CORE SCIENCE

Pitsco Education's Core Science Solutions for Grades 6-10

One Powerful Mission • One Proven Resource

the power of one

PITSCO EDUCATION

The foundations of a hands-on science program

The foundation of Pitsco Education's core science curriculum methodology is built upon four key components: framework, curriculum, enablement, and environment. By developing our curriculum upon these four components, we've created a consistent delivery methodology that provides quality, real-world learning experiences and, ultimately, student success in science.

Every curriculum title ensures that student learning remains engaging in diverse school settings and is filled with the kinds of reading, writing, math, science, technology, and hands-on activities that make for a complete, educationally sound learning system and curriculum.

Exciting, relevant, hands-on STEM curriculum

There's no better way for students to learn a subject than to get their hands involved during the learning experience. Pitsco Education's innovative curriculum guarantees that students will interact with the topic they're learning. In a Pitsco Education science lab, students are surrounded by more technology, educational instruments, software, and experiments than they might see in all of their other classes combined. As a result, critical learning experiences in science, technology, engineering, math, and language arts now take place in a classroom that is transformed into a real-world learning center – an environment where students use technology to apply knowledge every day.

The home of a revolutionary system

At Pitsco Education, we have a fundamental belief that in order for students to succeed, they require an environment that encourages communication – a space that fosters cooperative learning and opportunities to engage in problem solving and critical thinking. So we designed the learning environment to be just as unique to students as the content. It's a classroom unlike any other. Our workstations are specifically designed and manufactured to work in concert with our curriculum and to promote and ensure effective cooperative learning and individual student success.

Manufactured to unequaled specifications and quality standards, our learning environment is unmatched in the industry and meets the rigorous durability, usability, and flexibility demand of today's students. With workstations from Pitsco Education in your classroom, you end up with an environment that is every bit as revolutionary as our curriculum.

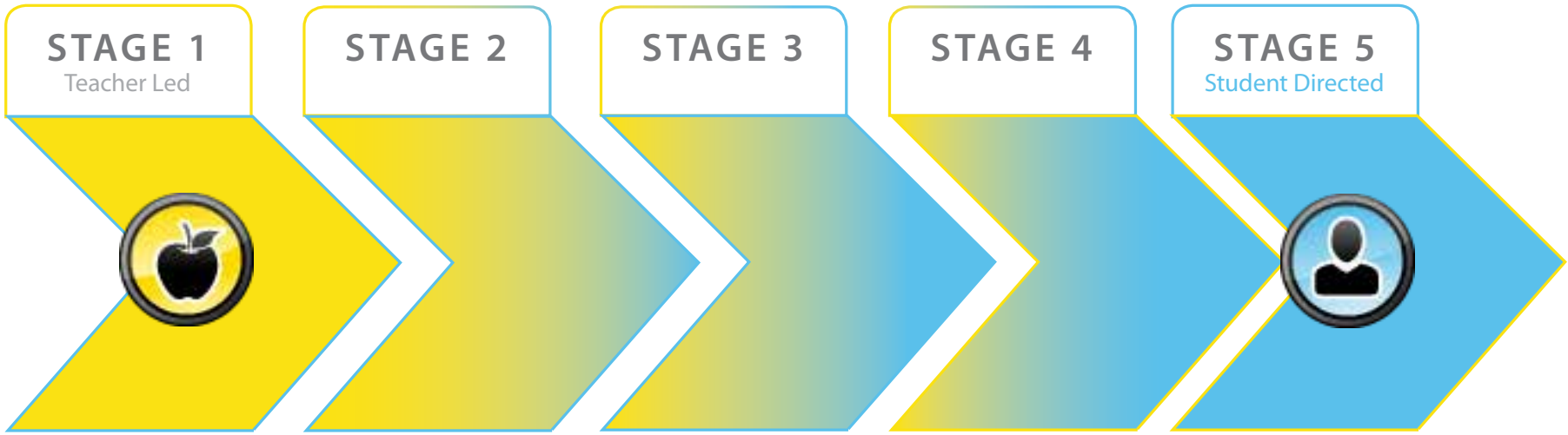
A teacher-facilitator **of student success**

At the core of Pitsco Education's science curriculum is a fundamental change to the teacher's role and the student's responsibility. Just as the rows of student desks are now gone, so are the traditional roles of teacher and student. The student-centered curriculum shifts the responsibility for learning to the student, encouraging each learner to be responsible for his or her own academic success. The teacher becomes a facilitator of student learning and interacts with students as a mentor as well as a teacher. Teachers spend less time on the traditional tasks of classroom management and student discipline and are afforded more one-on-one time with each student. An innovative, hands-on curriculum, the content delivery and assessment framework, and an unmatched professional development program all work together to enable teachers to do what they do best – teach.

Preparing to become a **facilitator**

Such a change in approach to teaching and curriculum delivery naturally requires a new approach to preparing teachers. More than 15 years of professional development and supporting thousands of teachers has confirmed that new facilitators can experience immediate success – and the student benefits that follow – by participating in professional development. Offered throughout the year and weekly during the summer, our professional development program helps teachers make the transition from their traditional classroom to a Pitsco Education lab an easy one.

PROGRESSION OF LEARNING



Core knowledge and the scientific method

Pitsco Education science curriculum employs a unique program scope and sequence designed to introduce students to the foundational concepts of inquiry-based learning and the scientific process. Students navigate through a progression of instruction where they inquire, hypothesize, research, experiment, analyze data, and draw conclusions. This process is designed around activities that are aligned with core content for Earth, physical, and life science.

Each core course is experienced over an evolution of five stages. In the first stage, students focus on understanding the scientific method before moving on to the remaining stages where they learn to apply the scientific method. Students develop, revise, and test hypotheses and are given more control of the learning process in each succeeding stage. The final stage gives students full ownership of the learning process, culminating with an open-ended scientific investigation.

Using this approach not only engages students in core science concepts in a real-world learning environment but also teaches them the 21st-century skills of critical thinking, problem solving, teamwork, and communication, all of which are learned by applying the scientific method.

The overarching goal of our science curriculum is to focus student attention on the unifying concepts or "big ideas" in order to develop a deeper understanding of the natural world. This is accomplished through exploration of Essential Questions. Below are examples of interrelated unit topics and corresponding Essential Questions.

SAMPLE UNIT TOPICS

ESSENTIAL QUESTION:
Should experiments that might help humans be conducted if they cause death to animals?

ESSENTIAL QUESTION:
Should Americans reduce their energy usage? If so, how?

ESSENTIAL QUESTION:
How many humans will Earth support?

ESSENTIAL QUESTION:
What water conservation techniques should be implemented in the United States in order to ensure future availability of water resources?

PLEASE NOTE: *Unit topics and Essential Questions are available to address core science standards for Earth, life, and physical science.*

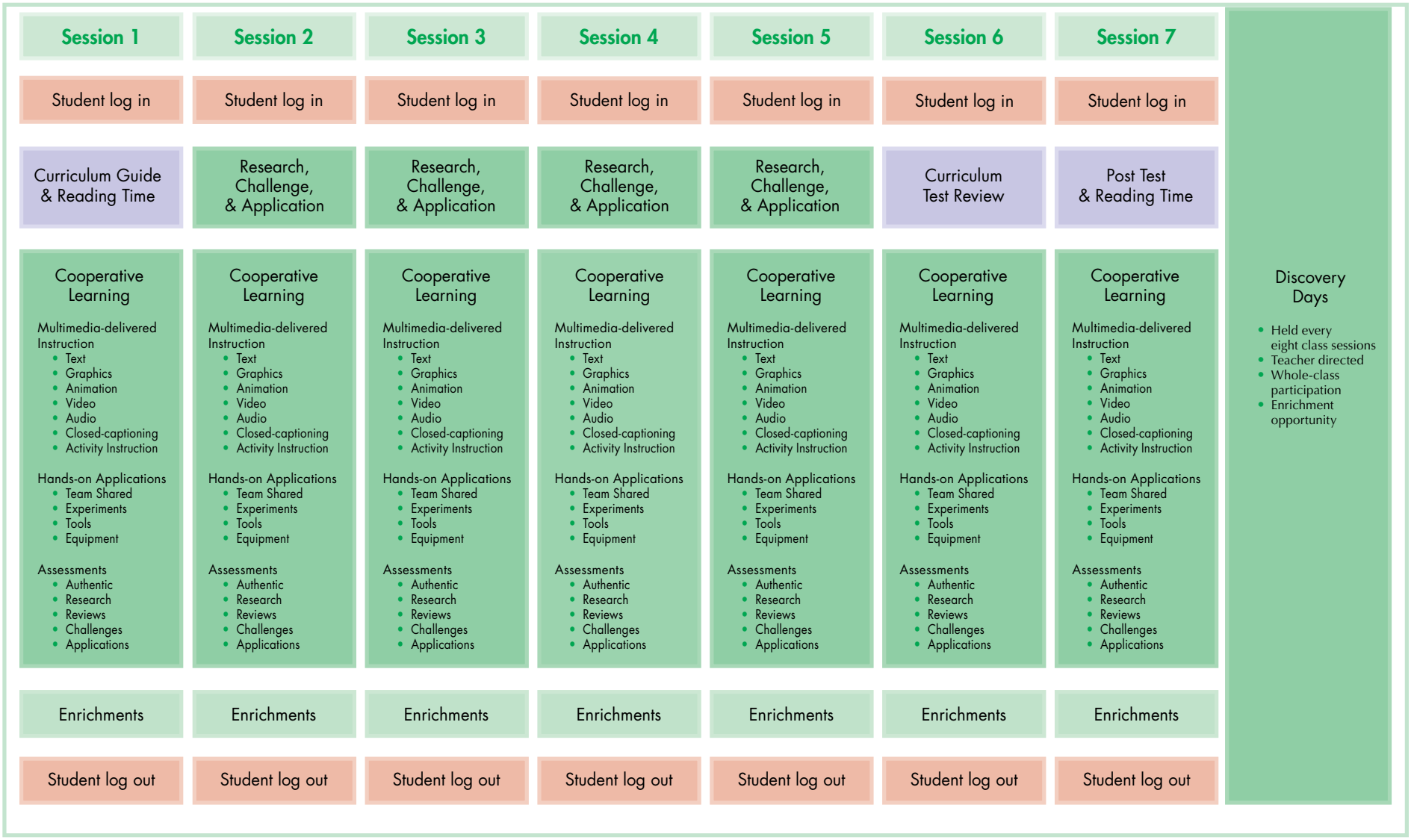
Cooperative Learning

The primary goal of Pitsco Education science curriculum is for students to become responsible learners and to work cooperatively with others. Our curriculum titles are student directed, giving students control of their own learning. And because students work with a partner to complete each title, the experiences they share promote positive communication, teamwork, inquiry, learning, and social skills.

Our core science curriculum is delivered through a combination of hands-on activities and proprietary multimedia curriculum. Science, technology, engineering, mathematics, and language arts experiences are woven throughout each curriculum title in seven sessions. Equipment, materials, reference texts, and all supplies necessary to achieve success reside at each workstation.

Every student's unique learning style is accommodated in a Pitsco Education science program. Whether a student is a kinesthetic or visual learner, a nonreader, or a speaker of English as a second language, our STEM science curriculum ensures student success through a combination of text; graphics; video; and real-world, hands-on activities.

Each session in a Pitsco Education science title contains cooperative learning activities. Every title includes multimedia-delivered instruction, hands-on experiences, and three authentic performance assessments completed by the teacher. Discovery Days are conducted at the end of every rotation. These teacher-directed activities are designed to augment science content, provide opportunities for whole-class participation, and allow students additional time to review or complete unfinished assignments.



Powerful tools to make powerful learning

Walking into a Pitsco Education science lab can be both intimidating and exhilarating to teachers. The dynamic nature of the environment, the wide range of equipment and materials, and the unique layout of the room require a different approach to classroom facilitation.

Synergy, our fully integrated, browser-based content management system, provides teachers with all the resources to manage and monitor student activity and performance. The Faculty Portal provides teachers easy access to a content management area where they can schedule student rotations; monitor lessons, assignments, and activities; and administer assessments. *Synergy* provides all the features teachers expect from a content-delivery and student-data management system.

