STEM

Hands-On, Project-Based STEM Curriculum

PITSCO EDUCATION

STEM Curriculum

A methodology built for student success

By developing Pitsco Education's curriculum around four key components – framework, curriculum, enablement, and environment – we've created a consistent delivery methodology that provides quality, real-world learning experiences and, ultimately, student success in the STEM disciplines.

Every curriculum title ensures that student learning remains positive and consistent 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. In a Pitsco Education STEM lab, students of all learning styles, academic abilities, and socioeconomic backgrounds are able to experience academic success on their way to **becoming college and workforce ready**.

"Pitsco provides a curriculum that pulls together the standards, the independent learning, the teamwork – all of the things we have said are so important – combined with YLI's (Youth Leadership Institute) expertise and extensive track record of helping students develop 21st-century skills such as communication, problem solving, and cooperative learning."

– Patsy Smith, Clemson University's Youth Learning Institute Director

Student-directed curriculum

An overarching goal of Pitsco Education STEM curriculum is for students to become responsible learners and to work collaboratively with others. Each hands-on title is student directed, giving students control of their own learning experience. And because students work with a partner to complete the curriculum, the experiences they share promote positive communication, teamwork, inquiry, learning, and social skills.

Pitsco Education offers more than 100 project-based STEM titles suitable for Grades 6 through 10, and each is delivered through a combination of hands-on activities and proprietary multimedia instruction. Each title is delivered in seven sessions to provide each student with relevant, real-world learning experiences. Equipment, materials, reference texts, and all supplies necessary to achieve success reside at each workstation.

Every student's unique learning style is accommodated, whether a student is a kinesthetic or visual learner, a nonreader, or a speaker of English as a second language. Pitsco Education curriculum has been designed and written to ensure student success through a combination of text, graphics, video, and real-world, hands-on activities.

"Our kids are excited. They want to get into those classes. They go at their own pace with their partners, and their interactions are great. **They're collaborating!** Just to see that higher-order thinking, that critical thinking, that problem solving, and all the discovery that's happening in those classrooms is amazing!"

– Rose Chapa, Junior High Principal

Framework

Each session in a Pitsco Education STEM title contains collaborative 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 the STEM content, provide opportunities for whole-class participation, and allow students additional time to review or complete unfinished assignments.

Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Session 7	
Student Log In	Student Log In	Student Log In	Student Log In	Student Log In	Student Log In	Student Log In	
Title Guide & Reading Time	Research, Challenge, & Application	Research, Challenge, & Application	Research, Challenge, & Application	Research, Challenge, & Application	Curriculum Title Test Review	Post Test & Reading Time	
Collaborative Learning **Multimedia-Delivered Instruction** • Text • Graphics • Animation • Video • Audio • Closed-Captioning • Activity Instruction **Hands-On Applications** • Team Shared • Experiments • Tools • Equipment **Assessments** • Authentic • Research • Reviews • Challenges • Applications	Collaborative Learning **Multimedia-Delivered Instruction** • Text • Graphics • Animation • Video • Audio • Closed-Captioning • Activity Instruction **Hands-On Applications** • Team Shared • Experiments • Tools • Equipment **Assessments** • Authentic • Research • Reviews • Challenges • Applications	Collaborative Learning **Multimedia-Delivered Instruction** • Text • Graphics • Animation • Video • Audio • Closed-Captioning • Activity Instruction **Hands-On Applications** • Team Shared • Experiments • Tools • Equipment **Assessments** • Authentic • Research • Reviews • Challenges • Applications	Collaborative Learning **Multimedia-Delivered Instruction** • Text • Graphics • Animation • Video • Audio • Closed-Captioning • Activity Instruction **Hands-On Applications** • Team Shared • Experiments • Tools • Equipment **Assessments** • Authentic • Research • Reviews • Challenges • Applications	Collaborative Learning **Multimedia-Delivered Instruction** • Text • Graphics • Animation • Video • Audio • Closed-Captioning • Activity Instruction **Hands-On Applications** • Team Shared • Experiments • Tools • Equipment **Assessments** • Authentic • Research • Reviews • Challenges • Applications	Collaborative Learning **Multimedia-Delivered Instruction** • Text • Graphics • Animation • Video • Audio • Closed-Captioning • Activity Instruction **Hands-On Applications** • Team Shared • Experiments • Tools • Equipment **Assessments** • Authentic • Research • Reviews • Challenges • Applications	Collaborative Learning **Multimedia-Delivered Instruction** • Text • Graphics • Animation • Video • Audio • Closed-Captioning • Activity Instruction **Hands-On Applications** • Team Shared • Experiments • Tools • Equipment **Assessments** • Authentic • Research • Reviews • Challenges • Applications	Discovery Days • Held every eight class sessions • Teacher directed • Whole-class participation • Enrichment opportunities
Enrichments	Enrichments	Enrichments	Enrichments	Enrichments	Enrichments	Enrichments	
Student Log Out	Student Log Out	Student Log Out	Student Log Out	Student Log Out	Student Log Out	Student Log Out	

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 STEM curriculum guarantees that students will interact with the topic they're learning while being surrounded by more technology, educational instruments, software, and experiments than they might see in all their other classes combined. As a result, critical learning experiences in math, science, and language arts now take place in a classroom that is transformed into a real-world learning center – an environment where students are exposed to a variety of career fields and obtain relevant college and career readiness skills.

Curriculum

The home of a revolutionary system

At Pitsco Education, we believe that in order for students to succeed, they require an environment that encourages communication – a space that fosters collaborative learning and opportunities to engage in problem solving and critical thinking. So, we designed the learning environment for our STEM curriculum to be just as unique to students as the content is. 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 collaborative 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 demands 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.

