over 300 Ag Ambassadors from every state who have then presented to thousands of teachers and tens of thousands of students. This program is truly making a difference in agricultural education. For more information and to apply to NATAA, visit: **naae.org/profdevelopment/nataa.cfm**

ANIMAL SCIENCE BUNDLE 1

Kit #AG-S08 **$186.95** (Savings of $41.00)

THIS BUNDLE CONTAINS THE FOLLOWING KITS:

906 Tracking the Spread of Infectious Diseases

STEM LITERACY AG REFILLABLE ADD A GROUP

Contagious diseases can spread very quickly through a population. If an infected individual mingles with healthy individuals, random contact can cause many more to become infected. This activity simulates the transmission of a contagious disease and the steps epidemiologists take to try to determine its source and limit its spread. Two scenarios are provided, one for an infection spreading among humans and another among livestock. If desired, the kit materials can also be used to simulate different "trackable" spreading event scenarios such as an invasive species or an outbreak of food poisoning. This activity also introduces the concept of exponential growth.

Accommodates dozens of classes, each with 24 students. Add only cups for larger classes.

NONCONSUMABLE

904S Natural Selection and Antibiotic Resistant Bacteria Developed by SEPUP

STEM LITERACY AG

Why is it important to take an antibiotic as prescribed? Students model the effects of antibiotics on the population of disease-causing bacteria during an infection. During the simulation, some groups complete the full course of antibiotics, while others miss doses. They then graph populations of more-resistant and less-resistant bacteria. Students observe the selection of more-resistant bacteria that can take place if antibiotic treatment is intermittent or discontinued prematurely. Through this activity, students learn why it's important to take "the full course" of antibiotics.

Accommodates unlimited classes, each with 16 groups of two students.

160 Bacteria Study

AG SPANISH REFILLABLE

Students conduct the classic Leeuwenhoek bacteria experiment in this individualized, self paced kit. Paralleling methods performed over 300 years ago, students observe and identify bacteria using a microscope.

Requires microscopes.

Accommodates two classes, each with 15 groups of two students.

ANIMAL SCIENCE BUNDLE 2

Kit #AG-S09 **$288.05** (Savings of $63.20)

THIS BUNDLE CONTAINS THE FOLLOWING KITS:

55 Metabolism Experiment

STEM AG SPANISH REFILLABLE

This kit introduces students to the study of metabolism by measuring the rate of oxygen consumption of small organisms, such as insects, snails, worms and germinating seeds. Using Patented Lab-Aids® Metabolism Chambers, students observe the organisms (not included) and draw correlations between size of an organism, the temperature of the environment and oxygen consumption. They are also asked to calculate an organisms respiratory rate in cubic cm of oxygen per kg per hour, measure total gas change in a closed environment and determine an organisms metabolic relationship to total gas in a closed environment.

Accommodates 1 class with 2 groups of students.

25R Enzymes as Catalysts for Starch Digestion

AG STEM LITERACY ADD A GROUP REFILLABLE

The basic concept behind this engaging kit is that all living organisms must alter nutrients in order to make them usable. Colorful controlled experiments let students observe factors affecting enzyme activity while studying catalysis in an organic reaction. Tests are performed in drop quantities using the Lab-Aids® Chemplate®.

Accommodates 1 class with 12 groups of two students.

22 Osmosis and Diffusion

AG STEM LITERACY ADD A GROUP REFILLABLE

Can studying the basic life process function of osmosis and diffusion stimulate your students' curiosity? It can with this hands-on lab experience. Students observe firsthand the characteristics of a differentially permeable membrane.

Some substances will pass through the membrane and some won't. Some will actually pass through the membrane in both directions simultaneously. Simple color changes help students visualize this biological-physiological phenomenon.

Accommodates 1 class with 12 groups of two students.

GENETICS BUNDLE 1

Kit #AG-S01 **$236.10** (Savings of $51.80)

THIS BUNDLE CONTAINS THE FOLLOWING KITS:

79 Strawberry DNA Extraction AG LITERACY REFILLABLE

Teach biotechnology without the technology in your classroom. A "low-tech" hands-on solution to presenting some high-tech topics. Extract DNA from strawberries and examine some physical properties. A complete classroom kit that provides everything necessary (except strawberries) along with specially prepared cell lysating solutions and DNA precipitating. This allows students to easily extract DNA by first crushing the strawberry, then lysing to release the cell components and finally precipitating and viewing the DNA after spooling the DNA on a splint.

Accommodates two classes, each with 8 groups of four students.

603S Investigating and Applying Genetics: Corn Developed by SEPUP LITERACY NONCONSUMABLE

Students build their understanding of selective breeding for desired traits in crops such as corn. They investigate the outcomes of crosses of hybrid and dihybrid corn plants for two unlinked genetic traits: corn kernel color and sweetness. They use Punnett squares to predict the ratio of phenotypes that will be produced by different crosses and analyze the actual ratio of phenotypes of the second generation offspring. A reading describes traditional selective breeding and modern genetic engineering approaches to improving crops.

Accommodates unlimited classes, each with 16 groups of two students.

ADD A GROUP

71 The Molecular Model of DNA and Its Replication LITERACY SPANISH NONCONSUMABLE

This basic introduction to the double helix model of DNA uses simple components developed exclusively by Lab-Aids®. Those unique components include:

- Double nitrogen pyrimidine bases are constructed proportionately larger in diameter than the single nitrogen purine bases
- Bases are linked by a unique hydrogen bond
- The deoxyribose sugar is pentagon-shaped, representing its actual molecular structure

Accommodates unlimited classes, each with 12 groups of two students.

GENETICS BUNDLE 2

Kit #AG-S02 **$177.90** (Savings of $39.05)

THIS BUNDLE CONTAINS THE FOLLOWING KITS:

70 Genetics Concepts LITERACY SPANISH NONCONSUMABLE

Through a series of simulated experiments, students experience the same problems encountered by the "Father of Genetics." Students "rediscover" his Law of Genetics using specially designed GAM-ETO-DISCS® and TETRADICE® to simulate Gametogenesis and fertilization. These unique Lab-Aids® items produce random genotype combinations that are statistically consistent, as consistent as if done with living organisms. This lab activity was developed in a game format to achieve a high level of interest and involvement by the students.