For the student, *Synergy* provides password-protected access so they can monitor and better manage their learning experiences. The Student Portal allows each student to log on – individually or with their partner – to complete assigned curriculum titles, activities, and assessments. *Synergy* provides easy navigation to previously viewed content and instant navigation to each student's last point of activity in any curriculum title, including those they have completed, those currently assigned, and others that have been extended or might be incomplete.

A network of **teacher support**

Exceptional customer support is a necessity for the success of teachers. No other company provides such complete, teacher-centered support. After teachers complete a Pitsco Education training seminar, we stay in touch with them through *The Pitsco Network*, a bimonthly magazine published during the school year highlighting what's new with all of our innovative education systems and products. In addition, we offer management assistance and advice from veteran teachers. A companion website, replete with the latest news, notes, and downloads, is a resource specifically designed for Pitsco Education facilitators, and you can find this resource at www.network.pitsco.com.

Just a **phone call away**

If teachers ever have a question or a challenge, every Pitsco Education teacher – no matter the version of his or her curriculum – has access to our experts for technical support and assistance. When teachers call our 800 number, there's no automated phone system and no long messages encouraging you to call back later – just easy access to a customer service department that has a renowned track record of answering teachers' questions and solving problems. And if you need instant access, our support specialists are just one click away during regular business hours using Pitsco Education's online chat support feature. Or you can send us an email or use our dedicated toll-free fax number, and our support team will take it from there.

Curriculum Titles

Alternative Energy

OVERVIEW

In *Alternative Energy*, students explore the basic concepts of energy as well as the law of conservation of energy. Information is presented about renewable and nonrenewable energy sources and how these resource types are important for meeting global energy demands. The advantages and disadvantages of alternative energy forms such as solar, wind, biomass, geothermal, and hydropower are presented. Hands-on experiences include experiments with a wind turbine, solar cells, and hydrogen fuel cells.

STUDENT OBJECTIVES

- Learn the characteristics of renewable and nonrenewable energy resources.
- Explore traditional and nontraditional, or alternative, forms of energy.
- Gain an understanding of the scientific law of conservation of energy.
- Learn about the use of wind energy and perform an efficiency experiment using a wind turbine.
- Learn the important role the Sun plays in the production of energy on Earth.
- Explore hydropower and geothermal power.
- Complete a fermentation experiment to explore biomass energy.
- Perform an experiment to simulate hydrogen fuel cell technology.
- Evaluate various energy resources and draw conclusions based upon statistical data.

ACTIVITIES

Students complete three performance assessments: 1) Energy – investigate various energy resources and their classifications; 2) Solar Energy – name characteristics of solar energy and explain how a solar cell works; and 3) Fuel Cell Energy – understand and explain how fuel cell technology functions.

Animals

OVERVIEW

In *Animals*, students learn classification systems and the place of animals (including humans) within them. Students explore physical and lifestyle characteristics of invertebrates and vertebrates through hands-on activities. They compare organisms in terms of adaptations such as symmetry, movement, and organ systems. They explore the transition to land and temperature regulation. They are introduced to concepts of evolution and the fossil record.

STUDENT OBJECTIVES

- Review the current three-domain, six-kingdom classification system.
- Design and use a dichotomous key to classify organisms.
- Explore the characteristics of eight invertebrate phyla.
- Compare body symmetry, movement, and organ systems in various animals.
- Learn the major characteristics of chordates and vertebrates.
- Compare the characteristics of the five classes of vertebrates.
- Consider some causes and effects of variation in the animal kingdom.
- Relate structural and behavioral adaptations to natural selection and evolution.
- Complete a fossil activity to illustrate the history of animal life on Earth.

ACTIVITIES

Students complete three performance assessments: 1) Classifying Invertebrates – identify invertebrate specimens to phylum and point out characteristics, including symmetry; 2) Vertebrates – list vertebrate adaptations for land, reproduction, and parental care and identify vertebrates by class; and 3) Adaptation and Evolution – explain genetic changes that occur during natural selection, show and explain layering of fossils, distinguish between relative and absolute fossil age, and explain half-life.

Applied Physics

OVERVIEW

In *Applied Physics*, students learn about the wonderful forces of nature that they must control and learn to live with to make their lives more enjoyable. Using an air track, students learn about motion by calculating the velocity and acceleration of air track cars using a photogate timer. Students study data transmission using a laser. Students also learn about radio waves, light, and heat and do experiments using mathematics.

STUDENT OBJECTIVES

- Define and calculate velocity and acceleration.
- Explain the relationship between gravity and acceleration.
- Define the relationships among frequency, pitch, amplitude, and loudness.
- Experiment with different sound waves and list the steps necessary to hear sound.
- Define *hypothesis* and make and test a hypothesis regarding heat transfer.
- List the steps of the scientific method.
- Differentiate between an insulator and a conductor.
- Discover how light waves travel.
- Explore various uses of lasers.

ACTIVITIES

Students complete three performance assessments: 1) Heat Experiment – explain a hypothesis, list the steps of the scientific method, and set up and complete an experiment; 2) Light Filter Experiments – set up and conduct light experiments and verbalize how tinted sunglasses filter light; and 3) Laser Experiments – demonstrate the proper care and use of a laser and utilize one or more mirrors in the transfer of sound through a laser and photocell.

Aquaculture

OVERVIEW

In *Aquaculture*, students learn fish biology, care, and management by maintaining their own goldfish tank. After an introduction to the history of aquaculture, they conduct chemical tests of tank water, learn fish anatomy and metabolism, calculate fish growth and productivity, and maintain records of their activities. Along the way, they learn the processes involved in a large-scale aquaculture operation and consider environmental impacts of aquaculture.

STUDENT OBJECTIVES

- Use a spreadsheet to practice record keeping for an aquaculture operation.
- Conduct tests of tank water and learn appropriate levels for each chemical.
- Identify internal and external structures of fish.
- Understand fish life cycles and measure fish length and weight.
- Analyze fish growth curves and calculate appropriate stocking rates.
- Explore fish metabolic rates and calculate nutritional needs and productivity.
- Explore environmental impacts of aquaculture.
- Graph and analyze data from the classroom aquaculture tank.

ACTIVITIES

Students complete three performance assessments: 1) Water Chemistry – conduct water chemistry tests, define and explain expected values, and understand tank filtration; 2) Fish Biology – identify fish structures and properly manipulate live fish, including taking length and volume measurements; and 3) Fish Productivity – measure gill-opening rates, understand metabolism, and complete productivity calculations.

Curriculum Titles

Astronomy

OVERVIEW

In *Astronomy*, students learn about the solar system and their relationship to it from a mathematical perspective. They investigate the Sun-Moon-Earth system and the characteristics, sizes, and distances of planets in the solar system. They construct a small refracting telescope and learn how it functions. They explore gravity and orbits, distinguish between weight and mass, and relate the kinetic energy equation to crater impacts.

STUDENT OBJECTIVES

- Use a planetarium model to investigate Sun-Moon-Earth movements.
- Relate gravity to orbits and distinguish between circular and elliptical orbits.
- Distinguish between weight and mass.
- Use the equation F = ma to calculate force, given mass.
- Learn the characteristics of the Sun and planets.
- Develop scale models comparing sizes and distances in the solar system.
- Explain the differences between reflecting and refracting optical telescopes and calculate magnification.
- Understand the kinetic energy equation $KE = 1/2\ mv^2$ and relate it to crater impacts.
- Express solar system distances in scientific notation.

ACTIVITIES

Students complete three performance assessments: 1) Planetary Motions – use the planetarium model to explain Earth's rotation and revolution, day-night cycles, seasons, and tides; 2) Planetary Distance – develop a scale model of solar system distances and calculate distances using both scientific notation and astronomical units; and 3) Telescopes – identify the parts of a refracting telescope, explain functions of its lenses, define focal length, *and explain its relationship to magnification.*

Biotechnology

OVERVIEW

In *Biotechnology*, students explore the past, present, and future of biotechnology. Through hands-on activities, computer simulations, and laboratory experiments, they investigate the structure of the DNA molecule and learn how it can be changed through genetic engineering, including recombinant DNA, gene splicing, and transgenic biotechnology. They consider some implications of using biotechnology in medicine, agriculture, and other fields.

STUDENT OBJECTIVES

- Define terms relating to genetics and biotechnology.
- Identify important historical events in the development of biotechnology.
- Construct and explain a model of a DNA molecule.
- Use pop-bead models to illustrate the processes of gene splicing and recombinant DNA.
- Complete a DNA extraction.
- Complete an enzyme experiment and analyze data from the experiment.
- Use multimedia and simulations to understand transgenic biotechnology.
- Learn about important applications of biotechnology in medicine and agriculture.
- Consider ethical problems related to biotechnology.

ACTIVITIES

Students complete three performance assessments: 1) Biotechnology and DNA – define biotechnology, *explain areas in which biotechnology is used, and explain the structure of DNA; 2) Gene Splicing – use models to demonstrate and explain the structure of DNA and the process of gene splicing; and 3) Data Analysis – document experimental data, explain differences between experimental and control groups, and explain why careful analysis of any type of genetic engineering is mandatory.*

Body Systems

OVERVIEW

In *Body Systems*, students explore the structure and functions of the 11 body systems. They measure functions and characteristics of their own bodies including respiration rate, CO_2 production, binocular vision, length of the digestive tract, and pulse rate. Students learn the hierarchy of organization within their own bodies and how body systems work together to maintain homeostasis.

STUDENT OBJECTIVES

- Explore the importance of vital signs in emergency medical situations.
- Learn the anatomical position and explain how it is used to locate organs.
- Locate major body organs and systems on a human torso model.
- Explore the major structures and functions of the 11 body systems.
- Observe and identify specialized tissues making up each body system.
- Consider levels of organization and relate levels to the human body as a system.
- Define *homeostasis* and explain how body systems work together to maintain it.
- Do hands-on activities to illustrate important aspects and functions in body systems including the digestive, circulatory, and integumentary systems.

ACTIVITIES

Students complete three performance assessments: 1) Digestion – identify the components of the alimentary canal, explain the process of digestion, and explain how nutrients enter the bloodstream; 2) Respiration and Skin – name and define structures of the two systems and show how respiration affects carbon dioxide production; and 3) Movement – explain how muscles and bones work together to move the body and demonstrate the movement of three types of joints.

Carbon Footprint

OVERVIEW

Carbon Footprint introduces students to greenhouse gases and global warming. They learn about carbon as an element and as a part of compounds. They learn what fossil fuels are and where they came from. They also learn about the natural carbon cycle and the effects people have on it. Students learn factors that are included in a carbon footprint and how to measure their own carbon footprint. Students learn what they can do to lessen their negative impact on the environment.

STUDENT OBJECTIVES

- Define the term *carbon footprint* and explain its significance.
- Identify carbon as an element and a part of compounds.
- Explore Earth's carbon cycle including major carbon sources and sinks.
- Explain how greenhouse gases relate to an individual's carbon footprint.
- Explore fossil fuels, where they came from, and how they affect the carbon footprint.
- Analyze the transportation, agriculture, energy, and consumer sectors of the carbon footprint.
- Brainstorm ways to decrease an individual's carbon footprint without changing the quality of life.

ACTIVITIES

Students complete three performance assessments: 1) The Carbon Cycle – list Earth's major carbon sources and sinks and define greenhouse gases *and explain how they relate to the carbon cycle; 2) Carbon Footprint – define* carbon footprint *and give an example of something people do that affects it; and 3) Measuring a Carbon Footprint – list major factors that contribute to the carbon footprint, use an equation to calculate the student's own carbon footprint, and discuss ways to decrease his or her carbon footprint.*

This title content focuses on green education.

Curriculum Titles

Cell Structure

OVERVIEW

In *Cell Structure*, students discover the structure and function of the living cell by doing a variety of hands-on activities. They learn proper techniques of microscope use. They observe prepared slides of cells and tissues, make wet-mount slides of living cells, and compare plant and animal cells. They do a naked-egg experiment to demonstrate osmosis across a semipermeable membrane. They use cell models to identify plant and animal cell organelles.