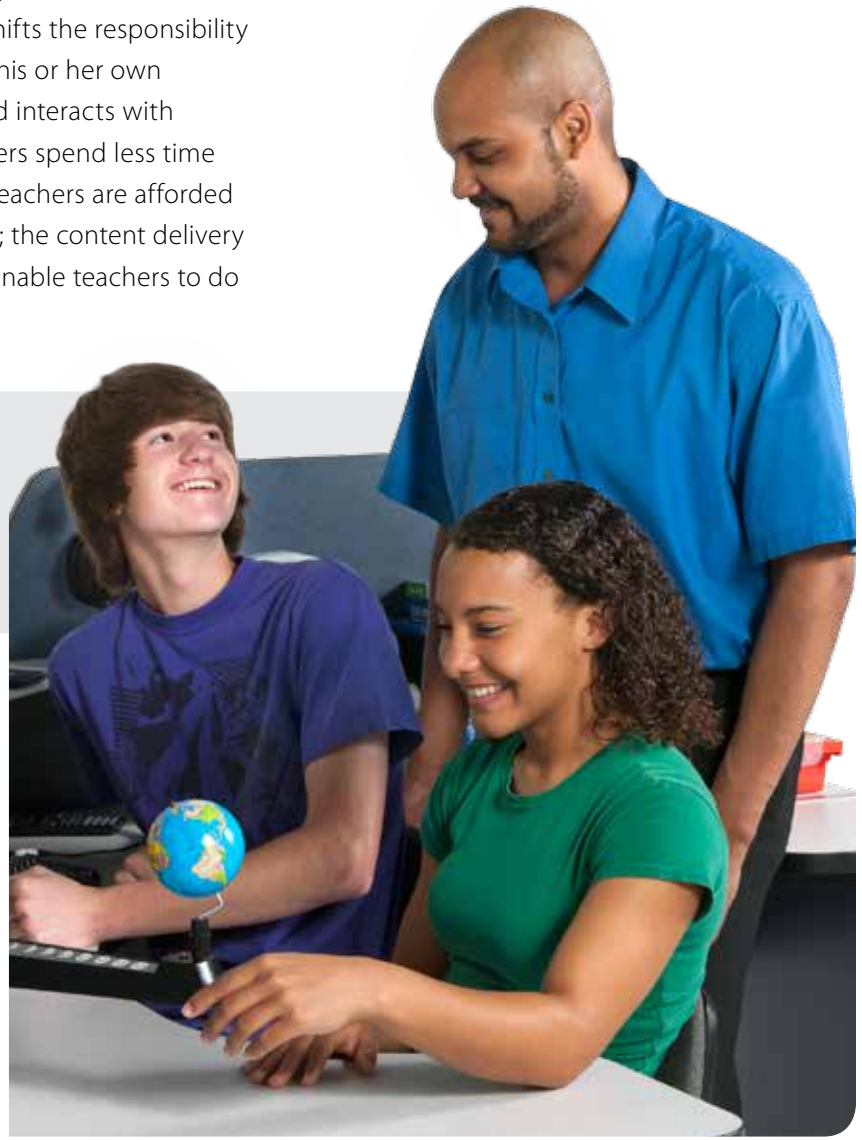
The Learning Environment

Facilitating student success

At the core of Pitsco Education STEM 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 in a positive, powerful way. In a Pitsco Education classroom, teachers spend less time on the traditional tasks of classroom management and student discipline. Teachers are afforded more one-on-one time with each student. Innovative, hands-on curriculum; the content delivery and assessment framework; and unmatched professional development all enable teachers to do what they do best – teach.

"First of all, I am not a lecture teacher. I like doing. I like interacting. I like engagement. I wouldn't be able to do anything different."

– Rita Rodriguez, 24-year Module lab facilitator



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 20 years of professional development and support for thousands of teachers has confirmed that new facilitators can experience immediate success – and the student benefits that follow – by participating in a teachers' seminar. Offered throughout the year and weekly during the summer, the seminar helps teachers make the transition from their role in a traditional classroom to their role in a Pitsco Education STEM classroom an easy one.

"I was very impressed with the entire conference. Everything was well done from beginning to end. The contact prior to coming all the way through the end was excellent. The facilitator was very knowledgeable and moved things along. The tour was nice as well. The small side things like the map and food vouchers were added bonuses. This was a first-class operation. Thank you!!"

– Jack Mecher, Summit Hill Junior High, Frankfort, IL

Powerful tools for powerful learning

Walking into a Pitsco Education classroom 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.

Synergy provides password-protected access so students can monitor and better manage their learning experiences. The Student Portal allows each student to log on – individually or with his or her 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 title, including those they have completed, those currently assigned, and others that have been extended or might be incomplete.

Classroom Management

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 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 our innovative education systems and products. In addition, we offer management assistance and advice from veteran facilitators. 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.pitsco.com/network.

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.

Customer Support

Exceeding tough requirements

Every teacher, principal, and administrator is accountable for meeting education standards. By design, our curriculum addresses today's rigorous science, technology, engineering, and math standards. Every learning event in every curriculum title has been selected, evaluated, analyzed, and documented by the experienced teachers who make up our curriculum team. Our curriculum development process produces detailed analyses that reside in our proprietary standards database. This enables us to accurately correlate the events and tasks in each unit of instruction to ensure they address state and national standards.

"The standards correlation has been phenomenal. You want this to have real-world application and for the students to see this again. The fact that we know the kids will be tested on those standards that are incorporated into the Modules is wonderful."

– John Cash, Principal

Note: More than 68% of the seventh- and eighth-grade math standards and more than 70% of the science standards are covered by the Modules in the Creekside Middle School STEM lab in Volusia County, Florida, after a district-wide Module lab update in 2014.

The science of going **green**

In this era of transition to green consciousness, it's important for students to understand how changes in our environment, limited resources, and living and working green affect their lives and the world around them. Our team of curriculum specialists have written 10 standards-based green education titles specifically for educators looking for an innovative way to teach green core content on sustainable energy and environmental science. Our green STEM curriculum can be combined to introduce secondary students to science, technology, engineering, and math by addressing contemporary issues and concerns of renewable energy; efficient, sustainable living; and eco-friendly principles. So, whether you wish to design an entirely new green lab or enhance an existing science lab, green STEM curriculum from Pitsco Education is perfect for educators who understand that to go green, you have to teach green.

greened
teach green to go green

Green Curriculum

Hands on. Project based. Real-world relevance.

Welcome to a whole new way to teach and learn at the secondary level. Pitsco Education STEM curriculum solutions have been developed to help ensure that students are succeeding every day. Students in more than 4,000 schools nationwide are benefiting from our unique systemic methodology. Through a combination of standards-based multimedia curriculum, hands-on activities, teacher training, and unique learning environment, students have the opportunity to succeed in a classroom that's unlike any other.

The system has proven successful in thousands of schools across the country. Both anecdotal and scientific evidence show that our hands-on, project-based curriculum titles help students succeed in the STEM disciplines in measurable ways. Increased math and science scores, reduced absenteeism, and gender equity are just a few of the powerful ways our curricula can affect a school and its students.

STEM Curriculum

- Alternative Energy
- Animals
- Applied Physics
- Aquaculture
- Astronomy
- BioEngineering
- Biotechnology
- Body Systems
- CADD
- Carbon Footprint
- Cell Structure
- Changing Oceans
- Chemical Math
- Climate & Biomes
- Climate Change
- CNC Manufacturing
- Composites
- Computer Graphics & Animation
- Confident Consumer
- Dynamic Earth
- e-Design
- Eco-Architecture
- Ecology
- Electricity
- Electronics
- Energy, Power & Mechanics
- Engineering Bridges
- Engineering Towers
- Engines
- Environmental Issues
- Environmental Math
- Factoring & Polynomials
- Fitness & Health
- Flight Technology
- Food Science
- Forces
- Forensic Math
- Forensic Science
- Future Fuels
- Garbology
- Genetics
- Geometric Packing
- Going Green
- Graphic Communications
- Gravity
- Gravity of Algebra
- Green Machines
- Heart Fitness
- Heat & Energy
- Home Makeover
- Horticulture
- Hotel Management
- Ideas & Innovations
- Immunology
- Intelligent Homes
- Interior Design
- Investigating Careers
- Laser Geometry
- Lenses & Optics
- Light & Lasers
- Material Science
- Math Behind Your Meals
- Microbiology
- Mission to Mars
- Money Management
- Music & Sound
- Natural Disasters
- Nuclear Energy
- Oceanography
- Organism Reproduction
- Package Design
- Plants & Pollination
- Plastics & Polymers
- Population Perspectives
- Practical Skills
- Projectile Motion
- Properties of Math
- Reactions
- Research & Design
- Robots
- Rocket Science
- Rocketry & Space
- Rocks & Resources
- Simple Machines
- Soils
- Sports Statistics
- Statistical Analysis
- Supply & Demand
- Sustainable Agriculture
- The Universe
- Unsolved Mysteries
- Video Production
- Water Management
- Water Quality
- Weather
- Weights & Measures
- Where in the World

Green titles
Algebra Readiness titles
Algebra titles

Curriculum Titles

Alternative Energy

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

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

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

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

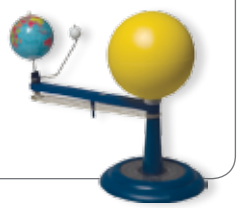
In *Astronomy*, students learn about the solar system and their relationship to it from a mathematical perspective. They investigate the Sun-Moon-Earth system and the characteristics, sizes, and distances of planets in the solar system. They construct a small refracting telescope and learn how it functions. 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.*



BioEngineering

In *BioEngineering*, students explore topics related to kinesiology and sports performance. They cover mathematical concepts including measuring and classifying angles, absolute values, positive and negative rational numbers, data collection, and simple algebra. Students perform flexibility tests, take digital images of the tests, and use the computer to analyze their flexibility.

