

Hands-On Science Activities for Your Classroom



from the
WSU Fairmont Center
for Science and Mathematics Education



The Fairmont Center has a lending library of science kits available for teachers to use to teach hands-on science to their students. The kits range from single topic kits that can be used for a few days to kits that comprise a whole unit and can be kept in the classroom for up to eight weeks. Each kit contains enough materials for an entire classroom to participate. There is no charge to use these kits, however teachers need to make arrangements to pick the kits up and return them. To reserve a kit call 316-978-3191.

Full Option Science System (FOSS) Kits

FOSS is a inquiry based, collaborative learning program for students in kindergarten through grade six that provides a fresh approach to science instruction and assessment. The kits listed below are available for teachers to check out and use in their classroom for up to 8 weeks. Each kit contains enough equipment for 32 students to do a variety of investigations on the given unit. (Each kit also contains enough consumable materials for two classroom uses.) With the exception of some common classroom items and food items, these kits are essentially complete.

Trees Module

Using real and representational materials, students get to adopt schoolyard trees, observe tree parts, investigate leaves and keep scrapbooks. This kit is best used in the fall when the trees still have leaves.

(grade recommendation: K)



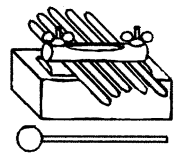
Air and Weather



This module involves students in monitoring weather. They use syringes and tubes to discover that air takes up space and builds up pressure when compressed. They also construct devices that use moving air to function-including balloon rockets, kites, and whirligigs. (grade recommendation: 1-2)

Physics of Sound

This module helps students learn that sound originates from a vibrating source; that individual sounds can be discriminated and matched; that sound is energy that can travel through solids, liquids, and gases; that the pitch of a sound is related to the physical properties of the sound source; and more. (grade recommendation: 3-4)



Balance and Motion

Students put learning into action with this module, which includes such activities as balancing cardboard shapes and pencils and investigating motion through tops, zoomers, whirlers, wheel and axle systems and rolling cups. (grade recommendation: 1-2)



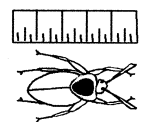
Magnetism and Electricity

Watch the light bulb of discovery click on when young scientists study the concepts in Magnetism and Electricity. This unit's activities integrate doing and viewing, while teaching magnetism, electricity, and electromagnetism. Students will build a telegraph, develop a code, and use their inventions for classroom communication. (grade recommendation: 3-4)



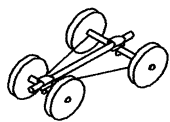
FOSS Measurement

This module awakens students to the importance of measurement - of determining how far, how long, how high, how much and how many. Using such tools as a meter tape and a balance, students also learn about the metric system. (grade recommendation: 3-4)



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Models and Designs



In this module students learn that scientific knowledge is not just accumulated, it is also applied helping people in many ways. The

activities encourage students to use creative thinking and problem solving skills to build working models, including a model of a device that they can hear but cannot see. (grade recommendation: 5-6)

Landforms

The Landforms module and the integrated Geology and Oceans and Space multimedia series illustrate how forces of nature



shape the earth's surface. Students practice the science of cartography, making maps of their school yard, and creating topographic maps of Mt. Shasta and other areas of the country. (grade recommendation: 5-6)

Mixtures and Solutions

Students learn fundamental ideas of chemistry: mixture, solution, concentration, saturation, and reaction. (grade recommendation: 5-6)



Foods and Nutrition

Students become informed consumers as they investigate what food is, what it is made of, and how several groups contribute to their overall nutrition. (grade recommendation: 5-6)

Diversity of Life

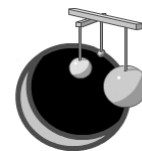
This module introduces students to the big picture of life on Earth. Students learn that all organisms are composed of cells and cells are the fundamental units of life. Both plant and animal cells are investigated. Snails and Madagascar Hissing Roaches are used to introduce the concepts of habitat and adaptation. Students are acquainted with the use of microscopes. (grade recommendation: 6-8)

Earth History

In this module, students explore sedimentary rocks and fossils to discover clues that reveal Earth's history. They consider the processes that created them, and compare evidence discovered in the rocks to present-day geologic processes and contemporary life forms. Then students use these data to make inferences about past organisms, environments, and events that occurred over Earth's history. (grade recommendation: 6-8)

Planetary Science

This kit allows students to study Earth as a celestial object and then progress to lunar science and solar system exploration.