Accommodates unlimited classes, each with 12 groups of two students.

905 Investigating Selective Breeding LITERACY AG ADD A GROUP NONCONSUMABLE

In this series of two activities students explore inherited traits. They use Lab-Aids® simulated corn ears and Punnett squares to gather data on, interpret, and predict the probability of traits being passed from parent to offspring. They then read about "survival of the fittest," natural selection, selective breeding, and the relationships between these concepts.

Accommodates unlimited classes, each with 12 groups of two students.

77 Heredity and Environment LITERACY STEM AG REFILLABLE

By germinating hybrid tobacco seeds first in darkness and then in light, students make interesting observations using this challenging kit. Students set up controlled experiments that provide mathematical data to test their theoretical genetic hypotheses about heredity and the factors determined by the environment. They see how a recessive trait becomes evident. Students also germinate the hybrid tobacco seeds with one normal and one albino gene, stimulate shoot production, examine the relationship of the dominant gene (chlorophyll production) to the recessive gene and make conclusions concerning the genotype relevant to a visible phenotype. This is an excellent Lab-Aid to correlate heredity with environmental influences.

Accommodates 15 groups of two students.

NATURAL RESOURCES BUNDLE 1

Kit #AG-S03 **$304.20** (Savings of $66.75)

THIS BUNDLE CONTAINS THE FOLLOWING KITS:

437 Modeling and Investigating Watersheds

LITERACY STEM AG ADD A GROUP REFILLABLE

Despite the significance of watersheds, many students get few opportunities to explore this important aspect of topography and its relationship to the water cycle. Students apply "rain" over a topographic model and observe the water runoff. From their observations they identify the location of major bodies of water such as lakes, rivers, and streams. This activity not only provides students with firsthand experience with watersheds but also provides a knowledge base to better understand issues such as how an abandoned mine may influence water quality far from the mine site or how farming practices in Nebraska may influence the health of organisms in the Gulf of Mexico.

Accommodates ten classes, each with 6 groups of four students.

442 Modeling Stream Erosion and Deposition

LITERACY STEM AG ADD A GROUP REFILLABLE

Student groups use a Lab-Aids® Mini Stream Table to investigate the dynamics of stream erosion and deposition. Using specially engineered materials students create, observe, describe, and interpret the erosional and depositional patterns created when "rainwater" flows over an area. Some of the features commonly formed include canyons, braided streams, and deltas.

Accommodates two classes, each with 6 groups of four students.

439S Making and Interpreting Topographic Maps Developed by SEPUP

LITERACY AG ADD A GROUP REFILLABLE

This activity provides students with a basic understanding of topographic maps and how to interpret them. Students conduct a hands-on investigation using the Lab-Aids® Topographic Model to construct contour lines and create a topographic map of an area. The activity illustrates the relationship between the contour lines on a topographic map and the actual shape of the land.

Accommodates dozens of classes, each with 6 groups of four students.

NATURAL RESOURCES BUNDLE 2

Kit #AG-S04 **$368.20** (Savings of $80.80)

THIS BUNDLE CONTAINS THE FOLLOWING KITS:

440S Copper Mining and Extraction Developed by SEPUP

LITERACY STEM AG REFILLABLE

Copper and other raw materials contribute to our technological lifestyle, but the byproducts of extracting copper from ore are potential toxic wastes. In this activity, students explore the properties of copper and copper ore. They conduct two reactions used to extract and recover copper from the ore.

This process introduces single and double replacement reactions. Students also consider the wastes produced by the extraction process.

Accommodates 8 groups of four students.

32 Biology and Chemistry of Soil Experiment

AG NONCONSUMABLE REFILLABLE

Time to play in the dirt! Students use ordinary soil samples to conduct a thorough evaluation of soil. Simple, easy-to-follow techniques and staining procedures are introduced early in this series of activities. After performing a series of activities, students are asked to draw conclusions concerning a soil's ability to support plant growth. All tests are performed using either the patented Chemplate® or calibrated sample tubes.

Accommodates four classes, each with 12 groups of two students.

19 Qualitative Introduction to Water Pollution

STEM AG REFILLABLE

This kit provides an unsophisticated, but effective way to examine their region's natural and treated waters. The easy-to-perform chemical tests in this kit qualitatively identify many common water pollutants. While conducting these tests, students also learn about the different methods used in quality water testing methods, how to interpret results from these methods, and how to identify the pH of locally collected water.

Accommodates two classes, each with 12 groups of two students.

POWER SYSTEMS BUNDLE 1

Kit #AG-S05 **$312.35** (Savings of $68.55)

THIS BUNDLE CONTAINS THE FOLLOWING KITS:

39S Biofuels: Investigating Ethanol Production and Combustion Developed by SEPUP

LITERACY STEM AG REFILLABLE ADD A GROUP

This activity includes three major parts.

- Investigation One - students observe a demonstration of the fermentation of corn and cane sugar, the two food sources used most commonly to produce ethanol, and the distillation of the fermented stillage to produce fuel.
- Investigation Two - students investigate the energy released by the combustion of ethanol and kerosene and compares the results.
- Investigation Three - students measure and compare two byproducts - CO_2 and particulate matter - of the two fuels. Students compare results and discuss the trade-offs of biofuels and fossil fuels as sources of energy.

Accommodates 6 groups of four students.

38 Modeling and Comparing Fossil Fuel and Biofuel Combustion

LITERACY STEM AG ADD A GROUP NONCONSUMABLE

In Part One of this activity, students use Lab-Aids® Molecular Models to build methane, ethanol, and octane molecules then "combust" them with oxygen molecules. "Combusting" the model molecules helps students determine the balanced chemical equations for the combustion reactions and compare the amount of carbon dioxide released when these three fuels are burned. In Part Two students use standard bond energies to calculate and compare the amount of energy released during the combustion reactions they modeled in Part One. They are then asked to use their data about the energy released and the CO_2 produced to choose which fuel they think is better.

Accommodates unlimited classes, each with 12 groups of two students.