STUDENT OBJECTIVES

- Distinguish between prokaryotic and eukaryotic cells and compare plant and animal cells.
- Use models to identify cell organelles and learn their structures and functions.
- Learn proper techniques for using a microscope, performing experiments, and writing lab reports.
- Make wet-mount slides of living cells and observe and identify slides of the four animal tissue types.
- Use slides and cell boards to learn the stages and importance of mitosis.
- Perform a naked-egg experiment to show osmosis across a semipermeable membrane.

ACTIVITIES

Students complete three performance assessments: 1) Eukaryotic Cells – demonstrate proper microscope technique, show differences between plant and animal cells, and define functions of cell organelles; 2) Mitosis – use cell boards to show stages of mitosis and explain the purpose of mitosis in organisms; and 3) Osmosis – show correct experimental procedures for the naked-egg experiment, explain the function of osmosis, and relate experimental results to living systems.

Changing Oceans

OVERVIEW

Changing Oceans first introduces students to general characteristics of oceans (such as salinity, depth, and layers) and to the variety of ocean organisms and their habitats. Then, students look at specific ocean-related problems and crises, including overfishing; ocean pollution; global warming; and exploitation of ocean minerals, metals, and energy. In addition to describing the problems, *Changing Oceans* concentrates on two factors: relating the problem directly to students and brainstorming current or potential solutions to the problem.

STUDENT OBJECTIVES

- Identify Earth's oceans according to salinity, depth, and other characteristics.
- Explore major types of ocean habitats and ocean organisms.
- Review the history and current status of ocean fisheries and explain changes.
- Explore types of ocean pollution, including effects on ocean organisms, food webs, and people.
- Describe global warming and explain its effects on ocean temperature and acidity.
- Explain effects of global warming on ocean ecosystems and organisms.
- Use problem-solving techniques to brainstorm solutions to a chosen ocean problem.

ACTIVITIES

Students complete three performance assessments: 1) Ocean Fisheries – explain changes in fisheries in the last 50 years, give reasons for the changes, and describe effects on human populations; 2) Ocean Pollution – list types of ocean pollution and their general locations and describe the Great Pacific Garbage Patch and where it came from; and 3) The Future of Oceans – list expected ocean-related changes in the next 50 years and explain how global warming is currently affecting oceans and the consequences to oceans if current trends continue.

This title content focuses on green education.

Chemical Math

OVERVIEW

Are you curious how chemists determine what to put together and just what quantity to use when making things such as perfume or medicine? In *Chemical Math*, students see the math that chemists use on a daily basis. Students balance equations, solve inequalities, use scientific notation, and learn basic chemistry concepts. Students use Avogadro's number and create Lewis dot structures of atoms. In *Chemical Math*, the numbers behind chemistry are the focus.

STUDENT OBJECTIVES

- Locate melting points on a number line.
- Calculate and compare densities of different substances.
- Learn the structure of an atom and of the periodic table.
- Express sizes of atoms and atom components using scientific notation.
- Calculate atomic mass based on isotope percentages.
- Explore the mole concept and Avogadro's number.
- Translate and solve algebraic expressions involving masses and moles of substances.
- Explore and solve examples of one- and two-step equations used in chemistry.
- Evaluate serial dilutions using inequalities.

ACTIVITIES

Students complete three performance assessments: 1) Scientific Notation – explain the structure of an atom, show a number in correct scientific notation, convert a given number to scientific notation, and explain the use of scientific notation in chemistry; 2) Balancing Equations – define equation *and give an example, explain chemical equations, and balance a given equation; and 3) Solving Equations – solve given equations, solve given inequalities, and explain the process of serial dilution.*

Climate & Biomes

OVERVIEW

In *Climate & Biomes*, students learn what climate is, what processes drive it, and how we measure both past and present climates. They locate and describe Earth's major biomes (large ecological systems), relate biomes to climatic zones, and demonstrate concepts such as the greenhouse effect, albedo, and global warming. *Climate & Biomes* enables students to practice higher-level scientific thinking, such as using models, recognizing types of evidence, and developing informed opinions.

STUDENT OBJECTIVES

- Learn major factors controlling world climate.
- Relate climatic patterns to Earth's biomes or vegetation patterns.
- Compare past and present climatic cycles.
- Learn how scientists determine past climates and predict future climates.
- Manipulate a simple model of climatic changes.
- Understand and demonstrate the greenhouse effect and global warming.
- Distinguish among fact, opinion, and scientific theory.
- Learn how to find and evaluate scientific evidence.
- Develop and write an informed opinion on the human contribution to global warming.

ACTIVITIES

Students complete three performance assessments: 1) Dendrochronology – analyze past climates through tree ring analysis; 2) Greenhouse Effect – illustrate and explain the greenhouse effect using a tabletop experimental system and distinguish four different types of evidence; and 3) Global Warming Controversy – explain the construction and use of a climate model; compare biased and unbiased sources; research, write, and justify an informed opinion on global warming.

Curriculum Titles

Climate Change

OVERVIEW

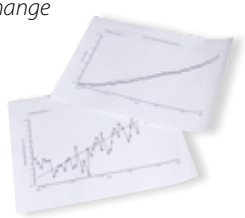
The 2007 Intergovernmental Panel on Climate Change (IPCC) Report describes causes, effects, and ways of dealing with climate change resulting from global warming. In *Climate Change*, students are introduced to the IPCC Report. They learn the effect of carbon dioxide and other greenhouse gases on global temperature increase. Then, they use graphing, polynomials, and matrices to analyze data from the report and develop possible carbon mitigation strategies.

STUDENT OBJECTIVES

- Learn factors causing climate change.
- Explore effects of climate change on weather, people, and ecosystems.
- Use software to create graphs of temperature and CO_2 changes.
- Learn to add, subtract, multiply, and divide polynomials.
- Set up polynomial equations describing factors causing global warming.
- Measure the albedo of different colored surfaces.
- Measure and graph rates of ice melt and water-level rise.
- Learn addition, subtraction, and scalar multiplication of matrices.
- Use matrices and polynomials to describe possible carbon mitigation strategies.

ACTIVITIES

Students complete three performance assessments: 1) Data Analysis – show polynomials describing factors that cause global warming and show and explain graphs of temperature and CO_2 changes over time; 2) Rates of Change – calculate rates of change and show graphs of data collected on ice melt and water-level rise; and 3) Polynomials – solve polynomial equations, add and subtract matrices, and explain their own carbon mitigation solution.



Composites

OVERVIEW

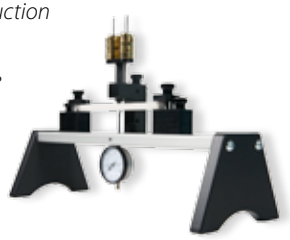
Composites are natural and synthetic materials consisting of two or more distinctly separate materials. *Composites* is focused on learning what composite materials are, where they are used, why they are used, and how they are made and on testing their properties. Students create composite test samples using various materials and perform stress tests to evaluate various composite materials.

STUDENT OBJECTIVES

- Recognize a composite.
- Learn the advantages of using composites.
- Explore the variety of uses for composite materials.
- Learn about the types of resins used in composites.
- Explore honeycomb construction.
- Create sample composite materials for testing.
- Compare and contrast materials using various stress tests.

ACTIVITIES

Students complete three performance assessments: 1) Composite Basics – define composite *and give two examples of natural and human-made composites; 2) Composite Materials – describe how core thickness affects stiffness in honeycomb construction using composite materials, describe the differences between pultrusion and extrusion, list one advantage of using graphite fiber instead of glass fiber for reinforcement; and 3) Simulation – give two reasons why the percentage of composites used in aircraft construction is increasing, demonstrate how to change the amount of force applied to a part using the simulation software, and demonstrate how to change the number of plies in a composite.*



Dynamic Earth

OVERVIEW

In *Dynamic Earth*, students gain a scientific understanding of the processes that shape our planet. Students construct a scale model of Earth's interior, calculate the epicenter of an earthquake, create and read a topographic map, and use a shaker table to simulate an earthquake's destructive force. They explore the history and evidence behind continental drift and the theory of plate tectonics.

STUDENT OBJECTIVES

- Examine Earth as it relates to the universe.
- Discover factors that give Earth its unique ability to support life.
- Use calculated data to design a two-dimensional scale drawing of Earth's interior.
- Become familiar with the history behind the theory of plate tectonics.
- Learn that evidence suggests Earth's magnetic poles vary.
- Distinguish among the three main types of plate boundaries.
- Perform an experiment that simulates a convergent plate boundary.
- Use models to simulate different types of faults and landforms that faulting can create.

ACTIVITIES

Students complete three performance assessments: 1) Scale Model – use dimensional analysis to convert units; make a two-dimensional scale drawing from a three-dimensional Earth model; 2) Plate Tectonics – explain plate tectonics and describe three types of tectonic plate boundaries; and 3) Locations and Faults – describe normal and reverse faults and the type of force acting on each.

Eco-Architecture

OVERVIEW

Eco-Architecture enables students to explore sustainable construction methods that designers and engineers use currently. Students learn how to evaluate the benefits and drawbacks of building materials based on the Six-Question Sustainability Test. They learn the importance of building for sustainability and learn why we need to reduce, reuse, recycle, and rethink when planning for new construction. Ultimately, students design and create their own Eco-home that represents choices they have made about designing with the environment in mind.

STUDENT OBJECTIVES

- Evaluate building materials based on the Six-Question Sustainability Test.
- Review LEED classifications that are used for green construction.
- Demonstrate how insulation works, including the benefits of green roofs.
- Create a thermal wall to understand the process of heat transfer.
- Explain the water cycle and how this is an integral part of Earthship design.
- Explore the benefits of straw bale, earth-sheltered, rammed-earth, and Earthship construction methods.

ACTIVITIES

Students complete three performance assessments: 1) Passive Solar – demonstrate how winter and summer sunlight differ and explain the benefits of passive solar design; 2) Thermal Mass – explain the process for creating rammed-earth walls and how a thermal wall is used for heating and cooling; and 3) Eco Choices – name two things all homeowners can do to make their landscaping more environmentally friendly and explain three construction choices they would make when designing their own Eco-home.

This title content focuses on green education.

Curriculum Titles

Ecology

OVERVIEW

In *Ecology*, students explore basic concepts and processes underlying the function of natural ecosystems. They consider biotic and abiotic factors; energy flow through food webs; nutrient cycles; population interactions including population growth, carrying capacity, and predator-prey interactions; biodiversity; and humans as part of ecological systems.

STUDENT OBJECTIVES

- Use a water test kit to measure abiotic factors in a river-tank ecosystem.
- Dissect a barn owl pellet and construct a barn owl food web.
- Relate the laws of thermodynamics to the energy pyramid in an ecosystem.
- Describe the process and importance of nutrient cycling in an ecosystem.
- Explore different types of adaptive interactions within a community.
- Explore population growth and carrying capacity and estimate population size.
- Simulate a predator-prey interaction.
- Explore biodiversity in ecosystems and calculate a diversity index.
- List ecosystem services provided to humans and consider human effects on ecosystems.

ACTIVITIES

Students complete three performance assessments: 1) Energy Flow – dissect a barn owl pellet and use the results to construct a food web and explain how energy travels through an ecosystem; 2) Biodiversity – use a sampling technique to measure biodiversity and use the data to calculate a diversity index; and 3) Population Growth – draw and explain the difference between exponential and logistic growth curves and explain the mark-recapture method for estimating population size.

Electricity

OVERVIEW

In *Electricity*, students learn the principles of electricity and draw a schematic of a parallel and a series circuit. Students complete a series and a parallel circuit as well as classify conductors and insulators. They use a voltage and ohm meter, and they identify the magnetic fields important to the concept of electricity. Students also measure voltage, resistance, and current during *Electricity* activities.