STUDENT OBJECTIVES

- Practice absolute value, number lines, and positive and negative numbers.
- Measure, classify, and identify angles using a protractor, a goniometer, a digital camera, and imaging software.
- Gather, graph, and interpret data on projectiles, relating angle size to distance achieved.
- Relate angle measurement to physical therapy, physical fitness, and sports performance.

ACTIVITIES

Students complete three performance assessments: 1) Projectile Data – estimate and justify the best angle from which to release a projectile in order to achieve a maximum distance; 2) Measure Body Angles – demonstrate and explain how to measure a joint angle using both a goniometer and a protractor; and 3) Angle Analysis – explain how angles apply to the function of the flexibility tester and identify the angle of joint ROM required in order to achieve maximum reach.

Biotechnology

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

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.

Curriculum Titles

CADD

In *CADD,* students use computer-aided drafting, or CAD, software to explore the fundamentals of drafting. Students use CAD software to create multiview drawings of a geometric solid and to complete a set of floor plans. The floor plans are based on standards for architectural drawings.

STUDENT OBJECTIVES

- Explore careers related to drafting.
- Work with the alphabet of lines.
- Create a pattern for a model soapbox racer.
- Measure the dimensions of geometric solids.
- Create, dimension, and print multiview drawings of geometric solids using CAD software.
- Create cutaway drawings.
- Complete an architectural drawing.

ACTIVITIES

Students complete three performance assessments: 1) Introduction to CADD – define CADD*, give examples of occupations in which CADD is used, and learn the alphabet of lines; 2) Multiview Drawings – create and dimension a multiview drawing; and 3) Creating a Floor Plan – create a floor plan for a house and evaluate the floor plan indicating how the plan could be improved.*

Carbon Footprint

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.

Cell Structure

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

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.

Curriculum Titles

Chemical Math

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

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.

Climate Change

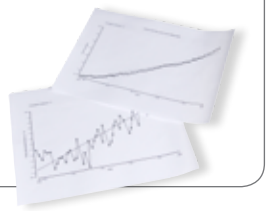
In *Climate Change*, students are introduced to the Intergovernmental Panel on Climate Change (IPCC) Report. They analyze mathematically some effects of climate change; look at global temperatures and concentrations of carbon dioxide, plot the changes, and show how they affect climate; and also develop their own set of strategies for managing climate change.

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.



CNC Manufacturing

In *CNC Manufacturing*, students explore the manufacturing process and important inventions that have advanced these various processes. Students learn the relationship of software to manufacturing and use software to design a project that is later machined on the Z-Mill. The Cartesian coordinate system and its effects on machine movement and digital automation are also presented.

STUDENT OBJECTIVES

- Explore the history of manufacturing.
- Learn the proper use and safety procedures for operating the Z-Mill.
- Learn why tolerances and specifications are important to the manufacturing process.
- Correctly measure and mill a geometric shape using the Z-Mill.
- Use the Cartesian coordinate system and see how it relates to the Z-Mill's movement.
- Create text for an engraved nameplate and mill the nameplate.
- Use the Z-Mill software to prepare a predrawn graphic for the milling process.
- Complete a challenge using the Z-Mill and associated software.

ACTIVITIES

Students complete three performance assessments: 1) CNC Basics – explain specifications, tolerance, and the use of each of the Z-Mill's control buttons and demonstrate proper setup of the mill and the layout process; 2) Advantages of CNC – relate the Cartesian coordinate system to 3-D, demonstrate the use of the Z-Mill, and list advantages of CNC over manual control; and 3) Z-Mill Challenge – produce a self-designed, 3-D project to given specifications.

Curriculum Titles

Composites

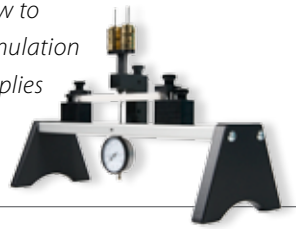
Composites are natural and synthetic materials consisting of two or more distinctly separate materials. *Composites* is focused on learning what composite materials are, where they are used, why they are used, and how they are made and on testing their properties. Students create composite test samples 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, and list one advantage of using graphite fiber instead of glass fiber for reinforcement; and 3) Simulation – give two reasons 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.*



Computer Graphics & Animation

In *Computer Graphics & Animation*, students learn how the use of computers can enhance products created by professional artists and animators. With the use of a computer and related software, students produce an animated sequence using bendable cartoon figures. Students use a digital camera to capture a picture and create an animated project. Students also explore 3-D animation and create an animated 3-D movie.

STUDENT OBJECTIVES

- Explore the process of graphic design.
- Complete a portfolio of projects by utilizing multiple software applications.
- Create and produce animated sequences by using computer software.
- Capture an image with a digital camera and manipulate the picture with morphing software.
- Animate a 3-D scene containing several objects and a 3-D logo.

ACTIVITIES

Students complete three performance assessments: 1) Basic Animation – define animation *and give examples of how animation is used and illustrate the three planes used in moving and aligning objects in the working box; 2) Using Modifiers – explain the process for applying a modifier to add movement to an animation and animate an object within animation software; and 3) Basic 3-D – explain how a 2-D surface can achieve the appearance of being 3-D and create and animate a 3-D text logo.*

Confident Consumer

In *Confident Consumer*, students use problem-solving techniques to complete activities related to consumer education. Students calculate unit prices, evaluate sales and discounts provided by vendors, calculate the most economical way to purchase food and drinks for a party of 25, evaluate products based on strength and absorbency, and much more. Percents, ratios, and proportions are used extensively throughout *Confident Consumer*.

STUDENT OBJECTIVES

- Learn the definitions of *ratio* and *unit price* and use ratios to calculate unit prices.
- Calculate total price using unit prices and sizes and calculate usable unit prices.
- Use factors beyond unit prices to determine which items are the better value.
- Experiment with paper towels to test absorbency and strength.
- Estimate and calculate the area of three different-size pizzas.
- Calculate the amounts and kinds of pizza and soft drinks to buy for a party.
- Select the least expensive way to buy pizzas and soft drinks and calculate the total cost.
- Compare cell phone plans, graph costs, and determine per-minute costs.

ACTIVITIES

Students complete three performance assessments: 1) Unit Price – explain how to calculate unit price and its relationship to the concept of ratio, calculate unit price, and give examples of units of measure; 2) Paper Towels – determine absorbency and strength ratios for different brands of paper towels; and 3) Comparison Shopping – calculate area using pi and determine the amount of food needed for 25 guests and the best buy to obtain the desired amount of food.