POWER SYSTEMS BUNDLE 2

Kit #AG-S06 **$438.25** (Savings of $96.25)

THIS BUNDLE CONTAINS THE FOLLOWING KITS:

205S Investigating the Design and Output of Wet Cell Batteries Developed by SEPUP

STEM ADD A GROUP AG LITERACY REFILLABLE

This kit introduces students to the concept of energy conversion through the study of a simple electrochemical cell connected to an electric motor. Students design and conduct an experiment that uses the unique Lab-Aids® Wet Cell Chamber to determine which combination of different metals works best to convert the potential chemical energy into electric energy. Their results allow them to rank the metals tested in order of reactivity. They also investigate how the distance between the metals, the direction of current flow and the amount of metal surface area impacts the electrical output of the wet cell.

Accommodates 6 groups of four students.

LITERACY STEM AG

220S Investigating Photovoltaic Cells Developed by SEPUP

ADD A GROUP NONCONSUMABLE

Students use photovoltaic cells to transform energy from sunlight into electrical energy as they investigate solar energy as an example of a renewable energy source. They explore how to power a motor using the photovoltaic cells and investigate some factors that affect the cells' ability to transform light energy into electricity. They then discuss the advantages and disadvantages of using solar energy.

Accommodates unlimited classes, each with 6 groups of four students.

AG LITERACY ADD A GROUP

213 Energy Transfer: Motors, Generators and Sources of Electricity

STEM NONCONSUMABLE

Students explore the relationship between, and practical applications of, electricity and magnets. They use a battery, a magnet and a coiled wire to build a simple electric motor and then use a pre-assembled electric motor to generate electric current. In Activity 2, students read about how electricity is generated for home and commercial use. They compare the methods and equipment needed to convert energy carried by renewable and nonrenewable resources into electric current. **Six D-cell batteries required but not included with the kit.**

Accommodates unlimited classes, each with 6 groups of four students.

PLANT SCIENCE BUNDLE 1

Kit #AG-S07 **$199.85** (Savings of $43.85)

THIS BUNDLE CONTAINS THE FOLLOWING KITS:

30S **Photosynthesis and Cellular Respiration** Developed by SEPUP AG LITERACY ADD A GROUP NONCONSUMABLE

Part One is an investigation into the reactions of photosynthesis and cellular respiration using a series of images and statements. Students then discuss these processes relative to ecosystems and the carbon cycle. In Part Two, students read about the details of photosynthesis and cellular respiration, including light and dark reactions, glycolysis, the Krebs cycle, and the electron transport chain.

Accommodates unlimited classes, each with 6 groups of four students.

31 **Photosynthesis, Plants and Food** LITERACY AG ADD A GROUP NONCONSUMABLE

In the first activity, students build carbon dioxide and water molecules then "react" them to form sugar and oxygen molecules. To reinforce and extend these concepts, students then read about plants as producers and the process of photosynthesis, including the role of chloroplasts.

Accommodates unlimited classes, each with 12 groups of two students.

66 **Seed Staining** AG REFILLABLE

In this engaging and fun kit, students learn how to differentiate between plant food stored as a simple sugar and food stored as a starch. Using a step-by-step procedure, students first dissect the seeds, and then treat them with reagents.

This helps to determine the quantity and location of the sugar and starch. The individualized, open-ended worksheets provide additional investigations for student exploration.

Accommodates 15 groups of two students.

PLANT SCIENCE BUNDLE 2

Kit #AG-S10 **$277.05** (Savings of $60.75)

THIS BUNDLE CONTAINS THE FOLLOWING KITS:

65 **Seed Structure and Enzyme Actions** AG REFILLABLE

An excellent activity for middle school through college, this kit focuses on the structure of dicot and monocot seeds. Students first examine and dissect two representative types of seeds - dicotyledons and monocotyledons. After diagramming and labeling seed structures, they study the action of enzymes in the germination process and the fate of each part of the germinating seed. Finally, students draw conclusions about the enzymatic process.

Accommodates two classes, each with 15 groups of two students.

68 **Effects of Gibberellic Acid** AG STEM REFILLABLE

This fascinating lab exercise studies the effects of gibberellic acid on plants. Gibberellic acid, when applied to plants, causes them to respond differently and at times unpredictably. This is an excellent activity for introducing your students to the study of growth hormones and also allows them to experiment with growth behavior. It also provides for special projects and additional explorations.

Accommodates two classes, each with 15 groups of two students.

REFILLABLE LITERACY

320 **Simulating Threshold Effects of Soil pH on Hydrangea Plants** AG ADD A GROUP

Students model how hydrangea plants are affected by soil pH. The use of a simulation allows students to determine the effect of agricultural lime on hydrangea flower color. Students use the data obtained from the simulation to determine the positive and negative threshold doses for "agricultural lime." They also reflect upon the results to decide whether they have sufficient data to recommend an optimal level of lime treatment to produce healthy plants with large, pink flowers.

Accommodates three classes, each with 6 groups of four students.

PLANT SCIENCE BUNDLE 3

Kit #AG-S11 **$318.80** (Savings of $69.95)

THIS BUNDLE CONTAINS THE FOLLOWING KITS:

63 Differentiation of Cells Experiment AG LITERACY REFILLABLE

Cell Differentiation is a process by which development of a living organism is achieved. Through a series of progressive changes, a generalized cell transforms into a specialized cell. The more specialized the cell becomes; the less likely it is to divide. After the seeds germinate, students prepare slides, then watch the living material differentiate before their eyes.

They will also observe generalized cellular divisions in meristematic root cap tissue and isolate specialized cells. In the final activity, students diagram and label the differentiated cells. MICROSCOPES ARE NEEDED.

Accommodates three classes, each with 15 groups of two students.

9 Normal Mitosis AG LITERACY REFILLABLE

Using this outstanding kit, students will first identify the phases of plant mitosis, then observe chromosomal development. They gain hands-on experience with the micro-techniques by staining and mounting their own slides. Finally students prepare their own plant cells by treating scientifically grown onion root tips cells with a mild acid, then staining the cells. A stained section of cells is then squashed onto a slide and smeared into a single layer for microscopic study. MICROSCOPES ARE NEEDED.

Accommodates two classes, each with 15 groups of two students.

61 Plant Cell Study AG LITERACY REFILLABLE

This simple lab activity provides a sense of realism that commercially prepared slides can't possibly duplicate. Students prepare slides using the pre-cut plant cross sections and macerated stem tissue, then stain and mount the samples.