STUDENT OBJECTIVES

- Draw a schematic diagram of a series and parallel circuit.
- Discover the relationship between the electrical units of voltage, current, and resistance.
- Demonstrate knowledge of electrical circuits.
- Classify samples of electrical conductors and insulators.
- Explore the concepts of electricity and magnetism.
- Observe the strength and direction of magnetic lines of force.

ACTIVITIES

Students complete three performance assessments: 1) Electricity Basics – demonstrate and define the term circuit *and draw and assemble a circuit; 2) Series and Parallel Circuits – wire a motor circuit, explain the use of an on/off switch, and wire and reverse a DC motor using a knife switch; and 3) Measuring Resistance – demonstrate the proper care of a multimeter (VOM) and identify and explain insulators and conductors.*

Energy, Power & Mechanics

OVERVIEW

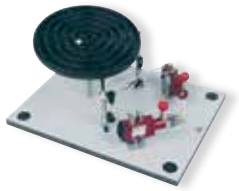
When students complete *Energy, Power & Mechanics*, they have a basic understanding of energy sources, the principles of power technology, and the concept of mechanical advantage and machines. Students see how fluids can be used with other simple machines. Using educational instruments, students learn the fundamentals of gears, fluid mechanics, and three classes of levers. Students also use a solar hot dog cooker and experience the concept of wind power.

STUDENT OBJECTIVES

- Understand the concepts of gears and gear ratios.
- Demonstrate knowledge of the three classes of levers by completing a hands-on activity.
- Discover the functions and potential uses for pneumatics, hydraulics, and gears.
- View video segments on energy, work, and the future.
- Witness an alternative use of the Sun's energy by operating a solar cooker.
- Control energy by adjusting the flow of air pressure.
- Differentiate between renewable and nonrenewable energy sources.

ACTIVITIES

Students complete three performance assessments: 1) Wind Energy – set up equipment, enter data into the computer, and defend conclusions about blade angles based on their data; 2) Levers – set up an educational instrument, enter data on-screen, and give examples of the three classes of levers; and 3) Fluid Systems – describe a pump using a cylinder and valves and demonstrate proper connections.



Engineering Bridges

OVERVIEW

In *Engineering Bridges*, students solve an engineering problem as a team. Their task is to build a balsa wood bridge that will span a space and hold the most weight before breaking. There are certain rules that the students must follow to build their bridges correctly. Students learn the relationships among design, structure, and strength of a bridge. By building a bridge and testing its strength on a structure tester, students learn valuable engineering concepts and principles.

STUDENT OBJECTIVES

- Use a worksheet to illustrate a bridge design and manufacture structural members.
- Assemble a bridge according to the design.
- Test the finished bridge on a testing device.
- Convert designs to full-size patterns.
- Learn about the forces that act upon a structure.
- Learn about the arch bridge and the cantilever bridge.

ACTIVITIES

Students complete three performance assessments: 1) Designing Your Bridge – create three thumbnail sketches of possible bridge designs, choose a design, defend why a bridge design was chosen, and draw a full-size pattern of the selected thumbnail sketch; 2) Bridge Construction – demonstrate the proper use of the Timber Cutter and begin cutting pieces for bridges; and 3) Final Assembly – meet the bridge-building specifications and complete the bridges.

Curriculum Titles

Environmental Issues

OVERVIEW

In *Environmental Issues*, students use multimedia and hands-on activities and experiments to explore pollution, loss of habitats and biodiversity, resource use, waste management, global climate change, and human population growth. They learn statistics related to these issues and do activities relating to acid rain, paper recycling, resource use, oil-spill cleanup, and global warming.

STUDENT OBJECTIVES

- Conduct and analyze an experiment on the effects of acid rain.
- Distinguish among nonrenewable, renewable, and perpetual resources.
- Do a mining activity to demonstrate depletion of a nonrenewable resource.
- Explore causes of pollution and do an oil-spill cleanup activity.
- Explore the solid waste problem and do a paper-recycling activity.
- Distinguish between the greenhouse effect and global warming.
- Demonstrate the greenhouse effect.
- Compare logistic and exponential growth and explore human population growth.
- Conduct a cost-benefit analysis of an environmental issue.

ACTIVITIES

Students complete three performance assessments: 1) Resource Use – demonstrate and explain the effects of mining on the availability of nonrenewable resources; 2) Paper Recycling – demonstrate and explain the process of paper recycling and discuss advantages of recycling; and 3) Population – explain the growth equation and create a concept map describing impacts of human population growth.

Fitness & Health

OVERVIEW

In *Fitness & Health*, students explore the basics of personal fitness and learn how to keep their bodies fit both inside and outside. They begin by analyzing their own fitness level. They learn ways to measure and improve cardiovascular and muscular fitness. They learn the basics of proper nutrition and the proper care of hair, skin, and teeth. Finally, based on what they have learned, they develop a plan to improve and maintain their own fitness.

STUDENT OBJECTIVES

- Define *fitness* and take measurements to analyze fitness level.
- Learn the factors of heart fitness, measure pulse and blood pressure, and practice aerobic exercises.
- Learn factors determining muscular and skeletal fitness and practice exercises to improve flexibility.
- Using the USDA recommendations, list the components of a healthy diet and compare it to the students' diets.
- Research the proper care of hair, teeth, and nails.
- Design a plan to improve and maintain fitness based on the provided information.

ACTIVITIES

Students complete three performance assessments: 1) Heart Fitness – describe the characteristics of a normal EKG, pulse, and blood pressure and list factors affecting heart fitness; 2) Muscle Fitness – identify muscles; demonstrate the exercises used to train muscles and maintain flexibility; and 3) Personal Fitness – present a personal fitness plan and justify the components of the plan, indicating how each component will improve or maintain their level of fitness.

Food Science

OVERVIEW

In *Food Science*, students examine the six main nutrients. They conduct experiments demonstrating the concepts introduced in *Food Science*. Students use laboratory equipment such as an electronic balance, graduated cylinders, test tubes, and beakers. Students also write a laboratory report for each experiment conducted during the course of *Food Science*.

STUDENT OBJECTIVES

- Gain an understanding of food science through real-world applications.
- Use equipment commonly found in a food science laboratory.
- Conduct food science experiments.
- Gather, graph, analyze, and interpret data collected from food science experiments.
- Identify and investigate how the six main nutrients are essential for a healthy body.
- Write laboratory reports on food science experiments.
- Explore what food scientists and sensory evaluation experts do.
- Identify the properties of acids and bases.
- Describe the pH scale and how it is used.

ACTIVITIES

Students complete three performance assessments: 1) Essential Nutrients – identify the six essential nutrients; 2) Odor Recognition – describe the sensory characteristics of food and explain the key biological steps that take place in the process of smelling an odor; and 3) pH of Common Foods – study and define acidic *and* basic, *describe how acidic and basic foods taste, and give examples of each.*

Forces

OVERVIEW

In *Forces*, students explore forces and how they affect the motion of objects. Students learn to describe and measure the motion of objects by completing distance, time, speed, and velocity measurement activities. Students use examples they already find relevant to learn about various forces. They describe and measure the changing motion of accelerating objects and observe the direction of motion and how radius affects centripetal acceleration.

STUDENT OBJECTIVES

- Calculate the force of gravity on a massive object in the metric unit of newtons.
- Experiment with balanced and unbalanced forces acting on an object.
- Observe a moving object and determine if the force acting on it is balanced or unbalanced.
- Explain the difference between speed and velocity.
- Experiment with and explain Newton's three laws of motion.
- Determine that all accelerating objects are experiencing an unbalanced force.
- Explain the difference between mass and weight.
- Learn that gravity is an attractive force between objects.
- Recognize and identify the presence of frictional forces in everyday activities.

ACTIVITIES

Students complete three performance assessments: 1) Speed and Velocity – use an air table, inclined ramp, and photogates to study objects moving at a nearly constant speed and velocity; 2) Acceleration – measure the changing motion of accelerating objects due to the force of gravity; and 3) Falling Objects – study Newton's three laws of motion to learn how gravity affects a variety of falling objects.

Curriculum Titles

Forensic Science

OVERVIEW

In *Forensic Science*, students determine the prime suspect in a fictitious vandalism of a local high school. Students analyze evidence, which includes fingerprints, hair samples, handwriting, and ink. Students also extract DNA from a sample. Students compare the evidence with samples taken from suspects. Finally, they must put all the evidence together and identify a prime suspect. Teachers may customize suspect samples and evidence, just to keep it interesting!

STUDENT OBJECTIVES

- Create a scaled drawing of a crime scene.
- Collect and analyze fingerprints.
- Gather, process, and analyze trace evidence, including hair and fiber evidence.
- Extract DNA from a given sample and explore the process of DNA fingerprinting.
- Learn the structure of the DNA molecule.
- Complete a chromatography experiment.
- Conduct an evaluation of a crime scene document.
- Utilize inductive and deductive reasoning.

ACTIVITIES

Students complete three performance assessments: 1) Forensic Science 101 – define forensic science*, explain Locard's exchange principle, and create an accurate crime scene sketch; 2) DNA Fingerprinting – explain the relationship among DNA, chromosomes, and genes and explain the concept of DNA fingerprinting; and 3) Identifying a Prime Suspect – explain deductive and inductive reasoning, identify a prime suspect, and explain evidence that supports this suspect's identification.*

Future Fuels

OVERVIEW

In *Future Fuels*, students determine how the Sun is the source for all energy we use on Earth. *Future Fuels* explores the need to find replacements for fossil fuels. Students investigate the concepts of renewable and nonrenewable resources and how these types of resources affect the environment. They will explore and compare several alternative energies including wind, geothermal, and hydropower.

STUDENT OBJECTIVES

- Identify the Sun as the source of all energy on Earth.
- Compare and contrast renewable and nonrenewable energy sources.
- Relate the use of fossil fuels to environmental problems.
- Explore the history of human energy use.
- Compare different types of available future fuels.
- Identify several possible solutions that can work together to solve energy problems.

ACTIVITIES

Students complete three performance assessments: 1) The Sun – explain how energy from the Sun is responsible for human energy and diagram how the Sun's energy moves a gasoline-powered car; 2) Renewable and Nonrenewable Energy – define the terms renewable *and* nonrenewable *and give examples of these types of energy; and 3) Energy Solutions – contrast and compare two types of potential energy sources.*

This title content focuses on green education.

Garbology

OVERVIEW

In *Garbology*, students learn about the history of waste material and what people can learn from studying it. *Garbology* also covers different kinds of waste and how each kind is classified. Students explore the extent and causes of the waste problem as well as waste-management techniques, including landfills, incineration, and gasification. Students also learn about the waste problem and how the cradle-to-cradle method of design is a promising long-term solution for the problem of waste.

STUDENT OBJECTIVES

- Describe how organic and inorganic materials differ.
- Explore examples of a quantitative and a qualitative study.
- Build a model of a landfill.
- Develop an understanding of how scientific studies increase and refine knowledge.
- Calculate volume and percent.
- Explore cause and effect in relation to waste.
- Compare and test types of packing peanuts.
- Compare the cradle-to-grave and cradle-to-cradle methods of design.

ACTIVITIES

Students complete three performance assessments: 1) Garbage Archeology – using quantitative and qualitative garbage studies, students will explain garbage concepts, and explain why archeologists study ancient garbage; 2) Landfills – after building a model landfill, students will compare garbage statistics and state reasons for the waste problem; and 3) Recyclable/ Not Recyclable – after conducting experiments on various plastics, students will give reasons why e-waste is a problem, describe differences in types of plastic, and explain how television contributes to the waste problem.

This title content focuses on green education.

Genetics

OVERVIEW

In *Genetics*, students learn genetics terminology and simulate breeding experiments similar to Gregor Mendel's. They construct models of chromosomes and DNA. Students create Punnett squares and determine probabilities of offspring given specific parent genotypes. They complete a dihybrid cross and a natural selection experiment.

STUDENT OBJECTIVES

- Learn genetics terminology and history.
- Model the structure of DNA and the processes of mitosis and meiosis.
- Explore dominant and recessive genes, genotypes and phenotypes, and sex-linkage.
- Use Punnett squares to show monohybrid and dihybrid crosses and calculate probabilities.
- Discuss the risks and benefits of genetic research.
- Explore the effects of natural selection on a simulated population.