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.

Curriculum Titles

e-Design

In *e-Design*, students examine design principles used to create effective graphics. Principles of design such as proportion, balance, contrast, harmony, rhythm, and unity are introduced and applied to a variety of different *Illustrator* projects. Students explore basic tools used within a desktop publishing software and are given the opportunity to use the tools on multiple projects.

STUDENT OBJECTIVES

- Examine the relative relationship between two visual elements.
- Recognize how the eye travels from element to element within a design.
- Explore ways that logos are used to convey meaning.
- Determine the difference between formal and informal balance.
- Learn the construction of the color wheel.
- Differentiate between complementary and contrasting colors.
- Construct a working definition of *e-portfolio*.
- Explore the uses of e-portfolios in the field of design.

ACTIVITIES

Students complete three performance assessments: 1) Logo Design – demonstrate the proper way to import a graphic; 2) Business Card – demonstrate how to add text to a design; and 3) Newsletter – demonstrate how to resize an image while maintaining its proportions.

Eco-Architecture

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.

Ecology

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

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.*

Curriculum Titles

Electronics

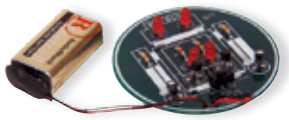
In *Electronics*, students learn the common components of basic circuits in electronic devices. Students learn how to solder electrical components together to form a circuit. They also complete various electronic experiments using an educational instrument. The construction of a simple electronics kit helps them to learn the application of each component used to make the project function successfully.

STUDENT OBJECTIVES

- Identify various electronic components.
- Understand the function of various electronic components.
- Construct several different circuits on a circuit board, including a night light, invisible beam alarm, police siren, and touch switch circuit.
- Learn to safely and properly use a soldering iron.
- Assemble and solder an electronic kit to produce a working circuit.
- Learn about technological discoveries that contributed to the advances of electronics.

ACTIVITIES

Students complete three performance assessments: 1) Solderless Experiment – construct a circuit and explain how the legs or pins on a chip are numbered; 2) Soldering Practice – demonstrate proper use and safety of the soldering iron and demonstrate the correct method for applying solder to the electronic component; and 3) Kit Assembly – check for quality control, name the various components, and trace the flow of electrical current on the circuit board.



Energy, Power & Mechanics

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

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.

Engineering Towers

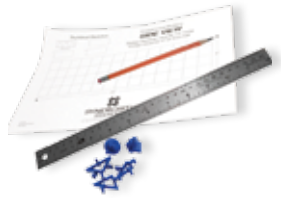
Students utilize math, physics, and problem-solving skills in *Engineering Towers*. They are given a challenge to build a tower that will hold more weight than the towers built by their classmates. Designing, building, and testing a tower are the activity base in *Engineering Towers*. Using engineering skills and video segments, students learn the skills necessary to facilitate construction and evaluation of a tower.

STUDENT OBJECTIVES

- Use a worksheet to create and illustrate a specific design for a tower.
- Recognize the various types of forces that act on a structure.
- Transfer their designs to patterns.
- Differentiate between an engineer and an architect.
- Learn about the forces that act upon structures.
- Learn how towers strengthen other structures.
- Evaluate their finished towers on a testing device.

ACTIVITIES

Students complete three performance assessments: 1) Designing Your Tower – sketch several different tower designs, demonstrate an understanding of diagonals and triangles through thumbnail sketches, and choose one of the sketches; 2) Making Your Pattern – demonstrate the ability to transfer a thumbnail sketch to a full-size drawing; and 3) Assembling Your Tower – complete towers and ensure the tower specifications were followed.



Curriculum Titles

Engines

In *Engines*, students are introduced to the history, theory, and applications of engines. Students learn shop and equipment safety, basic operating principles, parts, and tools – all through practical, hands-on experience with a common four-stroke motor.

STUDENT OBJECTIVES

- Develop an understanding of two- and four-stroke engines.
- Label the processes in two- and four-stroke reciprocating internal combustion engine cycles.
- Discover how technology has affected and continues to affect society.
- Identify and classify hand tools by their functions.
- Complete a hand-tools safety quiz.
- Develop basic technical skills and knowledge to perform routine maintenance.

ACTIVITIES

Students complete three performance assessments: 1) Tool ID and Safety – accurately evaluate a given situation for safety and explain what is or is not being done in accordance with hand-tool safety rules; 2) Parts and Procedures – identify the head, block, cylinder head, cylinder block, and crankcase; and 3) Engine Systems – identify the different parts of the compression system that are observable with the crankcase removed and identify the different parts of the crankshaft.

Environmental Issues

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.

Environmental Math

Triangles are the focus of *Environmental Math*, specifically how triangles are used by environmental scientists. Students utilize tools such as transits and protractors to create quadrats, determine distances, and calculate depth. Students also determine heights of objects – such as an inflatable palm tree – using similar triangles. Pythagoras would be proud to see students in action using his theorem.

STUDENT OBJECTIVES

- Use proportions to convert areas from square kilometers to square meters.
- Use both estimation and calculation to determine the square roots of given areas.
- Learn how quadrats are used in environmental science and use square roots to determine quadrat sizes.
- Learn types of angles and triangles and use a triangle to measure the height of an object.
- Learn the Pythagorean Theorem, Distance Formula, and Midpoint Formula.
- Use triangles and proportions to calculate height and depth.
- Measure slope in degrees using a protractor and transit and calculate slope using rise over run.

ACTIVITIES

Students complete three performance assessments: 1) Squares and Square Roots – explain and give an example of a perfect square, calculate the square root of 500 using the calculator, and explain completed quadrats; 2) Angles and Triangles – draw and explain acute, obtuse, and right angles; draw a triangle and explain how it is named; explain the Pythagorean Theorem; and 3) Triangulation – sketch and explain how triangles can be used to find distances and heights.

Factoring & Polynomials

In *Factoring & Polynomials*, students learn about different types of polynomials; how to identify and write monomials, binomials, and trinomials; and how to simplify polynomials by using addition and subtraction. Students also explore prime and composite numbers and how they relate to factoring polynomials. Students learn to factor and solve quadratic equations by using the Distributive Property and the FOIL method.

STUDENT OBJECTIVES

- Identify types of polynomials as monomials, binomials, and trinomials.
- Simplify polynomials by using addition and subtraction.
- Examine the properties of prime and composite numbers.
- Factor polynomial expressions and combine like terms.
- Use the Distributive Property to factor quadratic equations.
- Use the FOIL method to solve quadratic equations.
- Find the roots of quadratic equations.

ACTIVITIES

Students complete three performance assessments: 1) Polynomials – explain how to add, subtract, and simplify polynomial expressions; 2) Factoring – use the Distributive Property to factor a polynomial into two binomials; and 3) Solving Quadratic Equations – use the FOIL method to multiply two binomials to create a quadratic equation and then solve the quadratic equation.

Curriculum Titles

Fitness & Health

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 their own 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.

Flight Technology

In *Flight Technology*, students learn the principles of flight. Students use a computer flight simulator to experience piloting an aircraft. Each student evaluates the other and prepares a written critique of his or her partner's flight. Students are introduced to navigation and plot a course using angular measurement and mathematical computation.