Activities explore the origin of the Moon, celestial motions, Moon phases, lunar geology, cratering processes, imaging technologies, scaling, and space exploration. (grade recommendation: 6-8)

Electronics

In this course, students work with electronic components and meters to build simple and complex circuits, measure and monitor electric properties, and discover how different components affect circuits. (grade recommendation: 6-8)

Weather and Water

This kit focuses on Earth's atmosphere, weather, and water. Students are introduced to the concepts of atoms and molecules, changes of state, and heat transfer. Air masses, fronts, convection cells, winds, and severe weather are also investigated. (grade recommendation: 6-8)

The FOSS Kits were purchased with a grant from The Boeing Company.

Science Education for Public Understanding Program (SEPUP)

SEPUP Modules are self contained instructional units which take between 2 - 6 weeks to complete. The modules typically deal with a specific topic area such as pollution, energy, waste and household chemicals. To summarize, they are fun and interesting. Your students will appreciate the relevant themes and the practical application of science. (Grades: 5-9)



Investigating Energy from the Sun

In this module, students explore the physical properties of electromagnetic waves given off by the sun.



This includes the physical properties of infrared, visible and ultraviolet radiation and the concepts of selective transmission, reflection and absorption.

Investigating Wastewater: Solutions and Pollution

The focus of this module is the role chemicals play in our lives. Students examine the unique properties of water that



make it such a useful solvent. They 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.

Thresholds and Toxicology

Years of research, testing, and data collection are needed to make sure a new drug or food additive is safe.



In this module, students examine the regulation process, and consider a hypothetical herbal remedy promoted to increase intelligence.

Household Chemicals: Better by Design

In this module, students 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.

Living with Plastics

In this module, students address the question as to the best type of material to produce a product by focusing on the



development and use of plastic. They are then introduced to the basics of polymer chemistry and model the effect of cross-linking on polymer properties. They also explore the properties of natural polymers and relate these properties to their everyday uses.

Decision Making: Probability and Risk Assessment

This module helps students develop a greater understanding of how mathematical reasoning can be used to make decisions in everyday life. 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 with the emphasis placed on that understanding of trade-offs and decisions

Investigating 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 also 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. Lastly 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.



Investigating Environmental Health Risks

In this module, students explore basic concepts associated with environmental health risk including the risks associated with clean up of toxic waste sites. Through hands-on activities, students explore concepts necessary for understanding and comparing environmental health risks due to the presence of chemicals.

Waste Disposal: Computers and the Environment

In this module, students learn about the toxic and non-toxic waste issues associated with the manufacturing and disposal of computers. Students also investigate a variety of options for handling obsolete computer waste and learn about integrated waste management.



Environmental Impact: Comparing Industries

In this module, students investigate the advantages and disadvantages of having a chemical manufacturing or mining industry in their community. 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 students' ability to use evidence and identify trade-offs.



Hazardous Materials Investigations: The Barrel Mystery

What happens when unidentified, hazardous waste is left abandoned? In this module, students investigate a barrel of simulated hazardous waste as they learn to physically separate, test, and identify substances in the mixture. Students also evaluate the trade-offs involved in transporting hazardous materials as they are asked to create a plan for transporting large amounts of hazardous waste from one area to another.



*To reserve a kit call
316-978-3191.*

Chemicals, Health, Environment and Me (CHEM2) Kit

CHEM-2 is a supplementary science curriculum consisting of fifteen units. Each unit contains 3-5 activities providing a total of approximately 15 weeks of science instruction. It is designed to help fourth, fifth, or sixth-graders learn: science concepts related to chemicals, health, and the environment; how to collect, process, and analyze information; and how to use scientific evidence in decision-making.