Clearly diagrammed cell guides and individualized student worksheets help the students through this fascinating activity. This activity allows students to develop an understanding of the art of slide preparation, a skill necessary in future life science and biology classes. There is enough slide preparation material for 30 students in this kit. MICROSCOPES ARE NEEDED.

Accommodates two classes, each with 15 groups of two students.

FOOD PRODUCT SYSTEMS BUNDLE 1

Kit #AG-S12 **$300.60** (Savings of $66.00)

THIS BUNDLE CONTAINS THE FOLLOWING KITS:

6A Food Nutrient Analysis STEM AG SPANISH REFILLABLE

This Lab-Aid's kit is a variation of the Food Analysis kit (Kit #6). In this kit however, tests are performed using pure samples of the nutrients in order to standardize the tests. Working in teams, students are asked to test for, and identify, five classes of nutrients: sugar, starch, lipid, protein and Vitamin C.

This is an outstanding kit to demonstrate scientific methods, practices and processes.

Accommodates five classes, each with 15 groups of two students.

505 Modeling Molecules of Life Kit LITERACY AG SPANISH ADD A GROUP NONCONSUMABLE

In the Modeling Molecules of Life kit, students study the chemistry of carbohydrates, fats, and proteins. Durable, color-coded plastic atoms are assembled, disassembled, and reassembled quickly and easily into 3-D molecules that provide highly graphic and extremely motivating learning experiences.

Carbohydrates, lipids, and proteins can be completed as a series of lab activities, or as separate units. Students can also work independently for enrichment or remedial study. Each module can be systematically subdivided into smaller sections so students can do the work when most appropriate.

Accommodates unlimited classes, each with 12 groups of two students.

907S Animal Health and Food Safety: Chicken Little, Chicken Big Developed by SEPUP LITERACY STEM AG NONCONSUMABLE

Medical and dietary supplement products, such as vitamins, are often given to humans and other animals to improve health, growth, or performance. In this activity, students analyze data from a fictitious study on the effects of a chicken growth supplement. Students are introduced to toxicology and the design of clinical trials, find threshold doses, then grapple with the trade-offs involved with determining an optimum dose.

Accommodates unlimited classes, each with 16 groups of two students.

INVESTIGATING FOOD SAFETY

Module #FS-2

Developed by SEPUP

Consumers' concerns over food safety are broad. They range from worries over the possibility of Salmonella poisoning to questions about pesticide residues on produce. This module introduces some of the issues associated with food safety. Students first explore food-borne illness as they investigate the growth of yeast, a common fungus that is used to model other effects of pathogenic microorganisms. They examine the different chemical additives, and their use in preventing microbial growth. Students then explore how chemical additives can be used to slow the oxidation of fresh fruit and to enhance the nutrient content of foods. They also learn how foods can be tested for the presence of chemical residues, such as pesticides. Finally, the students evaluate the use of different food preservation techniques, which are intended to improve food safety. The embedded assessment system focuses on students' ability to use evidence and identify trade-offs.

A Teacher's Guide is included. Sixteen SEPUP Trays are needed but not included.

Accommodates five classes, each with 8 groups of four students.

Number of activities	8
Approximate length	10-15 sessions
Module No. FS-2	$467.65
SEPUP Trays, pkg of 16 SP-1CT	$84.50
Additional Teachers Guide FS-2PM	$68.25

LITERACY STEM AG REFILLABLE

GROUNDWATER CONTAMINATION: TROUBLE IN FRUITVALE

Module #FV-2

Developed by SEPUP

Exploring Earth science concepts such as the water cycle, map-making and interpretation, and groundwater pollution is the objective of this module. These concepts are used in an investigation of groundwater contamination in the fictional city of Fruitvale.

Students design and carry out a plan for testing water from different parts of the city to determine the contamination's source, severity, extent, and rate of travel. The data is then used to analyze the risk to Fruitvale's water supply. Finally, the students read about several clean-up options and participate in a role-play of a town meeting to decide which clean-up option to use.

Accommodates five classes, each with 8 groups of four students.

Number of activities	12
Approximate length	14 - 22 sessions
Module No. (includes Teachers Guide) FV-2	$467.65
Additional Teachers Guide FV-2PM	$68.25

LITERACY STEM AG REFILLABLE

CASE: CURRICULUM FOR AGRICULTURAL SCIENCE EDUCATION

Lab-Aids is pleased to be a partner with CASE in providing materials packages for the CASE courses described below. For more information about the CASE curriculum materials see **www.case4learning.org**

For a complete CASE Ag Refill Order Form go to **lab-aids.com/caserefills**

CASE
Curriculum for Agricultural Science Education

AGRICULTURAL POWER AND TECHNOLOGY

This package supports the Agricultural Power and Technology course developed by CASE. The course is designed to prepare students for the wide array of career opportunities in agricultural engineering. Students are immersed in inquiry-based exercises that tie in the math and science of agricultural mechanics and engineering. Throughout the course, students apply technical skill while becoming competent in the process that is used to operate, repair, engineer, and design agricultural tools and equipment. The materials package includes enough material for 20 students. This is the lab equipment as specified by CASE.

CASE-M004A **$1,778.80**

LITERACY STEM AG REFILLABLE

INTRODUCTION TO AGRICULTURE, FOOD AND NATURAL RESOURCES

This package supports the Introduction to Agriculture, Food, and Natural Resources (AFNR) course by CASE. It is the introductory course in the sequence of CASE courses designed to introduce the students to the four pathways offered. Students are presented with an overview of animal science, plant science, natural resources, as well as agricultural technology and systems, students will explore the National FFA, leadership, and science in agriculture. The materials package includes enough material for 20 students. This is Lab-Aids equipment as specified by CASE.

CASE-M003A **$1,333.85**

LITERACY STEM AG REFILLABLE

CASE: CURRICULUM FOR AGRICULTURAL SCIENCE EDUCATION

PRINCIPLES OF AGRICULTURAL SCIENCE - PLANT

This package supports The Principles of Agricultural Science – Plant (ASP) course structured to enable students to have a variety of experiences that will provide an overview of agricultural science with a foundation in plant science. The students will explore hands-on projects and activities, to learn the characteristics of plant science and work on projects and problems similar to those that plant science specialists, and plant research specialists face in their respective careers. The materials package includes enough materials for 20 students. This is the Lab-Aids equipment as specified by CASE.