STUDENT OBJECTIVES

- Explore the basic principles of aerodynamics by operating a flight simulator.
- Design and construct an airfoil.
- Observe and understand Bernoulli's principle by using a wing tester device.
- Produce and measure lift on an airfoil.
- Use a navigation plotter to determine the direction and distance for a flight plan.
- Use flight simulator software to test determined calculations.
- Use computer software to examine the factors that change the value of lift.

ACTIVITIES

Students complete three performance assessments: 1) Basic Aerodynamics – identify Bernoulli's principle and the effect of velocity on pressure and the effects and factors of stall, force, and lift of an airfoil; 2) Wing Testing – design, build, and test a wing using a wing tester; and 3) Navigation – demonstrate an understanding of how to calculate distance in nautical and statute miles and identify necessary tools during a flight.

Food Science

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

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 whether 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 Math

In *Forensic Math*, students create a theory about how a car might have been damaged in a fictional high school parking lot. Students use triangulation and polar coordinates to specify locations of objects within a crime scene and create scaled scene drawings. Tire impressions, footprints, and crime scene photos are used to piece together students' theories. Students find functions describing given relationships, determine slope, and determine the equation of a line.

STUDENT OBJECTIVES

- Create rough sketches of a scene using two different measurement methods.
- Learn about scale and convert measurements using a given scale.
- Use a final sketch to calculate actual distances.
- Learn about anthropometry.
- Record and graph foot length, height, and arm span measurements.
- Use functions to predict a person's height.
- Use the slope-intercept formula to determine the function of a line.
- Use skid speed and turning diameter formulas to analyze evidence.
- Put together a report stating a theory of what happened.

ACTIVITIES

Students complete three performance assessments: 1) Functions and Equations – solve and graph an equation and use the vertical line test to determine if a relation is a function; 2) Slope – determine the slope of a line, explain the slope-intercept formula, and demonstrate its use; and 3) Final Theory – identify excluded suspects and persons of interest and provide evidence to support a theory.

Forensic Science

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

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

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 Archaeology – 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 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.

Curriculum Titles

Genetics

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.*

Geometric Packing

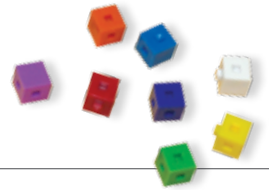
In *Geometric Packing*, students explore surface areas and volumes of various objects by packing materials. They explore spatial relationships and tessellations by transformations and the use of mathematical software. Students are introduced to the concept of slope, have tactile explorations of spherical packing, and find applications of Pascal's triangle. They use the Fibonacci sequence to understand the greatest common divisor and the least common multiple. Finally, they explore the Pythagorean Theorem by building a scale replica of the Pyramid of Giza.

STUDENT OBJECTIVES

- Discover surface areas and volumes of three-dimensional objects.
- Create tessellations by the use of rotations, reflections, and translations.
- Investigate spherical packing and the applications of Pascal's triangle in packing.
- Use the golden ratio, greatest common divisor, and least common multiple to understand architecture and designs.
- Utilize ancient Egyptian mathematics to explore the golden ratio and the Pythagorean Theorem.

ACTIVITIES

Students complete three performance assessments: 1) Surface Areas, Volumes, and Applications – find the surface area and volume of standard objects, recite the Honeycomb Conjecture, and define tessellation*; 2) The Fibonacci Sequence and Pascal's Triangle – find Fibonacci sequences, distinguish the greatest common divisor and the greatest common factor, and build Pascal's triangle; and 3) Rotations, Reflections, Translations, and Dilations – rotate, reflect, and translate a figure; identify the coordinates on a coordinate grid; and perform and explain dilations.*



Going Green

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.

Graphic Communications

In *Graphic Communications*, students learn the fundamentals of drafting and communication of technical information. They also learn to use the related tools (drawing board, scale, triangles, and T square) needed to complete various drawings such as orthographic projections. Design and measurement skills are also emphasized. The skills introduced in *Graphic Communications* will assist students throughout their lives.

STUDENT OBJECTIVES

- Use basic drafting tools: T square, drawing board, triangle, scale, and compass.
- Learn and apply the alphabet of lines and various drafting symbols.
- Demonstrate measurement knowledge by correctly using a scale.
- Gain drafting experience by completing various types of drawings.
- Demonstrate knowledge of proper techniques used for dimensioning.

ACTIVITIES

Students complete three performance assessments: 1) Introduction to Drafting – explain how drafting is a form of communication, why drafting is called the language of industry, and the different divisions used when measuring in inches and metrics; 2) Getting Started – define and describe the function of a drawing board, T square, and triangles; and 3) Geometry – display an understanding of geometric terms such as octagon, hexagon, equilateral triangle, *and* square.

Curriculum Titles

Gravity

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 energies.

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.

Gravity of Algebra

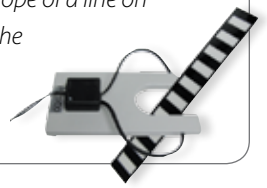
In *Gravity of Algebra*, students investigate the force of gravity and its effects on objects as they fall. Students perform various free-fall experiments, gather data from the experiments, and interpret the data by applying mathematical concepts such as direct and inverse variations, scatter plots, and slope. They use the point-slope and *y*-intercept forms of a line to create a mathematical representation of the data and calculate the acceleration due to gravity on Earth. Students also use graphing skills to learn the relationship between the kinetic and the potential energies of a falling object and explore the law of conservation of energy.

STUDENT OBJECTIVES

- Explore direct and inverse variations through experiments in force and motion.
- Create scatter plots and determine types of correlations for data gathered from a free-fall activity.
- Write linear equations in slope-intercept and point-slope form to describe the motion of falling objects.
- Explore the relationships between potential and kinetic energies of falling objects.
- Graph linear equations that represent the energy of a falling object.
- Use the universal law of gravitation to calculate the acceleration due to gravity on Earth.

ACTIVITIES

Students complete three performance assessments: 1) Scatter Plots – plot data points on a scatter plot, draw a line of fit to represent the data, and determine the type of correlation the scatter plot represents; 2) Slope and Acceleration – calculate the slope of a line on a velocity-versus-time graph and explain how this slope is related to the acceleration of the object; and 3) Linear Equations – write and graph equations of lines in both point-slope and slope-intercept forms.



Green Machines

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

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

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.

Home Makeover

DIY has made its way into the classroom. Students in *Home Makeover* put math skills to use as they plan an addition to a home. Students learn the basics involved in financing a home, designing roofs, building trusses, purchasing Sheetrock and floor covering, and calculating the amount of roofing, interior paint, and siding needed for the home.

STUDENT OBJECTIVES

- Explore different types of new homes as well as the costs and financing of a new home.
- Explore different styles of roofs and determine the slope of a roof.
- Explore different truss designs and construct a model truss.
- Determine the amount of roofing to purchase for a sample roof.
- Work with CAD software to design an addition to a home and a deck.
- Determine the amount of floor covering and Sheetrock needed for a room addition.
- Determine the area of the exterior of a house.
- Calculate the number of bags of cement to purchase for deck piers.

ACTIVITIES

Students complete three performance assessments: 1) Roof Trusses – explain how to find slope, explain how to determine brace locations in trusses, and construct a model truss; 2) Floor Plan Revisions – demonstrate and explain how to determine the dimensions of a room based on the floor plan; and 3) Deck Design – design a deck using CAD, evaluate the deck, and explain how a deck extends living area in a home.