ACTIVITIES

Students complete three performance assessments: 1) Genotype Dominance – distinguish between dominant and recessive and between genotype and phenotype using correct gene notation; 2) Incomplete Dominance – explain incomplete dominance and show how a Punnett square predicts probabilities; and 3) Dihybrid Cross – define dihybrid cross *and* sex-linked traits *and predict the offspring produced from a specific parent cross.*

Curriculum Titles

Going Green

OVERVIEW

In *Going Green*, students examine the environmental impact of personal choices made regarding the use of common household items. Students identify advantages and disadvantages of buying green and identify potentially toxic compounds found in many household products. Students examine the amount of energy required to run common household appliances.

STUDENT OBJECTIVES

- Define terms relating to global warming.
- Describe the greenhouse effect.
- Identify renewable and nonrenewable sources of energy.
- Examine the energy efficiency of common kitchen appliances.
- Define *water efficiency*.
- Build a solar water heater.
- Examine environmentally friendly choices for each room of a house.
- Examine the importance of maintaining a home's heating and cooling systems.
- Define *carbon footprint*.

ACTIVITIES

Students complete three performance assessments: 1) Greenhouse Effect – explain in their own words the greenhouse effect, define energy, *and list three traditional energy sources and three alternate energy sources; 2) Wattage Comparison – identify fuels used by power plants; define* kilowatt-hour, power consumption, *and* phantom load*; and explain the results of the experiment; and 3) Solar Water Heater – list advantages of using a solar water heater, give examples of ways to cut a heating and cooling bill, and build a solar water heater.*

This title content focuses on green education.

Gravity

OVERVIEW

In *Gravity*, students explore the velocity of falling objects using a picket fence and timer. Students use a photogate and computer software to explore velocity and acceleration of falling objects; they gather, graph, analyze, interpret, and apply experimental data; and they determine the acceleration of gravity. Students use an air track to perform experiments related to potential and kinetic energy.

STUDENT OBJECTIVES

- Use a photogate and computer software to gather data on falling objects.
- Explore coordinate graphing by creating velocity-versus-time graphs of a falling object.
- Determine the slope between points on a velocity-versus-time graph.
- Determine the acceleration due to gravity.
- Explore the difference between potential and kinetic energy.
- Use an air track and computer software to determine total energy of moving objects.
- Graph potential, kinetic, and total energy and analyze the relationships among them.

ACTIVITIES

Students complete three performance assessments: 1) Gravity Data Collection – use a photogate, a plastic picket fence, a computer interface, and computer software to gather data about free-falling objects; 2) Coordinate Graphing – explore Cartesian coordinates by graphing the data they have gathered and calculated; and 3) Energy – use an air track, two photogates, and computer software to explore kinetic and potential energies.

Green Machines

OVERVIEW

According to the Best Foot Forward group, the average American's carbon footprint shows 34% of the emissions produced are accounted for by personal travel. In *Green Machines*, the effects of personal travel and the transportation of goods on the environment are examined. While it would be unrealistic to imagine eliminating travel from our society, we can make smart buying choices regarding cars and fuel. Car types, car companies, fuel types, and alternative methods of travel are identified and examined. The focus of *Green Machines* is environmental health.

STUDENT OBJECTIVES

- Explore the history of transportation.
- Identify types of pollution and how transportation contributes to these.
- Explore alternative fuel vehicles such as hybrid, fuel cell, electric, and solar and list the advantages and disadvantages of each.
- Describe how biodiesel is created and used.
- Compare methods for minimizing the environmental impacts of transportation.
- Identify methods for increasing the fuel efficiency of a vehicle.
- Build and operate a maglev train.

ACTIVITIES

Students complete three performance assessments: 1) Emissions – identify various emissions that come from automobiles, explain how these may contribute to global warming, and list alternative methods for decreasing automobile emissions; 2) Fuel Efficiency – explain how to calculate fuel efficiency and list methods for increasing the fuel efficiency of a car; and 3) Eco-tourism – explain the eco-tourism concept, compare the advantages and disadvantages of transportation methods in the tourism industry, and plan an environmentally friendly trip.

This title content focuses on green education.

Heart Fitness

OVERVIEW

In *Heart Fitness*, students cover factors affecting heart fitness, particularly diet and exercise. They monitor and record blood pressure and heart rate, identify heart structures, and describe the path of blood through the circulatory system. They monitor their own diet and relate it to heart fitness. They study symptoms of cardiovascular disease and learn how diet, lack of physical activity, and smoking relate to the development of cardiovascular disease.

STUDENT OBJECTIVES

- Learn major factors affecting heart fitness.
- Identify heart structures and describe blood flow through the heart, using a model.
- Measure resting, standing, and active pulse rates, using a pulse rate monitor.
- Monitor and record resting heart rate, using a stethoscope.
- Record and evaluate blood pressure, using an electronic blood pressure monitor.
- Learn the components of a good diet; identify and evaluate personal dietary habits.
- Learn about cardiovascular disease and demonstrate arterial blockage.
- Relate obesity, physical inactivity, and smoking to cardiovascular disease.
- Evaluate the benefits of a healthy lifestyle and create a health plan.

ACTIVITIES

Students complete three performance assessments: 1) Exercise Heart Rate – utilize a pulse monitor to obtain heart rate and identify advantages of an aerobic exercise program; 2) Blood Pressure – draw and explain a normal EKG, demonstrate how to take blood pressure, and explain the reading; and 3) Diet Analysis – complete the Diet Analysis Log and explain the importance of establishing healthier eating habits based on the diet analysis.

Curriculum Titles

Heat & Energy

OVERVIEW

In *Heat & Energy*, students learn definitions of concepts related to heat and energy, including temperature, potential and kinetic energies, and work. They look at heat and energy from the molecular viewpoint as they construct models of simple hydrocarbon fuels. Students learn the chemical reaction involved in combustion and the components necessary for combustion to occur, and they distinguish examples of exothermic and endothermic reactions.

STUDENT OBJECTIVES

- Describe how heat and light energy are capable of work.
- Express how molecular motion relates to temperature.
- Define and give examples of the first and second laws of thermodynamics.
- Classify different types of fuel sources.
- Contrast exothermic and endothermic reactions.
- Deduce that food is fuel.
- Conduct an experiment to evaluate the expansion properties of different materials.

ACTIVITIES

Students complete three performance assessments: 1) Hydrocarbon Molecules – build a methane molecule and a propane molecule and show a chemical bond and explain what it represents; 2) Heat Content – understand and explain the differences and similarities among specific heat, heat capacity, and heat content; and 3) Heat Expansion – study and explain heat expansion and use a compound bar to explain how a thermostat works.

Horticulture

OVERVIEW

In *Horticulture*, students briefly explore important subfields of horticulture and then delve into the processes of growing and maintaining their own plants, including germinating plants, making cuttings, and growing plants in both soil and hydroponics media. They explore plant classification, structure, and reproduction. They are introduced to the forestry industry, tree identification, and ecology and conservation concerns in horticulture and forestry.

STUDENT OBJECTIVES

- Conduct a plant germination experiment.
- Learn and experiment with plant growth requirements.
- Learn major plant groups and identify vascular plant structures.
- Dissect a flower and identify its reproductive structures.
- Learn and practice methods of asexual plant propagation.
- Explore the extent of the United States forest industry.
- Use a dichotomous key to identify forest trees by leaf type.
- Consider ecology and conservation concerns in horticulture and forestry.

ACTIVITIES

Students complete three performance assessments: 1) Plant Requirements – explain and demonstrate experiments showing plant growth requirements, including nutrients, water, and type of growth medium; 2) Plant Propagation – make and grow a plant cutting and propagate a potato from an eye; and 3) Forestry – differentiate between hardwood and softwood trees and identify tree leaves using a dichotomous key.

Immunology

OVERVIEW

During *Immunology*, students explore the anatomy and physiology of the immune system. Students also explore different microscopic portions of the immune system and the pathogens it fights using digital microscopy. They use a mobile device to explore and use medical terminology to describe the causes, prevention, effects, treatments, and various other aspects of diseases, especially those that relate to the immune system. During the course of the seven sessions, students engage in digital microscopy, modeling, and personal risk assessment related to immunology.

STUDENT OBJECTIVES

- Complete a personal immune system health assessment.
- Identify the structures associated with the immune system.
- Use an app to explore terminology related to the immune system.
- Identify the types of blood cells that are a part of the immune system.
- Explain how the body's different immune responses work.
- Explore the concept of community immunity.
- Model how community immunity prevents the spread of diseases.
- Compare the sizes of human cells, bacterial cells, and viruses.
- Develop a personal health plan to boost their immune system.

ACTIVITIES

Students will complete three performance assessments: 1) Microscope Care and Use – demonstrate the proper care and use of a digital microscope and associated software to take on-screen micrographs of pathogens; 2) Pathogen Comparison – make comparisons of different pathogens and identify structures related to the treatment of the pathogens; and 3) Research Treatments and Prevention for Human Disease – identify current research being conducted in the field as well as evaluate personal habits that affect health.

Intelligent Homes

OVERVIEW

The innovations that can be installed or built into your home range from the most advanced home security systems to the convenience of remote access to lights, appliances, or any other home electronics products. In *Intelligent Homes*, students learn the history of X10 technology. They also learn about six common home automation-control technologies. Students use home automation software to turn a light on and off, turn a light on when movement is sensed, and remote access a video security camera.

STUDENT OBJECTIVES

- Draw and assemble a simple circuit.
- Identify ways to reduce energy consumption and heating/cooling costs using smart-home technology.
- Identify various types of sensors.
- Use software to program a dimmer switch.
- Use software to program an event to run at a specific time of the day.
- Test several different materials to see how they affect the sound volume in a room.
- Configure a security camera to receive a live feed via the Internet.

ACTIVITIES

Students complete three performance assessments: 1) Digital Thermostat – explain the function of a smart thermostat and the benefits of using its scene modes; 2) Material Testing – complete a sound volume material test and explain how the results might affect the selection of materials used when building a smart home; and 3) Home Security Systems – create an event in HouseLinc *and describe how an event, trigger, condition, and action are used in* HouseLinc.

Curriculum Titles

Light & Lasers

OVERVIEW

In *Light & Lasers*, students explore aspects of light and lasers and see how that technology can be used. Students use geometric concepts to divide and reflect a laser beam along a path and to create a security system utilizing the beam. Light is explored and manipulated through experiments that use lenses, prisms, filters, and intensity meters. The data from these experiments is analyzed and interpreted to provide a clear picture of the nature of light.

STUDENT OBJECTIVES

- Divide and reflect laser beams in desired paths using geometric concepts.
- Gather, analyze, and interpret data from experiments about the properties of light.
- Use algebraic concepts to perform calculations based on experimental data.
- Explore various properties including reflection, color, and intensity of light.
- Explore refraction of light.
- Use geometric concepts to predict reflected paths.
- Examine the effects of a prism on white light and laser light.
- Determine the magnification levels of various lenses.
- Determine the effects of distance and color on intensity.

ACTIVITIES

Students complete three performance assessments: 1) Reflection – explain the relationship between the angle of incidence and the angle of reflection; 2) Magnification – describe the magnification properties of a convex lens and a concave lens; and 3) Intensity – explain what determines the color and intensity of light and explain why a color paddle decreases the intensity of the light passing through it.

Material Science

OVERVIEW

In *Material Science*, students explore the basic structure and properties of various materials through hands-on activities and experiments. They conduct experiments to test the conductivity of materials and the difference between insulators and conductors of electricity. Students use an atomic building game board to construct a specific atom. The data from the experiments and activities in *Material Science* aid the students in understanding materials around them in day-to-day living.

STUDENT OBJECTIVES

- Investigate the structure of an atom.
- Compare the characteristics of atoms, molecules, elements, and compounds.
- Investigate the physical and chemical properties of compounds and elements.
- Examine different kinds of atomic bonds including covalent and ionic bonds.
- Explore the periodic table.
- Identify and evaluate properties and uses of various materials.
- Examine how humans use properties of materials to meet the needs of society.
- Explain how an element's location on the periodic table is related to its properties.