CASE-M001B **$1,014.55**

LITERACY STEM AG REFILLABLE

PRINCIPLES OF AGRICULTURAL SCIENCE - ANIMAL

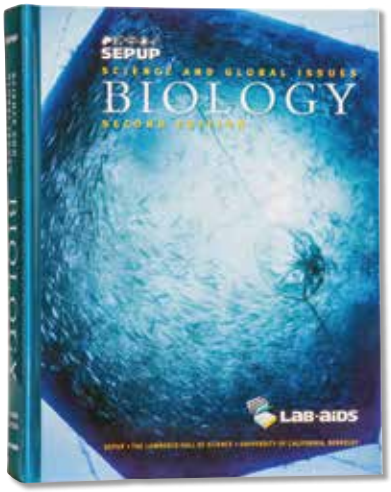
This package supports The Principles of Agricultural Science – Animal (ASA) course developed by CASE. The course is structured to enable students to have a variety of experiences that will provide an overview of agricultural science with a foundation in animal science. Students will explore hands-on projects and activities to learn the characteristics of animal science and work on projects and problems similar to those that the animal science specialists face in their careers. The materials package includes enough material for 20 students. This is the lab equipment as specified by CASE.

CASE-M002B **$468.65**

LITERACY STEM AG REFILLABLE

ENVIRONMENTAL SCIENCE ISSUES MECHANICAL SYSTEMS IN AGRICULTURE

Lab-Aids also supplies some essential items for these two CASE specialization-level courses. Call or visit the lab-aids.com or case4learning.org website for details.



SCIENCE AND GLOBAL ISSUES: BIOLOGY

SECOND EDITION

Sustainable development is a critical issue of our time and requires analysis and informed decision making.

The following five units in this course connect biology, agriscience, and sustainability by focusing on the science behind global issues.

- **Sustainability** - resource use and availability
- **Ecology: Living on Earth** - human impact on ecosystems
- **Cell Biology: World Health** – diseases' impacts on life
- **Genetics: Feeding the World** - genetically modified organisms
- **Evolution: Maintaining Diversity** – biodiversity and ecosystems services

Each unit immerses students in an issue that provides a realistic context related to sustainability. Students review possible actions to address the issue, analyze the associated evidence, then consider the trade-offs of each action.

FOR MORE INFORMATION SEE PAGES 80-86 IN THE CURRICULUM SIDE OF THIS CATALOG AND lab-aids.com/sgi-bio

SEPUP
Issue-Oriented Science

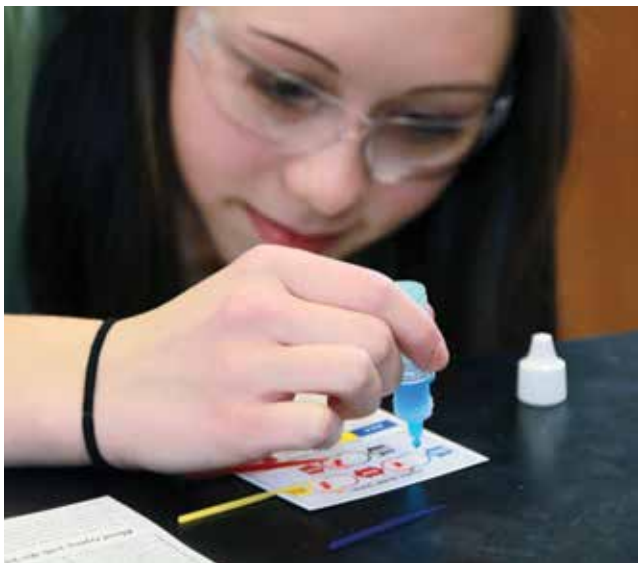
The Science Education for Public Understanding Program (SEPUP) is a research-based, non-profit at the University of California, Berkeley's **Lawrence Hall of Science**. **Science and Global Issues: Biology, Second Edition** is uniquely suited to supplement agriscience programs.

The following is a list of more Lab-Aids kits that Agricultural Science teachers have found to be valuable additions to their classroom programs.

FOOD PRODUCT SYSTEMS

PLANT SYSTEMS

ANIMAL SYSTEMS



POWER AND BIOTECHNOLOGY SYSTEMS

GENETICS (ANIMAL AND PLANT SYSTEMS)

ENVIRONMENTAL AND NATURAL RESOURCE SYSTEMS

LIGHT: THE VISIBLE SPECTRUM

Kit #P104-S01

Students use diffraction gratings then build a spectroscope to investigate the spectra of different light sources. They gather evidence showing, and learn the science to explain, that if different light sources and colored filters are used, the appearance of objects can change.

Accommodates unlimited classes, each with 1 group of four students.

Kit No. P104-S01 $172.75

LITERACY NONCONSUMABLE

DENSITY: UNDERSTANDING THROUGH EXPERIMENTAL DESIGN

Kit #P610

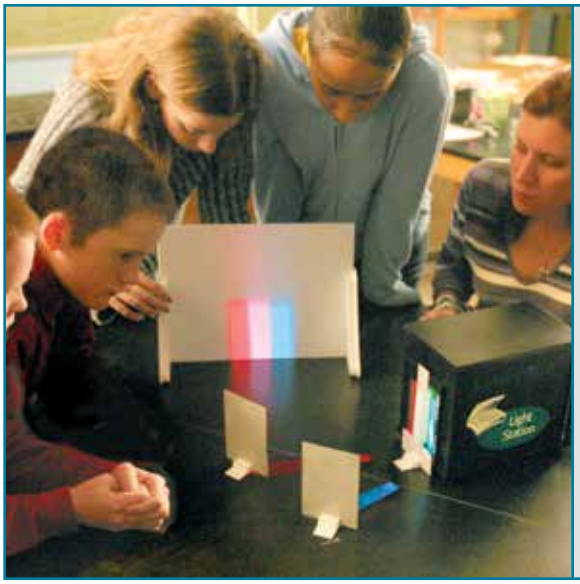
This kit helps students understand density as an intrinsic quality of matter that remains the same regardless of sample attributes such as size, shape, and color. Equally important, students also practice the fundamentals of inquiry and experimental design. These experiences help prepare students for common topics found in classroom and statewide assessments. Students first reveal their preconceptions about several aspects of density that are often misunderstood. Each of these aspects is then examined through student-designed experiments which provide evidence for students to use when they revisit and revise their initial preconceptions. Unique equipment designed by Lab-Aids allows students to easily and accurately collect, compare, and analyze data from various materials. Eight activities approximately 15 minutes each.