Horticulture

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.

Hotel Management

In *Hotel Management*, students explore the internal components of operating a hotel. They examine the functions of the five main hotel divisions – sales and marketing, rooms, engineering, housekeeping, and security. Students utilize math skills by calculating occupancy rates, RevPAR, ADR, room rates, and room discounts. Students are also responsible for the designing of a brochure advertising the grand opening of a new hotel.

STUDENT OBJECTIVES

- Examine the classification methods of lodging properties.
- Examine the roles of hotel staff – management, marketing, housekeeping, and security.
- Examine the purpose of a night audit and two statements monitoring financial performance.
- Calculate RevPAR, occupancy rates, room discounts, and room rates.
- Design a brochure advertising the grand opening of a new hotel.
- Explore yield management as it relates to demand and price.
- Complete basic calculations based on housekeeping data.
- Review evacuation and emergency procedures.

ACTIVITIES

Students complete three performance assessments: 1) RevPAR/Occupancy Rates – list the formulas used for determining occupancy rates and RevPAR and calculate occupancy rates and RevPAR of a given hotel; 2) Forecasting/Room Rates – explain the process used in most hotels for forecasting, give examples of direct and indirect expenses, and calculate a modified room rate; and 3) Hotel Brochure – produce a brochure that includes room rates as well as safety information.

Curriculum Titles

Ideas & Innovations

In *Ideas & Innovations*, students explore the relationships among science, technology, and engineering. They are exposed to problem-solving strategies and use critical-thinking skills to find solutions. They also explore the Universal Systems Model and how it relates to technology and innovation. Introductory activities center on using the TETRIX® Building System to solve simple design problems. The activities culminate with the students designing a vehicle to compete against other classmates in a design challenge such as an endurance, speed, or torque challenge.

STUDENT OBJECTIVES

- Distinguish the difference between an invention and innovation.
- Use the *Ideas & Innovations* problem-solving model.
- Investigate techniques for ideation.
- Explore the relationships among science, technology, and engineering.
- Experiment with engineering trade-offs.
- Investigate the concepts of systems, subsystems, and systems thinking.
- Explore the Universal Systems Model of technology.
- Compete in a vehicle design challenge.
- Learn what it takes to be an engineer.

ACTIVITIES

Students complete three performance assessments: 1) Problem Solving – compare and contrast invention and innovation and explain how a problem-solving model can be used to solve problems; 2) Science and Technology – identify the goals of science and technology and describe one example of how science and technology have spurred each other on to new advancements; and 3) Universal Systems Model – explain system and subsystem and describe the steps of the Universal Systems Model.

Immunology

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

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 remotely 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.

Interior Design

In *Interior Design*, students study many concepts that today's interior decorator utilizes on a daily basis. They explore the principles of design, color coordination, floor plans, home furnishings, and remodeling budgets. Students learn about the relationships between material costs and personal choices by creating a cost proposal for a remodeling project.

STUDENT OBJECTIVES

- Prepare a room layout or floor plan utilizing a computer application.
- Explore various principles and elements of design by creating a wallpaper pattern.
- Create a cost proposal for a remodeled room.
- Differentiate between material cost and individual preference.
- Using a computer application, demonstrate formal and informal balance.
- Complete hands-on activities to understand the concept of the color wheel.
- Differentiate between natural and artificial light.

ACTIVITIES

Students complete three performance assessments: 1) Wall Composition – study and explore proportion, harmony, and balance as it pertains to wall composition; 2) Interior Lighting – explain the difference between natural and artificial light as well as the principles and elements of design; and 3) Remodeling Budget – create a remodeling budget to redecorate a bedroom using a price list.

Curriculum Titles

Investigating Careers

In *Investigating Careers*, students research career information in the 16 recognized career clusters. Students complete sample real-world activities to assist them in assessing their likes, dislikes, and aptitudes. Students explore interview and employment skills useful in any career.

STUDENT OBJECTIVES

- Distinguish between a job and a career.
- Complete a dexterity test.
- Complete a short personality survey.
- Complete a sample job application.
- Explore interviewing strategies.
- Investigate mental agility and reaction time tests.
- Create a slide-show presentation.
- Learn about soft skills and how to keep a job.
- Explore careers requiring differing levels of training in each of the 16 career clusters.

ACTIVITIES

Students complete three performance assessments: 1) Job Application – explain the importance of having a neat and accurate letter of application or résumé and correctly complete a sample job application; 2) Job Interview – give two examples of instances, other than applying for jobs, where a person might need to have good interviewing skills and describe strategies typically used in successful interviews; and 3) Job Retention – describe the difference between hard skills and soft skills and give an example of each and give two examples of activities that might result in an employee being dismissed from a job.

Laser Geometry

In *Laser Geometry*, students use algebra and geometry to explore different mathematical concepts including exponents, scientific notation, angles, and waves. Students conduct experiments to investigate interior and exterior angles. Finally, they explore degrees of angles by using a game controller to create an inexpensive, interactive whiteboard and by manipulating the direction of laser beams to piggyback a radio signal to a receiver.

STUDENT OBJECTIVES

- Investigate types and properties of angles and triangles.
- Relate angle properties to parallel and perpendicular lines.
- Use exponents and scientific notation to represent numbers.
- Use and solve proportions in order to discover similar and congruent polygons.
- Use a compass and straightedge to create parallel and perpendicular lines, create triangles, and bisect angles.

ACTIVITIES

Students complete three performance assessments: 1) Angles – define angle of incidence *and* angle of reflection *and characterize properties of parallel lines cut by a transversal; 2) Triangles & Congruency – classify triangles by the measure of their internal angles, determine congruency, explore supplementary and complementary angles, and understand Heisenberg's Uncertainty Principle; and 3) Waves & Particles – explain how a photon acts as a wave and a particle, find the slope-intercept of a line, and explain the slopes of parallel and perpendicular lines.*

Lenses & Optics

In *Lenses & Optics*, students use the focal length of a lens to solve rational equations. Students gather information by performing an activity to determine lens' optic measurements and then graph the measurements. Students perform an experiment to discover the relationship between the object height and the image height, which is used to define the magnification ratio. Students create a slide projector and discover how lenses are used to correct vision problems.

STUDENT OBJECTIVES

- Solve simple rational equations.
- Use cross multiplication to solve formulas.
- Learn about direct and inverse variation.
- Graph the lens' optics measurements.
- Solve the magnification formula by using cross multiplication.

ACTIVITIES

Students complete three performance assessments: 1) Slide Projector – determine focal length of a lens by experimentation, determine magnification, and successfully set up a slide projector; 2) Images – use the lens formula; explain the relationships among image size, image distance, object size, object distance, and focal length; and explain a real and virtual image; and 3) Vision – define nearsightedness *and* farsightedness, *explain how lenses correct vision, and calculate the diopter of a lens.*

Light & Lasers

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.

Curriculum Titles

Material Science

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* aids 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.

Math Behind Your Meals

The Centers for Disease Control ranks an individual's height and weight by using the BMI formula. The US Department of Agriculture compiles data and finds percents of change involving food production and consumption. In *Math Behind Your Meals*, students examine how algebra is used in relation to food and health and learn algebra basics such as algebra language, number systems, properties, and multistep equations. Students use formulas, percents of change, and ratios and proportions while exploring food and health-related issues. They also review skills and play a calorie intake and output game.