ACTIVITIES

Students complete three performance assessments: 1) Atoms/Elements – use an atomic model to construct models of atoms that indicate the number and location of protons, neutrons, and electrons; 2) Molecules/Compounds – construct models of various atoms according to their location on the periodic table; and 3) Material Resistance – use instruments to test the electrical and heat conductivity of various materials.

Microbiology

OVERVIEW

In *Microbiology*, students learn classification systems and characteristics of bacteria, protistans, and fungi. They culture and identify bacterial colonies and observe living protistans and fungi. They distinguish between simple prokaryotic and more complex eukaryotic cells. They learn microscope use, measure microscopic organisms, and calculate actual sizes of microorganisms based on their magnification.

STUDENT OBJECTIVES

- Learn classifications and place bacteria, protistans, and fungi in them.
- Review important milestones in the history of microbiology.
- Identify and compare characteristics used to classify monerans and protistans.
- Learn and be able to identify the three major groups of monerans.
- Discover the importance of bacteria on Earth (both helpful and harmful functions).
- Learn habitats and importance of protistans and fungi on Earth.
- Calculate sizes of bacteria and protistans using scientific notation.

ACTIVITIES

Students complete three performance assessments: 1) Microscope – identify microscope structures, show the correct way to handle and focus the microscope, and explain magnification; 2) Bacteria – explain how the same bacteria can be both beneficial and harmful and give an example; and 3) Diversity – explain how individuals can contribute to developing antibiotic-resistant bacteria.

Mission to Mars

OVERVIEW

Mission to Mars integrates the concepts of green living into the current research being conducted for a planned mission to the planet Mars. Using a Mars mission as a microscale ecosystem, *Mission to Mars* explores the green topics of water conservation, food availability, energy needs, global warming, and ozone depletion, to name a few. Students will be given the opportunity to identify and solve many of the problems of a mission to Mars and see how those solutions can also apply to many of the environmental challenges that are faced here on Earth.

STUDENT OBJECTIVES

- Describe the origins and characteristics of the universe and objects in the universe.
- Identify the objects in our solar system and list their characteristics.
- Relate the need for radiation protection to the ozone layer.
- Identify ways to conserve water and how to apply those solutions to space exploration.
- Identify potential alternative power sources and how they can be utilized on Mars.
- Relate plants to the production of oxygen and food on Earth and possibly Mars.

ACTIVITIES

Students complete three performance assessments: 1) Radiation Risk – identify the risks of radiation exposure at different locations and explain how to mitigate those risks; 2) Water Resources – identify possible water resources based on evidence and explain how to utilize those resources; and 3) Base Location – identify a location on Mars as a possible location for a base and explain how resources would be supplied at that location.

This title content focuses on green education.

Curriculum Titles

Natural Disasters

OVERVIEW

In *Natural Disasters*, students briefly explore various categories of natural disasters. They learn the scientific concepts underlying the cause and the general effects of each disaster, as well as locations in the US and around the world where each type of disaster is most likely to strike. They do activities to demonstrate both scientific concepts and methods of measuring and tracking the process. Finally, they develop a school disaster plan based on given conditions.

STUDENT OBJECTIVES

- Demonstrate types of faults and locate major tectonic plates on a world map.
- Use a tabletop seismograph to demonstrate seismic waves.
- Make and compare different types of lava and compare types of volcanic rocks.
- Demonstrate effects of wave action and demonstrate how a tsunami is produced.
- Summarize causes and effects of weather extremes.
- Study circular storms, such as hurricanes and tornadoes, and track a hurricane.
- Learn the scales used to measure earthquakes, hurricanes, and tornadoes.
- Using concepts such as risk analysis and probability, develop a school disaster plan.
- Observe examples of specific natural disasters through video and slide shows.

ACTIVITIES

Students complete three performance assessments: 1) Earthquakes – explain how fault lines and plate boundaries relate to earthquakes, demonstrate the use of a seismograph, and explain the Richter scale; 2) Waves – illustrate parts of a wave, demonstrate wavelength and frequency, and compare tsunami waves to wind waves; and 3) Circular Storms – compare hurricanes and tornadoes, plot a hurricane's path, and demonstrate hurricane wind fields.

Oceanography

OVERVIEW

In *Oceanography*, students locate oceans and explore the topography of the ocean floor. They do several experiments and activities to understand salinity, density, conductivity, and pressure changes in the oceans and to explore the actions of waves and currents. They survey the organisms found in several ocean habitats and consider the ways in which humans use and abuse the oceans. They do several types of mathematical calculations related to ocean properties.

STUDENT OBJECTIVES

- Locate Earth's major oceans and explore the topography of the ocean floor.
- Do an experiment to determine density and conductivity of water at different salinities.
- Use a pressure column to demonstrate how pressure changes with depth.
- Learn the characteristics and importance of estuaries and coral reefs.
- Use a tabletop ocean basin to demonstrate actions of waves and currents.
- Explore the influence of the Moon on tides.
- Discuss some ways in which human actions are harmful to ocean ecosystems.

ACTIVITIES

Students complete three performance assessments: 1) Salinity – explain how to mix sea water of a specific salinity; distinguish among distilled, brackish, and ocean water; 2) Nearshore Environments – explain the characteristics of nearshore environments (estuaries, coral reefs); explain what causes high and low tides; and 3) Pressure, Waves, and Currents – using the Pitsco Pressure Column, show how pressure changes along a water column and relate this to pressure changes in the oceans.

Organism Reproduction

OVERVIEW

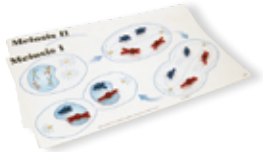
During the course of *Organism Reproduction*, students learn how different organisms reproduce, starting with the simplest of all organisms, bacteria, and ending with humans, the most complex organisms. Students explore asexual and sexual reproduction processes involving organisms from each of the five kingdoms. Students investigate both the mitosis and meiosis processes. Students research inherited diseases caused by abnormal genes.

STUDENT OBJECTIVES

- Research how bacteria reproduce.
- Examine the reproductive habits of fungi and protists.
- Examine the step-by-step phases of mitosis.
- Learn how plants reproduce by pollination.
- Investigate the reproductive practices of invertebrates.
- Examine the reproductive habits of reptiles, fish, and amphibians.
- Research the reproduction habits of birds.
- Investigate and identify the human male and female reproductive organs.
- Research positive and negative effects of selective breeding programs.

ACTIVITIES

Students complete three performance assessments: 1) Mitosis – correctly arrange on cell boards the process chromosomes go through in each of the four phases of mitosis; 2) Plant Reproduction – describe the reproduction process in plants and define the reproductive parts of a plant; and 3) Mutations/Selective Breeding – describe how mutations occur and discuss ethical issues surrounding the use of genetic engineering.



Plants & Pollination

OVERVIEW

In *Plants & Pollination*, students fit plants into the five-kingdom classification system and learn the importance of plants on Earth. They are introduced to the structure and function of plant cells and tissues. They learn the functions of roots, stems, and leaves and cover plant processes including photosynthesis, respiration, and transpiration. They also look at plant pollination and reproduction and the difference between monocots and dicots.

STUDENT OBJECTIVES

- Learn the five- and six-kingdom classification systems and place plants within them.
- Learn to use a microscope and observe prepared plant cells under the microscope.
- Prepare slides, observe living plant cells, and compare plant cells with animal cells.
- Germinate seeds and observe seed leaves of monocots and dicots.
- Learn the importance of plant pigments; extract pigments using chromatography.
- Using slides and models, identify structures of stems, roots, and leaves.
- Demonstrate the process of photosynthesis.
- Understand the importance of photosynthesis and the factors affecting it.
- Identify plant reproductive structures; learn how pollination occurs and its importance.

ACTIVITIES

Students complete three performance assessments: 1) Plant Structure – identify monocot and dicot seeds and identify plant organs and tissues; 2) Plant Reproduction – identify reproductive structures, explain purpose of fruits and seeds, and describe pollination; and 3) Photosynthesis – show and explain the setup for the photosynthesis experiment, explain the results, and give reactants and products of the photosynthesis equation.

Curriculum Titles

Plastics & Polymers

OVERVIEW

In *Plastics & Polymers*, students explore several types of polymers, including plastics. The students explore the basic concepts of atoms, molecules, and compounds. This enables students to better understand the properties of the plastics and polymers they create and manipulate. Students create, mold, recycle, and form various polymers. These activities provide a better understanding of the usefulness and limitations of the materials.

STUDENT OBJECTIVES

- Explore basic molecular structure including atoms, molecules, and compounds.
- Examine uses for various polymers.
- Gather, analyze, and interpret data from experiments related to polymers.
- Verify the conservation of mass laws in polymer experiments.
- Explore the various properties of plastics and polymers including strength, malleability, and flexibility.
- Use procedures based on the scientific method to explore the properties of polymers.
- Create, mold, recycle, and form various polymers.

ACTIVITIES

Students complete three performance assessments: 1) Atoms, Molecules, and Polymers – define basic terms related to polymers and explore a polymer's characteristics; 2) Polymer Analysis – compare and contrast student-created polymers and the methods for storing these polymers; and 3) Recycling Polymers – create injection-molded golf tees from different polymers and evaluate the properties of recycled polymers.

Reactions

OVERVIEW

In *Reactions*, students experience and perform chemical processes that contribute to their general understanding of basic chemical principles, the reasoning for classifying reactants and products into specific groups, and the methods involved for mathematically interpreting the results. Practical, familiar examples of chemical reactions are used throughout *Reactions* to enhance the student realizations of the importance of chemistry.

STUDENT OBJECTIVES

- Utilize the basic information found in the periodic table.
- Classify matter as elements, compounds, and mixtures by their makeup.
- Enhance mathematical skills by solving problems related to chemical reactions.
- Experiment with the differences between endothermic and exothermic reactions.
- Describe how chemical symbols, formulas, and balanced equations are used in reactions.
- Identify the reactants and products in a chemical reaction.
- Use electrolysis to demonstrate the separation of water into its elemental parts.
- Write balanced chemical equations.
- Determine how to alter conditions for combustion to extinguish or enhance a fire.

ACTIVITIES

Students complete three performance assessments: 1) Types of Reactions – identify the four binary types of chemical reactions and classify each of the various types; 2) Precipitation – identify the reactants and products in the electrolysis reaction and explain what precipitation reaction occurs; and 3) Combustion – explore the compounds required to create and sustain a combustion reaction.

Rocket Science

OVERVIEW

In *Rocket Science*, students learn about the scientific principles of flight, propulsion, and aerodynamics. Newton's laws of motion are introduced and explained in practical terms. The history of rocket science is an important concept in understanding the development of rockets and is presented during *Rocket Science*. Students construct a water-fueled Stratoblaster® rocket and launch it as a culminating activity.

STUDENT OBJECTIVES

- Explore the principles of flight, propulsion, and aerodynamics.
- Examine the forces of flight including lift, drag, weight, and thrust.
- Design and construct a water-fueled rocket.
- Examine factors that affect rocket performance.
- Explore the historical development of rockets.
- Explore the significance of rocket science and rocket scientists.
- Calculate the apogee of a rocket.
- Investigate the effect of Newton's laws on rocket flight.

ACTIVITIES

Students complete three performance assessments: 1) Understanding Rocket Flight – explain Newton's laws and communicate the fundamental concepts of how a rocket achieves flight; 2) Forces of Rocket Flight – gain understanding of aerodynamics, the concept of mass, and the difference between laminar and turbulent airflow; and 3) Rocket Construction – complete the construction of a water-fueled rocket and launch the rocket as a culminating activity.

Rocketry & Space

OVERVIEW

In *Rocketry & Space*, students learn about the development of rocketry and the United States space program and its history. The principles of rocket design, propulsion, and certain scientific principles that are fundamental to successful rocket flight are important concepts in *Rocketry & Space*. Students construct and launch a model rocket as a means of bringing application to the scientific concepts presented.