A comprehensive Teacher's Guide includes performance criteria and both multiple choice and constructed response assessment items.

Accommodates unlimited classes, each with 8 groups of four students.

Kit No. P610 $586.05

AG LITERACY STEM NONCONSUMABLE



LIGHT: COLORS AND ENERGY

Kit #P104-S02

Students compare and contrast the effects of different combinations of colored filters and different combinations of colored light. Students then explore the energy contained in different colors of light in both pre-designed and self designed investigations.

Accommodates unlimited classes, each with 1 group of four students.

Kit No. P104-S02 $167.00

STEM LITERACY NONCONSUMABLE

INVESTIGATING LIGHT

Kit #P110

The six activities in this module allow students to explore light's interactions with matter and the straight line nature of light. Working with light beams, students quantify the size of a shadow and use shadows to mathematically determine the sizes of objects. The activities in this module (and in the related P120 and P130 modules) include materials designed for seamless use with Lab-Aids® Light Stations (p. 113).

LIGHT STATIONS NOT INCLUDED.

Accommodates unlimited classes, each with 8 groups of four students.

Kit No. P110 $428.40

LITERACY NONCONSUMABLE

COLOR AND SPECTRUM

Kit #P120

During the seven activities in this module, students use diffraction gratings and make a spectroscope to separate, describe, and understand the spectrum of light from a variety of sources. They also study how light interacts with color filters, how colored light can change the "color" of objects and how combining different colored light produces other colors, including "white." Using luminescent material, students also study absorption, emission and conservation of energy. The activities in this module (and in the related P110 and P130 modules include materials designed for seamless use with Lab-Aids® Light Stations (p. 113).

LIGHT STATIONS NOT INCLUDED.

If you have the P110 Investigating Light Module, the P120A extension package supplies all additional materials needed and avoids duplicates.

Accommodates unlimited classes, each with 8 groups of four students.

Kit No. P120	$840.75
Extension Materials P120A	$714.05

LITERACY NONCONSUMABLE

REFLECTION AND REFRACTION

Kit #P130

The nine activities in this module have students explore images formed by plane and curved mirrors and discover the rule for reflection of light. They also use lenses to study light refraction, measure focal length. make a simple camera, and observe how focused light energy is converted to heat energy. The activities in this module (and in the related P110 and P120 modules) include materials designed for seamless use with Lab-Aids® Light Stations (p. 113).

LIGHT STATIONS NOT INCLUDED.

If you have the P110 Investigating Light Module, the P130A extension package supplies all additional materials needed and avoids duplicates.

Accommodates unlimited classes, each with 8 groups of four students.

Kit No. P130	$748.05
Extension Materials P130A	$598.90

LITERACY NONCONSUMABLE

FORCE AND MOTION

Kit #P210

Over the course of this module's nine activities students learn about all three of Newton's laws of motion through concrete, inquiry-based experiences. Students accurately measure time intervals and force, they design a procedure to investigate the motion of a ball, create velocity/distance vs. time graphs, and use a simple accelerometer to investigate acceleration, including orbiting systems.

Accommodates unlimited classes, each with 8 groups of four students.

Kit No. P210	$748.05

LITERACY NONCONSUMABLE

DECISION MAKING: PROBABILITY AND RISK ASSESSMENT

Module #DM-2

Developed by SEPUP

This module is an outstanding teaching tool for helping students develop a greater understanding of how mathematical reasoning can be used to make decisions in everyday life. Marble-rolling activities, number cubes, and coin tosses are used to introduce probability. After reading several historical case studies, students are presented with a hypothetical life-or-death decision involving an epidemic disease. They are asked to make recommendations about ways to reduce the risks associated with local emergency or disaster situations that could be either natural or human-caused. The assessment emphasis is placed on student understanding of trade-offs and decisions.

A Teacher's Guide is included.

Accommodates five classes, each with 8 groups of four students.

Number of activities	11
Approximate length	14-19 sessions
Module No. (includes Teachers Guide) DM-2	$96.35
Additional Teachers Guide DM-2PM	$68.25

INVESTIGATING ENVIRONMENTAL HEALTH RISKS

Module #EHR-2
Developed by SEPUP

In this module, students explore some basic concepts associated with environmental health risks. In addition to the risks associated with familiar activities, they explore risks associated with clean up of the Superfund (toxic waste) sites. Through hands-on activities, students explore concepts necessary for understanding and comparing environmental health risks due to the presence of chemicals. The concepts include: sampling, testing for contaminants, parts per million, and acute vs. chronic toxicity. They also investigate epidemiological methods that can be used to investigate risks from biological or chemical agents. The module ends with an activity in which students read about and apply their knowledge in evaluating evidence related to two environmental health risks.

A Teacher's Guide is included. Sixteen SEPUP Trays are needed but not included.

Accommodates five classes, each with 8 groups of four students.

Number of activities	8
Approximate length	10 -16 sessions
Module No. EHR-2	$349.25
SEPUP Trays, pkg of 16 SP-1CT	$84.50
Additional Teachers Guide EHR-2PM	$68.25

LITERACY STEM AG
REFILLABLE

ENVIRONMENTAL IMPACT: COMPARING INDUSTRIES

Module #EI-2
Developed by SEPUP

Having an industry in your community can lead to both positive and negative outcomes. In this module, students investigate the possible outcomes through a scenario, in which they role-play being residents of an island who are asked to vote to allow a factory to be built. Students engage in hands-on explorations of two industries; mining and chemical manufacturing. They read about two others; food processing and gasoline production. These explorations provide the students with an understanding that all industries have common needs: obtaining raw materials, manufacturing a product, and safely disposing of wastes. The embedded assessment system focuses on the students' ability to use evidence and identify trade-offs.

A Teacher's Guide is included. Sixteen SEPUP Trays are needed but not included.

Accommodates five classes, each with 8 groups of four students.