STUDENT OBJECTIVES

- Learn basic algebra language and use elements of the real number system including integers, rational numbers, and irrational numbers.
- Carry out procedures using the properties of real numbers to simplify expressions.
- Explore food production with charts and graphs.
- Find percents of change based on food consumption and food history information.
- Use charts and tables to analyze calorie intake and output.
- Use formulas to figure body mass index, total calorie requirements, and calories.
- Find waist-to-hip ratios and ratios of grams of sugar to calories in foods.
- Explore proportions with food serving and portion size information.

ACTIVITIES

Students complete three performance assessments: 1) Algebra Language – give examples of types of numbers, define algebra terms, and demonstrate use of properties and order of operations; 2) Formulas and Percents of Change – calculate percents of change and locate information on a table to solve an equation; and 3) Ratios and Proportions – use the BMI formula to figure body mass index, find ratios of total fat to calories from nutrition labels, and show ratios of fat to calories in multiple servings are proportional.

Microbiology

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

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 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

Money Management

In *Money Management*, students explore several different aspects of money management – from how to use a debit card to how to build savings for the future. They see the effects that compound and simple interest can have on savings and debt. Students develop a budget and examine how lifestyle choices can affect their budget. Students explore how to make wise financial decisions so that these decisions can be repeated in real life.

STUDENT OBJECTIVES

- Define basic money management terms.
- Identify and learn how to calculate various types of salary withholdings.
- Learn how to fill out a check and record a debit card transaction.
- Learn how to reconcile a checking account.
- Define and create a budget based upon personal lifestyle choices.
- Explore different types of savings options.
- Define and discuss auto insurance.
- Calculate costs associated with repayment of a car loan.
- Explore the three principal types of credit and examine how credit history is built.
- Use the 20-10 rule of credit to determine a safe debt load.

ACTIVITIES

Students complete three performance assessments: 1) Check Register – list two or more actions that can be taken to prevent a checking account from overdrafting; 2) Car Buying – identify methods for researching fair market prices for used cars; and 3) Investing – describe the conditions that led up to the stock market crash of 1929.

Music & Sound

Frequency, pitch, waves, amplitude, Fibonacci numbers, and ratios are concepts covered in *Music & Sound.* Students learn music history and explore the creation of music. They investigate the science and math behind the components of sound and are introduced to music theory. Students apply their skills to create rhythms on an electronic drum pad and melodies on an electronic keyboard. Students utilize software to record their melodies.

STUDENT OBJECTIVES

- Analyze the structure of a sound wave and compare noise and music.
- Investigate sound through amplitude and volume.
- Experiment with frequency and pitch and compare frequency of musical notes.
- Determine a specific frequency using mathematical ratios.
- Explore the Fibonacci sequence and its relationship to music.
- Play notes on the keyboard and use software to record audio in a digital format.
- Use a metronome, electronic drum pads, and an electronic keyboard to explore rhythm.

ACTIVITIES

Students complete three performance assessments: 1) Exploring the Monochord – identify the pitch of a note on the monochord and explain string length and frequency; 2) Musical Scales and Sequences – understand the Fibonacci sequence and the golden ratio or golden proportion; and 3) Reading a Musical Score – define rhythm *and* beat, *demonstrate a 3-4 beat rhythm written to accompany a melody, and explain the relationship between tempo and beat.*

Natural Disasters

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.

Nuclear Energy

In *Nuclear Energy,* students explore the various components of nuclear energy. Students utilize the graphing calculator to graph and explore equations related to the theory of relativity, rational functions related to Coulomb's law, exponential equations related to nuclear fission generation times, and rational equations related to radioactivity. Students use the *Nuclear Power Plant* software to run a reactor simulation where the goal of the simulation is to not have a nuclear meltdown.

STUDENT OBJECTIVES

- Define *energy* and learn about the various characteristics of energy and its sources.
- Learn about atomic structure, including subatomic particles.
- Be introduced to the periodic table, chemical formulas, isotopes, and elements involved in a nuclear reaction.
- Explore the relationship between mass and energy, isotopes and binding energy, and nuclear bonding.
- Define *fission* and learn about uranium's role in fission, fission reactions, and energy yields.
- Examine the components of a nuclear reactor.
- Investigate a nuclear reactor's core temperature.
- Define *radioactivity* and learn about radioactive exposure, various radioactive particles, and radioactive half-life.

ACTIVITIES

Students complete three performance assessments: 1) Graphing Calculator – input and graph a rational equation correctly by using a graphing calculator; 2) Tables – produce and evaluate data in table form by using a graphing calculator; and 3) Slope-intercept Form – input an equation correctly into a graphing calculator in slope-intercept form, or y = mx + b form; produce a graph; and evaluate the data.

Curriculum Titles

Oceanography

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

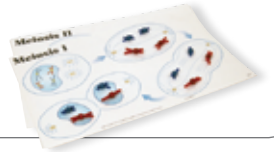
During the course of *Organism Reproduction*, students learn how different organisms reproduce, starting with the simplest of all organisms, bacteria, and ending with humans, the most complex organisms. Students explore asexual and sexual reproduction processes involving organisms from each of the five 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.



Package Design

In *Package Design*, students design and construct a package for a specified product. They explore spatial relationships as well as transformations and use rotations, reflections, and translations to create tessellations used as graphics for packages. Students select the package's shape based on appearance and practicality and design packages to conserve as much material and space as possible. Students also explore how transformations can be used in art.

STUDENT OBJECTIVES

- Learn some of the factors used in package design and elements of pattern design.
- Create a package for a CD by creating a net of the package's shape.
- Calculate volume and circumference.
- Design a package pattern (net) for a specific product.
- Learn about different types of transformations.
- Define *tessellation* and create a translation-based tessellation.
- Create a rotation-based tessellation.
- Create a package from a geometric net and place artwork on that package.
- Learn about uses of tessellations in art.

ACTIVITIES

Students complete three performance assessments: 1) Package Layout – study package design and design a package from a geometric net; 2) Rotations, Reflections, and Translations – study rotations, reflections, and translations of a figure and the coordinates on a grid; and 3) Package Construction – construct and evaluate a package to hold a product and identify ways to improve the package.

Plants & Pollination

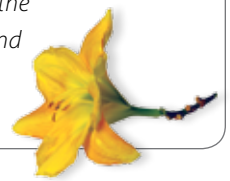
In *Plants & Pollination*, students fit plants into the five-kingdom classification system and learn the importance of plants on Earth. They are introduced to the structure and function of plant cells and tissues. They learn the functions of roots, stems, and leaves and cover plant processes including 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

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.

Population Perspectives

Demography, the study of human populations, is very much a numbers game. It illustrates connections between math and the real world and also provides an example of a career field in which math is not only important but essential. In *Population Perspectives*, students learn about quadratic and exponential functions and polynomials and use these algebra concepts to solve population-related problems.

STUDENT OBJECTIVES

- Spotlight population growth in various countries.
- Solve problems by using population growth rate equations.
- Define and identify functions, including exponential growth and decay functions.
- Use the graphing calculator to graph exponential growth and decay functions.
- Construct and solve polynomials related to population characteristics.
- Define *quadratic equations* and solve them using several methods.
- Define *carrying capacity* and *demographic transition*.
- Review population problems in more- and less-developed countries.
- Make recommendations for dealing with future population growth.