STUDENT OBJECTIVES

- Actively participate in the process of designing and constructing a model rocket.
- Understand the history of US space exploration.
- Comprehend certain scientific principles as they relate to rocketry and space flight.
- Construct and paint a model rocket.
- Observe rocket aerodynamics and flight by launching a rocket.
- Measure the altitude of a model rocket while in flight.

ACTIVITIES

Students complete three performance assessments: 1) Lift-off Game – identify how to access shuttle program terminology and information and verbalize information gained about the shuttle program; 2) Rocket Kit Assembly – attach fins to the body tube, cut out and assemble the parachute, install the engine mount, and assemble the rocket; and 3) Rocket Painting – demonstrate the proper way to complete the painting portion of the rocket kit assembly.

Curriculum Titles

Rocks & Resources

OVERVIEW

In *Rocks & Resources*, students study the rock cycle and learn characteristics of the three basic rock types. They learn and observe properties of minerals, including hardness and fluorescence, in more detail. They review examples of how rocks and minerals are used as nonrenewable resources. They review different types of mining and learn why mining is essential to civilization. They also learn how it affects the environment, using Picher, Oklahoma, as a case study. Finally, they look at potential future mining trends, including deep-sea mining.

STUDENT OBJECTIVES

- Describe the rock cycle.
- Identify and compare characteristics of the three rock types.
- Distinguish among rocks, minerals, and ores.
- Identify properties of minerals and fluorescent minerals.
- Use Mohs' hardness test to determine mineral hardness.
- Explore uses of rocks, minerals, and metals as nonrenewable resources.
- Describe types of mining, including undersea mining.
- Review environmental impacts of mining.

ACTIVITIES

Students complete three performance assessments: 1) Rocks and Minerals – name and identify examples of the three types of rocks, distinguish between rocks and minerals, and explain Mohs' hardness test; 2) Rocks as Resources – give examples and uses of metallic and nonmetallic resources and explain the life cycle of a manufactured product; and 3) Land Mining – define ore *and explain ore grade, distinguish between surface and underground mining, and explain the importance and environmental impacts of mining.*

This title content focuses on green education.

Simple Machines

OVERVIEW

In *Simple Machines*, students explore how work, force, energy, and machines make moving objects easier through the use of the computer and hands-on activities. Students use variables and equations to describe the principles of simple machines. Students use the information they learn about simple machines to design a compound machine that moves an object.

STUDENT OBJECTIVES

- Explore how simple machines are used to convert small input force to large output force.
- Use the scientific method to determine the mechanical advantage of simple machines.
- Perform experiments.
- Design and create a compound machine that moves an object.
- Identify patterns and investigate relationships to determine mechanical advantage.

ACTIVITIES

Students complete three performance assessments: 1) Inclined Planes – calculate the length of an inclined plane and the mechanical advantage; 2) Levers – explain how levers make work easier and demonstrate and explain how to use a lever to lift a five-newton weight with less than five newtons of force; and 3) Compound Pulleys – explain the relationship between the mechanical advantage of a pulley system and the number of pulleys.

Soils

OVERVIEW

In *Soils*, students explore the role soil plays in agriculture and in our survival as a species on this planet. Students learn about soil formation, soil chemistry, and sustainable agricultural practices used to conserve, as well as increase, the productivity of soil. They participate in experiments that determine the characteristics of an agriculturally productive soil and show the importance of the relationship among soil, water, air, and living organisms.

STUDENT OBJECTIVES

- Categorize the various soil-forming processes.
- Compare and contrast rocks and minerals.
- Use the scientific method to solve a problem.
- Identify the processes involved in the rock cycle.
- Identify the processes involved in the water cycle.
- Evaluate the texture of soil and learn about essential soil nutrients.
- Evaluate prescribed soil conservation practices/amendments.
- Differentiate among various soil conservation practices.
- Determine the pH, nitrogen, potassium, and phosphorus levels in a soil sample.

ACTIVITIES

Students complete three performance assessments: 1) Soil Fertility – name the three nutrients that must be provided to plants and determine the levels of these nutrients in soil; 2) Soil Texture Triangle – demonstrate the ability to successfully interpret the soil texture triangle and justify your determination of the soil sample's texture; and 3) Soil Organisms – name five organisms found in soil, define humus*, and create a decomposer food web.*

Sustainable Agriculture

OVERVIEW

In *Sustainable Agriculture*, students explore issues facing today's farmers and ranchers. Topics such as soil composition, the water cycle, animal care and the use of genetically engineered hormones, and farming technology are covered in *Sustainable Agriculture*. Students explore the concept of urban farming and how large cities are creating ways to grow their own food locally. Throughout *Sustainable Agriculture*, students grow plants in various types of soil and draw conclusions about what type of soil produces the best plant growth.

STUDENT OBJECTIVES

- Perform various tests on soil samples to determine which is most favorable for growing certain plants.
- Explore the pros and cons of traditional farming versus organic farming.
- Describe the benefits of compost and the nutrients it brings to soil.
- Investigate urban farming and its potential impact on large cities.
- Perform an experiment related to the greenhouse effect.
- Explore the technology involved in green farming.
- Explain the water cycle and identify water sources for farm irrigation.

ACTIVITIES

Students complete three performance assessments: 1) Compost – identify soil nutrients, determine how composting replenishes these nutrients, and explain soil acidity levels and the pH scale; 2) Greenhouse – explain the concept of greenhouses and how they work and identify positive and negative aspects of the greenhouse effect; and 3) Irrigation – explain the stages of the water cycle, the concept of conservation, and methods used to control runoff.

This title content focuses on green education.

Curriculum Titles

The Universe

OVERVIEW

To study a topic as big as the universe, you need big numbers! In *The Universe*, students use positive and negative exponents to calculate star magnitudes and scientific notation to calculate sizes and distances of the stars and galaxies beyond our own solar system. They also explore concepts of probability to consider the likelihood of other planets containing life and civilization.

STUDENT OBJECTIVES

- Use an Astroscan telescope and calculate focal length and magnification.
- Calculate light intensities and distances to stars based on their magnitudes.
- Use scientific notation to calculate distances in the universe.
- Measure the speed of light and convert it into different units.
- Make a scatter plot of star luminosities and compare it to the H-R diagram.
- Explore life cycles of stars and compare stellar luminosities.
- Calculate distances between galaxies in light-years and parsecs.
- Consider the age and origin of the universe, including the Big Bang Theory.
- Learn concepts of probability and relate them to the Drake Equation.

ACTIVITIES

Students complete three performance assessments: 1) Powers and Roots – define power, exponent, *and* root *and use the calculator to show changes in light intensity given star magnitudes; 2) Scientific Notation – use scientific notation to calculate distances between stars and explain the process for measuring the speed of light; and 3) Probability – explain the Big Bang Theory and give evidence to support it and explain how the Fundamental Counting Principle relates to the Drake Equation.*

Water Management

OVERVIEW

In *Water Management*, students explore the hydrologic cycle, the uses of water, types of water pollution, and the design and function of water treatment plants. They use a River Tank to estimate surface area and volume of water in a water body and to calculate flow rate. They use a watershed model to simulate runoff, groundwater activity, and pollution. They also calculate a water budget for a family, use a variety of graphs, and consider methods of water conservation.

STUDENT OBJECTIVES

- Learn characteristics and uses of water and explore the hydrologic cycle.
- Use 2-D and 3-D figures, including geometric nets, to estimate surface area and volume.
- Measure flow rate in a River Tank and learn how water managers use flow rate.
- Use a watershed model to demonstrate flow of runoff and how pollution travels through an ecosystem.
- Make polluted water and clean it using primary and secondary treatment processes.
- Calculate a family water budget and learn types and effects of water pollution and methods of water conservation.

ACTIVITIES

Students complete three performance assessments: 1) Water Area and Volume – know 2-D and 3-D shapes, area equations, volume equations, and the process of estimating surface area and volume using geometric nets; 2) Flow Rate Calculations – explain and demonstrate how to calculate flow rates of running water; and 3) Calculating Water Budgets – explain the uses of graphs and show how to graph the results of a family water budget.

Weather

OVERVIEW

Weather begins from a global perspective by explaining circulation and weather patterns and moves to local weather system investigation. Students see the relevance of *Weather* daily as their local weather conditions change. They learn how their local weather is predicted, or forecasted, on the news and how global weather patterns can influence their everyday lives. They use a computerized weather station to monitor daily weather data such as temperature, pressure, and wind direction.

STUDENT OBJECTIVES

- Identify elements that comprise the atmosphere.
- Distinguish among various instruments and technologies used by meteorologists.
- Examine the relationship between the seasons and weather patterns.
- Examine global circulation patterns and recognize the effect of these events on weather.
- Identify weather events associated with warm, cool, stationary, and occluded fronts.
- Recognize the differences in high and low pressure areas.
- Gather, analyze, and interpret weather data for creating forecast predictions.

ACTIVITIES

Students complete three performance assessments: 1) Weather Measurement – learn names and functions of weather instruments and download weather data to the computer; 2) Light Intensity – demonstrate how light intensity changes as a function of light angle; and 3) Air Masses and Fronts – diagram and explain air mass movement within a front, construct a weather map, and explain the weather patterns on the map.

Weights & Measures

OVERVIEW

How many ounces of popcorn are contained in that large tub at the local multiplex? How many ounces of soda in the large cup? These are questions students answer as they learn about *Weights & Measures*. Students also learn to convert from international units to customary units of measurement and temperature, using both dimensional analysis and formulas along the way.

STUDENT OBJECTIVES

- Learn about early forms of measurement.
- Identify the basic units of measurement in the Customary System.
- Use the Customary System of measurement to find the length, capacity, and weight of items.
- Convert from one unit to another using dimensional analysis.
- Use metric measurement to measure capacity, volume, and weight.
- Place three-dimensional shapes in order from least to greatest volume.
- Use a thermometer and formulas to convert from Celsius to Fahrenheit and vice versa.

ACTIVITIES

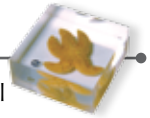
Students complete three performance assessments: 1) Customary Length and Ratios – demonstrate customary and international measurement and write ratios in a-over-b form; 2) Customary Capacity and Weight – measure ounces of popcorn and fluid ounces in drink containers; and 3) Converting Celsius and Fahrenheit – demonstrate how to convert temperatures using a demonstrational thermometer and formulas.