Number of activities	8
Approximate length	12-16 sessions
Module No. EI-2	$467.65
16 SEPUP Trays SP-1CT	$84.50
Additional Teacher's Guide EI-2PM	$68.25

LITERACY STEM AG
REFILLABLE

INVESTIGATING ENERGY FROM THE SUN

Module #ES-2

Developed by SEPUP

Most of the energy the earth receives from the Sun is in the form of electromagnetic energy. In this module, students explore the physical properties of electromagnetic waves given off by the Sun. The physical properties of infrared, visible and ultraviolet radiation are explored using the concepts of selective transmission, reflection and absorption. Through an established storyline, students use evidence to establish a relationship between the physical properties of ultraviolet waves and their associated health risks of cataracts and skin cancer. Students then discuss ways to reduce the overall risks associated with ultraviolet exposure. The embedded assessment system focuses on student ability to analyze data.

A Teacher's Guide is included.

Accommodates five classes, each with 8 groups of four students.

Number of activities	7
Approximate length	12-18 sessions
Module No. ES-2	$597.10
Additional Teachers Guide ES-2PM	$68.25

LITERACY STEM AG REFILLABLE

INVESTIGATING FOOD SAFETY

Module #FS-2

Developed by SEPUP

Consumers' concerns over food safety are broad. They range from worries over the possibility of Salmonella poisoning to questions about pesticide residues on produce. This module introduces some of the issues associated with food safety. Students first explore food-borne illness as they investigate the growth of yeast, a common fungus that is used to model other effects of pathogenic microorganisms. They examine the different chemical additives, and their use in preventing microbial growth. Students then explore how chemical additives can be used to slow the oxidation of fresh fruit and to enhance the nutrient content of foods. They also learn how foods can be tested for the presence of chemical residues, such as pesticides. Finally, the students evaluate the use of different food preservation techniques, which are intended to improve food safety. The embedded assessment system focuses on students' ability to use evidence and identify trade-offs.

A Teacher's Guide is included. Sixteen SEPUP Trays are needed but not included.

Accommodates five classes, each with 8 groups of four students.

Number of activities	8
Approximate length	10-15 sessions
Module No. FS-2	$467.65
SEPUP Trays, pkg of 16 SP-1CT	$84.50
Additional Teachers Guide FS-2PM	$68.25

STEM LITERACY AG REFILLABLE

GROUNDWATER CONTAMINATION: TROUBLE IN FRUITVALE

Module #FV-2

Developed by SEPUP

Exploring Earth science concepts such as the water cycle, map-making and interpretation, and groundwater pollution is the objective of this module. These concepts are used in an investigation of groundwater contamination in the fictional city of Fruitvale.

Students design and carry out a plan for testing water from different parts of the city to determine the contamination's source, severity, extent, and rate of travel. The data is then used to analyze the risk to Fruitvale's water supply. Finally, the students read about several clean-up options and participate in a role-play of a town meeting to decide which cleanup option to use.

A Teacher's Guide is included.

Accommodates five classes, each with 8 groups of four students.

Number of activities	12
Approximate length	14-22 sessions
Module No. FV-2	$467.65
Additional Teachers Guide FV-2PM	$68.25

LITERACY STEM AG REFILLABLE

HOUSEHOLD CHEMICALS: BETTER BY DESIGN

Module #HC-2

Developed by SEPUP

Many different types of chemicals are used by industries to produce products. These products are advertised using strategies designed to create consumer demand. Can we believe the claims of the manufacturer? How should the product be used safely? In this module, students explore their knowledge and attitudes about chemicals and chemical use. They use chemicals to produce a common household product (i.e. cleaners, food products, and toys), then test their product in various ways. The students come "full circle" by creating ads for their products. The ads are examined for accuracy and appropriateness. This module provides many opportunities for students to design their investigations using an open-ended inquiry model. Students are assessed in a variety of ways that measure their ability to design and conduct independent investigations.

A Teacher's Guide is included. Sixteen SEPUP Trays are needed but not included.

Accommodates five classes, each with 8 groups of four students.

Number of activities	11
Approximate length	23-28 sessions
Module No. HC-2	$586.05
SEPUP Trays, pkg of 16 SP-1CT	$84.50
Additional Teachers Guide HC-2PM	$68.25

STEM LITERACY AG REFILLABLE

HAZARDOUS MATERIALS INVESTIGATION: THE BARREL MYSTERY

Module #HM-2

Developed by SEPUP

In this module, students explore some basic concepts associated with environmental health risks. In addition to the risks associated with familiar activities, they explore risks associated with clean up of the Superfund (toxic waste) sites. Through hands-on activities, students explore concepts necessary for understanding and comparing environmental health risks due to the presence of chemicals. The concepts include; sampling, testing for contaminants, parts per million, and acute vs. chronic toxicity. They also investigate epidemiological methods that can be used to investigate risks from biological or chemical agents. The module ends with an activity in which students read about and apply their knowledge in evaluating evidence related to two environmental health risks.

A Teacher's Guide is included. Sixteen SEPUP Trays are needed but not included.
Accommodates five classes, each with 8 groups of four students.

Number of activities	8
Approximate length	10-16 sessions
Module No. HM-2	$471.25
SEPUP Trays, pkg of 16 SP-1CT	$84.50
Additional Teachers Guide HM-2PM	$68.25

LITERACY STEM AG REFILLABLE

LIVING WITH PLASTICS

Module #PL-2

Developed by SEPUP

There are many different types of materials used to produce the same product. Which is best? What are the trade-offs in selecting one material over another? In this module, students address these questions by focusing on the development and use of plastic. They investigate the properties of different plastics and read about the history of plastics development. The students are then introduced to the basics of polymer chemistry and model the effect of crosslinking on polymer properties. They also explore the properties of natural polymers and relate these properties to their everyday uses. In the final activity, students apply their knowledge of plastics to evaluating competing claims about the usefulness of plastics. The embedded assessment system focuses on students' ability to use evidence and identify trade-offs.

A Teacher's Guide is included.

Accommodates five classes, each with 8 groups of four students.