Each of the fifteen units begins with a CHEM Dilemma, a cartoon-style drawing which engages students and allows them to express their preconceptions. Students then conduct a series of hands-on investigations using student pages and laboratory equipment. Student pages also include questions and reading.

A Teacher's Guide provides specific strategies to facilitate discussion and assess student learning after each activity. It also includes materials to help teachers integrate science with other subjects in the elementary curriculum. Each of the 15 CHEM-2 units uses commonly available household and classroom supplies to bring laboratory experiences to fourth, fifth, and sixth-grade classrooms. Two of these activities are:

Build a Community: Students examine the essential services a community should provide as they explore the relationships and interactions between humans and their environment. In small groups, students design an "ideal" community and present their proposals to their classroom community members.

Sound: In this activity students explore the cause of, and variables involved in, the production of sound. They learn about the difference between pitch and volume and about the vibrational (wave) nature of sound. Students also examine testimony in a mock jury trial as they try to determine fault in a case involving a person's hearing loss.

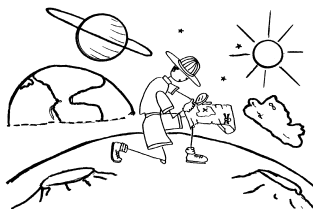
Learning Centers

Learning Centers are similar to FOSS kits, but they focus on a single topic rather than a whole unit. Each Learning Center comes with a classroom set of materials and includes full instructions and activity books. Each Center can be reserved for a two-week period.

Cells

The cell kit provides information on cellular organization, organelles and functions and the differences between plant and animal cells. Also included are various classroom activities, worksheets, quizzes, vocabulary and videos. (grade recommendation 6-10)

Solar System Treasure Hunt



Solar System Treasure Hunt takes your students on a journey across our solar system. Students will discover the features found on each planet, what the planets have in common and how to group them. (grade recommendation: 2 and above)

Microscopes

The microscope learning center includes a set of 12 microscopes, microscope slides, coverslips, forceps, medicine droppers, Methylene Blue staining solution and lens paper. (Grade recommendation: 3-12)

Make A Telescope



The Make A Telescope Learning Center gives students the chance to investigate the properties of a telescope by building one out of simple lenses and plastic pipe. The center includes a complete set of eight telescopes. (grade recommendation: 3 and above)

Fun With Light

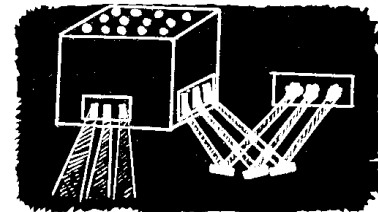
The Fun With Light Learning Center allows students to explore light and color by using filters, lenses and mirrors. Give your students the tools to experiment with and understand light. (grade recommendation: 2 and above)

Biomes

This learning center gives your students a chance to explore the climate and habitats of Earth's eight biomes. Students record the properties of each biome and then use that information to determine the type of animals that live there. (grade recommendation: 4 and above)

Meteorites

Your students can explore the properties of several meteorites in your classroom with this learning center. Magnets and magnifiers are provided to guide their exploration of these interesting visitors from space. (grade recommendation: 3 and above)



Tree Kit

This kit uses real specimens to help students learn to observe, predict, classify and collect data. The kit includes Leaf ID Kit, Seed ID kit, Twig ID kit, How a Tree Grows kit, Leaf and Seed Games kit and a Dichotomous Leaf Key from the Young Naturalists Company. A great hands-on way to learn about native tree species. (Grade recommendation: 4 -12; some materials could be used with younger students.)

Watershed Kit

All rivers, lakes, ponds, creeks and streams are part of a watershed. This standards based kit provides the opportunity for students to study and learn about watersheds and the important role they play in the ecosystem. The activities provide an explanation of watersheds, the different types of life found in them, and the impact humans can have on the fragile systems. Students will learn the importance of monitoring and maintaining the quality of their local waterways and the surrounding land. The analysis of real water quality data will prepare the students to take measurements and determine the water quality of a nearby watershed. (Grade recommendation: 4 -12; some materials could be adapted for use younger students.)