Career Connections

Alternative Energy

- Chemical Engineers
- Civil Engineers
- Electrical or Electronic Engineers
- Environmental Engineers
- Hazardous Materials Removal Workers
- Industrial Safety Engineers
- Nuclear Engineers
- Petroleum Engineers
- Service Station Attendants

Animals



- Animal Caretakers (Kennel Attendants, Groomers)
- Animal Trainers
- Biological Scientists (Zoologists)
- Farmers or Ranchers
- Forest or Conservation Workers
- Pest Control Workers
- Veterinarians
- Veterinary Assistants
- Zookeepers

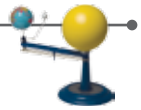
Applied Physics

- Aerospace Engineers
- Broadcast Technicians
- College or University Faculty
- Communication Equipment Installers or Repairers
- Database Administrators
- Mechanical Engineers
- Opticians
- Stationary Engineers

Aquaculture

- Agricultural Engineers
- Agricultural Technicians
- Biologists
- Conservation Workers
- Farmers or Ranchers
- Fish or Game Wardens
- Food Scientists
- Seamen
- Water Treatment Plant Operators

Astronomy



- Aerospace Engineers
- Air Traffic Controllers
- Astronomers
- College or University Faculty
- Computer Hardware Engineers
- Computer Operators
- Computer Science Teachers
- Photographers
- Physicists
- Reporters or Correspondents

Biotechnology

- Agricultural Engineers
- Agricultural or Food Science Technicians
- Biologists
- Chemical Engineers
- Chemists
- Epidemiologists
- Hazardous Materials Removal Workers
- Medical Laboratory Technicians

Body Systems

- Athletes
- Cardiovascular Technicians
- Dentists
- Emergency Medical Technicians
- Family or General Practitioners
- Medical Transcriptionists
- Optometrists
- Paramedics
- Registered Nurses
- Rehabilitation Counselors
- Skin Care Specialists
- Sports Competitors

Carbon Footprint

- Agricultural and Food Scientists
- Forest and Conservation Workers
- Industrial Production Managers
- Statisticians

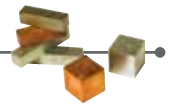
Cell Structure

- Agricultural Engineers
- Biologists
- Chemists
- Epidemiologists
- Family or General Practitioners
- Medical or Clinical Laboratory Technologists
- Phlebotomists
- Veterinarians

Changing Oceans

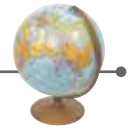
- Chemical Oceanographers
- Fishers or Fishing Vessel Operators
- Marine Biologists
- Physical Oceanographers

Chemical Math



- Analytical Chemists
- Applied Mathematicians
- Chemical Engineers
- Chemical Technicians
- Materials Chemists
- Materials Engineers
- Medicinal Chemists
- Nuclear Engineers
- Petroleum Engineers
- Physical or Theoretical Chemists

Climate & Biomes



- Agricultural Engineers
- Atmospheric Scientists (Climatologists)
- Atmospheric Scientists (Meteorologists)
- Biological Scientists (Ecologists)
- Computer Programmers
- Conservation Officers
- Environmental Engineers
- Forest or Conservation Workers
- Geoscientists (Oceanographers)

Career Connections

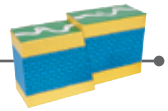
Climate Change

- Atmospheric Scientists (Meteorologists)
- Climatologists
- Computer Scientists
- Environmental Science Technicians
- Mathematicians
- Operational Meteorologists (Weather Forecasters)
- Physical Meteorologists

Composites

- Aerospace Engineers
- Aircraft or Avionics Equipment Mechanics or Technicians
- Automotive Body or Glass Repairers
- Dentists
- Industrial Designers
- Industrial Engineering Technicians
- Materials Engineers

Dynamic Earth



- Agricultural Engineers
- Agricultural Technicians
- Biologists
- College or University Faculty
- Conservation Officers
- Environmental Engineers
- Farmers or Ranchers
- Forest Workers
- Landscape Architects

Eco-Architecture

- Architects
- Construction Managers
- Energy Auditors
- Engineers

Ecology

- Agricultural Engineers
- Biological Scientists (Ecologists)
- Conservation Officers
- Environmental Engineers
- Forest or Conservation Workers
- Landscape Architects
- Marine Biologists
- Surveyors
- Urban or Regional Planners

Electricity

- Electrical Engineering Technicians
- Electrical Engineers
- Electrical Equipment Assemblers
- Electrical Power-Line Installers or Repairers
- Electricians
- Insulation Workers
- Security Systems Installers
- Telecommunications Line Installers
- Welders

Energy, Power & Mechanics

- Electrical Power-Line Installers
- Electricians
- Farm Equipment Mechanics
- Heating, Air Conditioning, or Refrigeration Mechanics
- Mechanical Engineers
- Nuclear Engineers
- Petroleum Engineers

Engineering Bridges

- Mechanical Drafters
- Paving Equipment Operators
- Railroad Yardmasters
- Sheet Metal Workers
- Ship or Boat Captains
- Steel Workers
- Surveyors
- Tool or Die Makers
- Woodworking Machine Operators

Environmental Issues

- Agricultural Engineers
- Biologists
- Civil Engineers
- Conservation Officers
- Environmental Engineers
- Farmers or Ranchers
- Forest or Conservation Workers
- Hazardous Materials Removal Workers
- Material Moving Occupations (Refuse or Recyclable Material Collectors)
- Nuclear Engineers

Fitness & Health

- Fitness Trainers
- Personal Care Aides
- Physical Therapists
- Recreation Workers
- Registered Nurses
- Rehabilitation Counselors
- Respiratory Therapists
- Shampooers
- Speech Pathologists

Food Science

- Agricultural Engineers
- Chemical Engineers
- Dieticians or Nutritionists
- Farmers or Ranchers
- Food Preparation Workers
- Food Science Technicians
- Food Scientists or Technologists
- Waiters or Waitresses

Forces

- Aerospace Engineers
- Air Traffic Controllers
- Aircraft Engine Specialists
- Boat Builders or Shipwrights
- Civil Engineers
- Construction or Building Inspectors
- Highway Maintenance Workers
- Mechanical Engineers

Career Connections

Forensic Science

- Chemical Engineers
- Claim Examiners
- Criminal Investigators
- Emergency Medical Technicians
- Epidemiologists
- Fire Inspectors
- General Practitioners
- Insurance Investigators
- Science Technicians

Future Fuels

- Electrical Engineers
- Geologists
- Hydrologists
- Meter Readers

Garbology

- Environmental Scientists
- Hazardous Materials Removal Workers
- Hydrologists
- Inspectors, Testers, Sorters, Samplers, or Weighers
- Refuse and Recyclable Materials Collectors

Genetics

- Biologists
- Conservation Officers
- Dieticians or Nutritionists
- Epidemiologists
- Family Practitioners
- Farmers or Ranchers
- Nursery or Greenhouse Managers
- Registered Nurses

Going Green

- Environmental Engineers
- Farmers
- HVAC Technicians
- Woodworkers

Gravity

- Aerospace Engineers
- Air Traffic Controllers
- Aircraft Engine Specialists
- Avionics Technicians
- Civil Engineers
- College or University Faculty
- Mechanical Engineers
- Network Administrators

Green Machines

- Cargo or Freight Agents
- Geoscientists
- Landscape Architects
- Petroleum Engineers

Heart Fitness

- Athletes or Sports Competitors
- Cardiovascular Technicians
- Dieticians or Nutritionists
- Family or General Practitioners
- Fitness Trainers
- Home Health Aides
- Licensed Practical Nurses
- Physical Therapists
- Physician Assistants
- Respiratory Therapists

Heat & Energy

- Chemical Engineers
- Chemists
- Fire Fighters
- Food Scientists or Technologists
- Industrial Safety or Health Engineers
- Nuclear Engineers
- Petroleum Engineers

Horticulture

- Agricultural Engineers
- Biological Scientists (Botanists)
- Biological Scientists (Ecologists)
- Floral Designers
- Forest or Conservation Workers
- Landscape Architects
- Landscape Workers
- Logging Equipment Operators
- Nursery Greenhouse Managers
- Pesticide Handlers

Immunology

- Biologists
- Child Care Workers
- Dieticians and Nutritionists
- Family and General Practitioners
- Home Health Aides
- Medical and Clinical Laboratory Technicians
- Medical Assistants
- Medical Scientists (Epidemiologists)
- Registered Nurses

Intelligent Homes

- Architects
- Construction Managers
- Electrical Engineers
- Electrical and Electronics Installers/Repairers
- Computer Hardware Engineers
- Home Entertainment Equipment Installers/Repairers
- Telecommunications Equipment Installers/Repairers

Light & Lasers

- Avionics Technicians
- Dispensing Opticians
- Etchers or Engravers
- Ophthalmic Laboratory Technicians
- Optometrists
- Photographers
- Precision Devices Inspectors
- Radiologic Technicians
- Security or Fire Alarm Systems Installers
- Telecommunications Line Installers or Repairers

Material Science

- Assemblers or Fabricators
- Brick Masons
- Carpenters
- Ceiling Tile Installers
- Cement Masons
- Chemical Engineers
- Construction Laborers
- Petroleum Engineers

Career Connections

Microbiology

- Biological Scientists (Microbiologists)
- Chemists
- Farmers or Ranchers
- Food Scientists or Technologists
- Medical Assistants
- Medical or Clinical Laboratory Technologists
- Pharmacists
- Phlebotomists
- Registered Nurses

Mission to Mars

- Agricultural Engineers
- HVAC Technicians
- Interior Designers
- Occupational Health or Safety Specialists

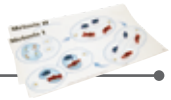
Natural Disasters

- Civil Engineers
- Construction or Building Inspectors
- Emergency Management Specialists
- EMTs or Paramedics
- Environmental Engineers
- Epidemiologists
- Fire Fighters
- Hazardous Materials Removal Workers
- Managers of Police or Detectives
- Police, Fire, or Ambulance Dispatchers
- Public Safety or Security Personnel

Oceanography

- Environmental Science or Protection Technicians
- Fishers or Fishing Vessel Operators
- Geoscientists (Marine Biologists)
- Geoscientists (Oceanographers)
- Marine Engineers or Naval Architects
- Material Moving Occupations (Longshoremen)
- Ship Officers or Sailors

Organism Reproduction



- Agricultural Technicians
- Biologists
- Clinical Laboratory Technologists
- Conservation Officers
- Epidemiologists
- Farmers or Ranchers
- Nursery Greenhouse Managers
- Veterinarians

Plants & Pollination

- Agricultural Engineers
- Biological Scientists (Botanists)
- Floral Designers
- Forest Fire Inspectors or Prevention Specialists
- Forest or Conservation Workers
- Landscape Architects
- Landscape Workers
- Logging Equipment Operators
- Nursery Greenhouse Managers

Plastics & Polymers

- Assemblers or Fabricators
- Brick Masons
- Chemical Engineers
- Chemical Plant Operators
- Chemists
- Hazardous Materials Removal Workers
- Industrial Safety Engineers
- Manufacturing Bakers

Reactions

- Agricultural or Food Science Technicians
- Biologists
- Chemical Engineers
- Chemists
- Environmental Engineers
- Fire Inspectors
- Hazardous Materials Removal Workers
- Industrial Safety or Health Engineers
- Nuclear Engineers

Rocket Science

- Aerospace Engineers
- Aircraft Engine Specialists
- Avionics Technicians
- Computer Programmers
- Electrical Engineering Technicians
- Electrical Engineers
- Mechanical Drafters
- Mechanical Engineers

Rocketry & Space

- Aerospace Engineers
- Air Traffic Controllers
- Aircraft Engine Specialists
- Airline Pilots
- Avionics Technicians
- Legislators
- Personnel Recruiters
- Radio or Television Announcers

Rocks & Resources

- Ecologists
- Environmental Engineering Technicians
- Environmental Engineers
- Hydrologists

Simple Machines

- Amusement or Recreation Attendants
- Automotive Body Repairers
- Bicycle Repairers
- Boat Builders
- Farm Equipment Mechanics
- Maintenance Workers
- Sewing Machine Operators
- Small Engine Mechanics

Career Connections

Soils

- Agricultural Engineers
- Agricultural Equipment Operators
- Agricultural Technicians
- Biologists
- Environmental Engineers
- Farmers or Ranchers
- Food Scientists
- Heavy Equipment Operators
- Nursery Workers
- Surveyors

Sustainable Agriculture

- Farmers or Ranchers
- Food Scientists
- Landscape Architects
- Soil Conservationists

The Universe

- Aerospace Engineering or Operations Technicians
- Aerospace Engineers
- Aircraft Mechanics
- Aircraft Pilots
- Astronautical Engineers
- Astronomers
- Computer Scientists
- Flight Engineers
- Mathematicians
- Physicists

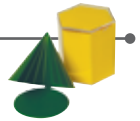
Water Management

- Biologists
- Chemical Plant Operators
- Conservation Officers
- Environmental Engineers
- Hazardous Material Workers
- Longshoremen
- Plumbers
- Public Safety Personnel
- Safety or Health Engineers

Weather

- Air Traffic Controllers
- Atmospheric Scientists (Climatologists)
- Atmospheric Scientists (Meteorologists)
- Dispatchers
- Environmental Engineers
- Environmental Scientists or Hydrologists
- Farmers or Ranchers
- Public Safety Personnel
- Weather Forecasters

Weights & Measures



- Agricultural Engineers
- Biologists
- Chemical Engineers
- Chemists
- College or University Faculty
- Epidemiologists
- Food Scientists or Technologists
- Medical Records or Health Information Technicians

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