Number of activities	8
Approximate length	14-16 sessions
Module No. PL-2	$471.25
Additional Teachers Guide PL-2PM	$68.25

LITERACY STEM AG REFILLABLE

INVESTIGATING WASTEWATER: SOLUTIONS AND POLLUTION

Module #SP-2
Developed by SEPUP

The central focus of this foundation module is the vital role chemicals play in our lives. Our opinions about chemicals are based on knowledge and attitudes. What do we really know about chemicals and what are the factors that affect our attitudes toward them? In the opening sequence, survey research techniques are used to help students analyze what they know and think about chemicals and their chemical use. Next, they examine the unique properties of water that make it such a useful solvent. Students then apply basic concepts such as acid/base properties and neutralization, as they devise a plan to treat a solution of dilute acid rinse wastes from an electroplating plant.

A Teacher's Guide is included. Sixteen SEPUP Trays are needed but not included.

Accommodates five classes, each with 8 groups of four students.

Number of activities	10
Approximate length	17-21 sessions
Module No. SP-2	$708.00
SEPUP Trays, pkg of 16 SP-1CT	$84.50
Additional Teachers Guide SP-2PM	$68.25

LITERACY STEM AG REFILLABLE

THRESHOLDS AND TOXICOLOGY

Module #TT-2
Developed by SEPUP

Obtaining governmental approval for new drugs and medicines is no easy task. Years of research, testing, and data collection are needed to make sure the product is safe for society as a whole. In this module, students examine the historical development of the regulation process, and consider a modern day example using "lily juice," a hypothetical herbal remedy promoted to increase intelligence. Simulated rat toxicity testing provides data that can be analyzed to decide whether the product should be allowed. Acute and chronic health effects are considered in the final decision.

A Teacher's Guide is included. Sixteen SEPUP Trays are needed but not included.

Accommodates five classes, each with 8 groups of four students.

Number of activities	10
Approximate length	14-21 sessions
Module No. TT-2	$503.20
SEPUP Trays, pkg of 16 SP-1CT	$84.50
Additional Teachers Guide TT-2PM	$68.25

LITERACY STEM AG REFILLABLE

WASTE DISPOSAL: COMPUTERS AND THE ENVIRONMENT

Module #WD-2

Developed by SEPUP

Management of the waste produced throughout the life cycle of electronic products is extremely complex and challenging. In this module, students learn about the toxic and non-toxic waste issues associated with the manufacturing and disposal of computers. In a series of activities, students simulate the production of circuit boards and the disposal of the resulting liquid toxic waste. Students then investigate a variety of options for handling obsolete computer waste and learn about integrated waste management. Finally, they use their understanding of the waste issues and disposal options to recommend a computer company to purchase computers from. The module provides many opportunities for students to develop their skills in using evidence and weighing trade-offs to make decisions.

A Teacher's Guide is included. Sixteen SEPUP Trays are needed but not included.

Accommodates five classes, each with 8 groups of four students.

Number of activities	8
Approximate length	12-15 sessions
Module No. (includes Teachers Guide) WD-2	$586.05
SEPUP Trays, pkg of 16 SP-1CT	$84.50
Additional Teachers Guide WD-2PM	$68.25

LITERACY STEM AG REFILLABLE

INVESTIGATING ALTERNATIVE ENERGY: HYDROGEN AND FUEL CELLS

Kit #P310 Developed by SEPUP

This six-activity module focuses on hydrogen fuel cell technology as one potential solution to energy concerns. Students first consider trade-offs of using various fuels for powering vehicles then use an electrolyzer to produce hydrogen and oxygen gas from water. Using these gases to generate electricity with a proton exchange membrane (PEM) fuel cell students observe the consumption of gases and the motion of an electric propeller. They also measure the voltage and the current and are introduced to oxidation reduction reactions and half-reactions.

To further their understanding of the chemistry involved, they use both a computer simulation and a manipulative model of a PEM fuel cell. To end the unit, students use the $\triangle G$ of the reaction to compute the efficiency of the fuel cell in converting the energy in H_2 to electricity then identify the advantages of and the challenges facing fuel cell powered vehicles. This kit features access to a free library of online videos and simulations.

A Teacher's Guide is included. Accommodates five classes, each with 1 group of four students.

Kit No. P310	$337.45 (Complete Module)
Kit No. P310A	$209.85 (Lab-Aids® Electrolyzer and fuel cell only)
Add a Group No. P310EL	$259.90

Discount given when purchasing multiple Kit No. P310 and Add A Group No. P310EL.

LITERACY STEM AG REFILLABLE ADD A GROUP

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Lab-aids®

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Subject(s) Taught: (check all that apply) ❑ Agriculture ❑ Biology ❑ Chemistry ❑ Earth ❑ Environmental ❑ General Science ❑ Integrated ❑ Math/Science ❑ 5th Grade ❑ 6th Grade ❑ 7th Grade ❑ 8th Grade ❑ Administrator ❑ Purchasing

QUANTITY	ITEM NUMBER	DESCRIPTION	UNIT PRICE	EXT. PRICE

OUR GUARANTEE

Our guarantee is simple! You must be satisfied with every product you purchase from Lab-Aids®, Inc. If you are not 100% satisfied, let us know within 30 days and we will issue a replacement, refund, exchange or credit. Please review the terms and conditions on the back of this order form.

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Please add 12% to your order to cover shipping and handling charges or a $10.00 minimum on orders of $80.00 or less. If you are located in Hawaii of Alaska, please call for a shipping quote. Order are shipped within 5-7 business days upon receipt of order. Your order will be shipped by the most efficient and expedient means, unless you specify a preferred carrier. The appropriate charges (freight, insurance and handling cost) will be prepaid and added to your invoice

SHORTAGE, LOSS OR DAMAGE

I.C.C. regulations require damage claims to be reported to the delivering carrier within ten (10) days of receipt. Extreme care is always given to your order. If discrepancies do occur, refer to the enclosed packing list and report it to us immediately. Lab-Aids® Inc. is unable to assume liability if the problem is not reported within 30 days from date of delivery.

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Returns will be accepted up to 90 days from the invoice date, in accordance with the following guidelines: 1) first contact Customer Service for a Return Authorization Number, 2) materials must be returned in the original box and in resalable condition, 3) returns on items resulting from an ordering error are subject to a 20% restocking fee with freight prepaid by your organization, and 4) a 20% restocking fee will be applied to any returns after 30 days from the date of invoice, up to 90 days.

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