Bubble Festival / Bubbleology

Students combine intense enjoyment with important concepts in chemistry and physics through imaginative experiments with soap bubbles. They devise an ideal bubble-blowing instrument; test dishwashing brands to see which makes the biggest bubbles; determine the optimum amount of glycerin needed for the biggest bubbles; employ the Bernoulli principle to keep bubbles aloft; use color patterns to predict when a bubble will pop; and create bubbles that last for days. This guide is packed with solid scientific, technological, and mathematical content and learning. An extensive background section on bubbles is included. (GEMs kit; grade recommendation 5-8.)

Fingerprinting

In these "fingers-on" activities, students explore the similarities and variations of fingerprints. They take their own fingerprints (using pencil and transparent tape), devise their own classification categories, and apply their classification skills to solve a crime. The mystery scenario, Who Robbed the Safe?, includes plot and character sketches; teachers are also encouraged to create characters and plots to develop their own mysteries. (GEMS kit; grade recommendation 4-8.)

Messages From Space

Building on collaborative work between the SETI (Search for Extraterrestrial Intelligence) Institute and the Lawrence Hall of Science, Messages from Space takes advantage of our fascination with extraterrestrials to catalyze study of the solar system and beyond. The activities create an exciting context for students to engage in creative learning, gaining a great deal of astronomical knowledge. Imagining that they are SETI scientists, students begin to analyze where, in the solar system and beyond, there may be conditions favorable for life. They investigate how our solar system and other planetary systems may have formed, and consider how what we know about the solar system fits into a bigger picture of the universe. (GEMS kit; grade recommendation 5-8.)

Build It Festival

Weaving mathematics concepts into engaging, hands-on construction activities, this GEMS festival guide includes a wide assortment of classroom learning-station activities that emphasize construction, geometric challenges, and spatial visualization. Introductory activities, such as Architect/Builder, involve students in free exploration of materials and lay the foundation for such mathematical challenges as Create-A-Shape, Dowel Designs, Polyhedra, Symmetry, Tangrams, and What Comes Next? (GEMS kit; grade recommendation K-6.)

Investigating Artifacts

This unit presents three intriguing activities related to anthropology, archaeology, and diverse Native American and world cultures. Students are immediately involved, hands-and-minds-on, as they sort and classify material objects found on a walk, then make masks from those materials. They create stories to explain natural phenomena and learn how ancient peoples used folklore to explain and represent the natural world. (GEMS kit; grade recommendation K-6.)

The Real Reasons For Seasons

This guide is aimed at helping students arrive at a clear understanding of seasons as they investigate the connections between the Sun and Earth. Along the way, students take a "Trip to the Sun," determine the real shape of the Earth's orbit, evaluate actual data on world temperature and hours of sunlight in different locations, and model how the angle at which sunlight hits the Earth affects its concentration. Throughout these engaging activities, students gain important standards-based science and mathematics content and develop abilities essential in scientific investigation. (GEMS kit; grade recommendation 6-8.)



Bubble Festival

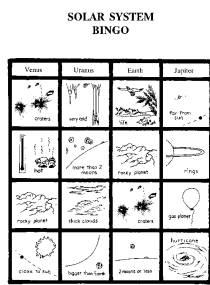
For more resources check the Fairmount Center website:
webs.wichita.edu/facsme

Instructional Games

These instructional games are available free to teachers for a two week checkout. Call to reserve one today! Classroom sets of our games are also available for purchase.

Astronomy Card Games:

Students can use decks of Astronomy Cards to learn terms that are used in astronomy. The Moon Phases Cards acquaint students with features on the moon and its phases. (grade recommendation: K-2)



Astronomy BINGO Games:

Solar System Bingo, Moon Phase Bingo, and Stellar Bingo are used to teach properties of the planets, phases of the Moon and the properties of stars. (grade recommendation: 3-9)

Severe Weather BINGO:

Through this game students discover the properties of four types of severe storms: tornadoes, thunderstorms, lightning, and hurricanes. (grade recommendation: 3-9)

Lake Afton Public Observatory

The Fairmount Center also operates the Lake Afton Public Observatory. At the Observatory your students can use the 16-inch telescope to observe and learn about: the sun, the moon and planets, the lives of stars, and the type of objects that comprise our Milky Way galaxy. Call (316) 978-3191 weekdays from 9 a.m. - 4 p.m. for details or visit the Observatory on the web at: webs.wichita.edu/lapo.

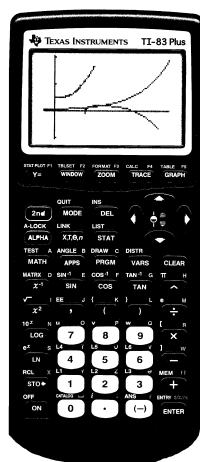
Graphing Calculators and Calculator Based Labs

Secondary math and science teachers step into using Graphing Calculators and Calculator Based Labs (CBLs)! The Fairmount Center has all the tools that you will need to get your class using these learning tools.

A complete classroom set of TI-83 Graphing Calculators with or without CBLs can be borrowed for classroom checkout. If you aren't ready to turn your class loose on these tools, you can borrow a Teacher Pack so you can explore the activities before you turn them over to your students.

The following probes are available for use with the CBLs: light meter, temperature, voltmeter, microphone, motion detector, low-g accelerometer, student force sensor and pH meter. Also available are single carbon dioxide, dissolved oxygen, and turbidity probes.

The TI-83s can be checked out with or without the CBLs for a two week period. Included with the calculators is a CD-ROM of nearly 500 science and math activities your students can do. To reserve a kit, call 978-3191.



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Wichita State University does not discriminate on the basis of race, religion, color, national origin, gender, age, marital status, sexual orientation, status as a Vietnam-era veteran, or disability. Any person having inquiries concerning this may contact the Office of Equal Employment Opportunity, Wichita State University, 1845 Fairmount, Wichita, Kansas 67260-0145, (316) 978-3001.

The Kansas Jason Project

The JASON Project is a nonprofit subsidiary of the National Geographic Society which offers a multimedia science curriculum designed for grades 5-8 (but with the flexibility to be adapted to higher or lower grades). JASON connects students with great explorers and great events to inspire and motivate them to learn. By working with NASA, NOAA and National Geographic to develop the science content, students learn standards-based science from cutting-edge missions of exploration and discovery. By providing educators with the same inspirational experiences - and giving them the tools and resources to better teach science - JASON seeks to reenergize teachers so that they have a lasting, positive impact on their students. Go to www.jason.org for complete online curriculum and more information.

Kansas Science Olympiad

The Kansas Science Olympiad is a statewide interscholastic competition which challenges the abilities of secondary school teams to demonstrate their knowledge, ability, and skills in all areas of science. More details can be found at:

<http://webs.wichita.edu/scienceolympiad/>

Kansas Junior Academy of Science

The Kansas Junior Academy of Science is an organization for students interested in research based science and mathematics. Each student in the Junior Academy completes a science, engineering, or mathematics project during the year. District Meetings are held each spring where Junior Academy members report their research results to senior scientists that act as judges. Papers which are rated as superior at the District Meeting are invited to be presented at the State Junior Academy Meeting at WSU. More details can be found at: <http://webs.wichita.edu/kjas/>

Kit Name	Grade												
	K	1	2	3	4	5	6	7	8	9	10	11	12
Learning Centers (continued):													
Watershed Kit					X	X	X	X	X	X	X	X	X
Bubble Festival / Bubbleology (GEMS)						X	X	X	X				
Fingerprinting (GEMS)					X	X	X	X	X				
Messages From Space (GEMS)						X	X	X	X				
Build It Festival (GEMS)	X	X	X	X	X	X	X						
Investigating Artifacts (GEMS)	X	X	X	X	X	X	X						
The Real Reasons for the Seasons (GEMS)							X	X	X				
Instructional Games													
Astronomy Card Games	X	X	X										
Solar System BINGO			X	X	X	X	X						
Moon Phase BINGO					X	X	X	X	X				
Stellar BINGO					X	X	X	X	X				
Severe Weather BINGO					X	X	X	X	X				