ACTIVITIES

Students complete three performance assessments: 1) Exponential Growth – contrast linear and exponential growth, explain the exponential growth equation, and graph it on a graphing calculator; 2) Polynomials – use Algebra Tiles to construct and solve a polynomial equation and use given data to construct a polynomial expression describing age cohorts of a population; and 3) Quadratic Functions – graph a quadratic function on the graphing calculator and use the calculator to solve it by using the Quadratic Formula.

Practical Skills

In *Practical Skills*, students learn to identify common tools and their uses. They are introduced to the history of measuring systems, repair faulty systems, and follow directions to assemble prefabricated furniture. One important skill is to recognize situations when it would be best to call in a professional to help them solve the problem.

STUDENT OBJECTIVES

- Troubleshoot a situation and repair the system in question.
- Learn the value in following a set of instructions.
- Understand the importance of hand-tool safety, care, and use.
- Apply what they learned concerning tool identification to assemble a prefabricated item.
- Learn to correctly measure using the appropriate measuring tool.
- Explore the function of a home plumbing system.
- Assemble a secure dead bolt and learn about the importance of home security.

ACTIVITIES

Students complete three performance assessments: 1) Measurement – demonstrate the proper safety and use of the ruler and tape measure; 2) Mounting Shelf Brackets – demonstrate proper safety and use of various tools, explain how mechanical fasteners work, and produce a horizontally level shelf; and 3) Prefabricated Pull Cart – correctly and completely assemble a prefabricated item and explain how following directions can save time.

Projectile Motion

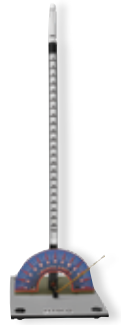
In *Projectile Motion*, students build and launch straw rockets in order to observe how flying objects follow a curved path called a parabolic path. Students predict the launch angle that will make the straw rocket travel the greatest horizontal distance, and they test their predictions. Students learn the general form of a quadratic equation, identify the coefficients in a quadratic equation, and use the coefficients in a quadratic equation to predict the shape of a parabola. Students predict where the straw rockets will land by using a quadratic equation that describes the straw rocket's path.

STUDENT OBJECTIVES

- Identify the roots and observe graphs of quadratic equations.
- Learn to recognize the parts of a parabola.
- Identify the coefficients in a quadratic equation.
- Determine the x-coordinate and y-coordinate of the vertex.
- Graph quadratic equations by using a graphing calculator.
- Practice using the Quadratic Formula.
- Complete a three-ring challenge in which a straw rocket will fly through three rings that have been placed along the rocket's parabolic path.

ACTIVITIES

Students complete three performance assessments: 1) Parabolas – describe a parabola, define vertex *and* line of symmetry, *and create a straw rocket; 2) Graphing Equations – demonstrate how to enter and graph equations, identify the a, b, and c coefficients in an equation, and identify the x- and y-coordinates of a vertex; and 3) Three-Ring Challenge – find the roots of a quadratic equation, demonstrate how to use the TRACE function on a graphing calculator, and use algebra to successfully fly a straw through three hula hoops.*



Curriculum Titles

Properties of Math

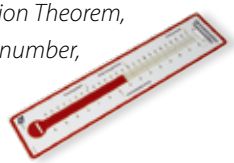
In *Properties of Math*, students use two-color counters, number lines, thermometers, and playing cards to learn the properties of addition, subtraction, multiplication, and division of integers. Students learn the rules for mathematical operations with integers and then apply those rules in engaging – and fun – ways as they solve problems.

STUDENT OBJECTIVES

- Locate integers on a number line and on a thermometer.
- Identify the absolute value of an integer.
- Name pairs of opposites and order integers from least to greatest.
- Add, subtract, multiply, and divide integers.
- Demonstrate and identify the Commutative and Associative Properties of Addition and Multiplication.
- Demonstrate and identify the identity property of addition and multiplication.
- Demonstrate and identify the Zero Property of Multiplication.
- Simplify expressions using the order of operations.
- Solve equations.

ACTIVITIES

Students complete three performance assessments: 1) Expressions – order numbers on the real number line, define expression*, and find the absolute value of a number; 2) Multiplication and Division – define* sets*, solve expressions, and explore modular arithmetic; and 3) Prime Factorization – recite the Prime Factorization Theorem, define* greatest common divisor*, find the prime factorization of a number, and reduce fractions.*



Reactions

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.

Research & Design

In *Research & Design*, students design, manufacture, and race a model CO_2-powered dragster car. Students design their car to meet certain specifications and limitations so that it qualifies as a legal car on race day. They learn the concepts and terms in the design process as well as gain an understanding of lift and drag on an object. After they finish their car, students test it in several ways and predict its performance.

STUDENT OBJECTIVES

- Understand the relevance of specifications to the design process.
- Follow the design process to design and build a CO_2-powered dragster.
- Use a band saw, drill press, sandpaper, and paint to produce a completed CO_2 dragster.
- Test the performance design of a dragster.
- Explore the concepts of aerodynamics.
- Learn how mass affects the performance of a CO_2-powered dragster.

ACTIVITIES

Students complete three performance assessments: 1) Design Your Dragster – demonstrate or explain the concept of initial design sketches and follow limitations when designing the dragster; 2) Smooth Your Dragster – demonstrate the work skills necessary to produce a quality product; and 3) Test and Predict Performance – meet all limitations set for the dragster and relate test results with actual dragster performance on a racetrack.

Robots

In *Robots*, students learn about the fascinating role that robots play in our lives. More and more, this technology is helping to improve the way we live and manufacture items. Students learn how to operate, program, and use robots in different environments. Initially, each student learns to manipulate the robot and program it to conduct repeatable tasks. Students learn about each of the sensors and how to program them to control a self-directed robot. Ultimately, they program a robot to operate by using the sensors as inputs to solve a challenge.

STUDENT OBJECTIVES

- Explore the history of robotics by using a software program.
- Experience the fundamentals of industrial robots by viewing a video segment.
- Use a computer to program and operate a robotic arm.
- Recognize the importance of robotics in the development of manufacturing.
- Use software to manipulate a robotic arm to perform selected activities.
- Identify the advantages and disadvantages of robots.
- Learn how a touch sensor, an ultrasonic sensor, a sound sensor, and a light sensor function.
- Create a program to complete a task using multiple sensors and the NXT Brick.

ACTIVITIES

Students complete three performance assessments: 1) Exploring Robots – learn several uses for robots and give one example of a repetitive job that a robot might perform; 2) Programming SAM – demonstrate the process of teaching SAM a series of moves and complete and save a logical series of programmed movements; and 3) Program Challenge – develop a program that uses at least three different sensors and successfully run the program.

Curriculum Titles

Rocket Science

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

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.

Rocks & Resources

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

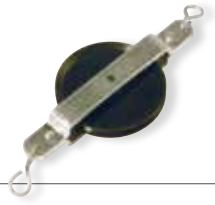
In *Simple Machines*, students explore how work, force, energy, and machines make moving objects easier through the use of the computer and hands-on activities. Students use variables and equations to describe the principles of simple machines. Students use the information they learn about simple machines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



Curriculum Titles

Soils

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.*

Sports Statistics

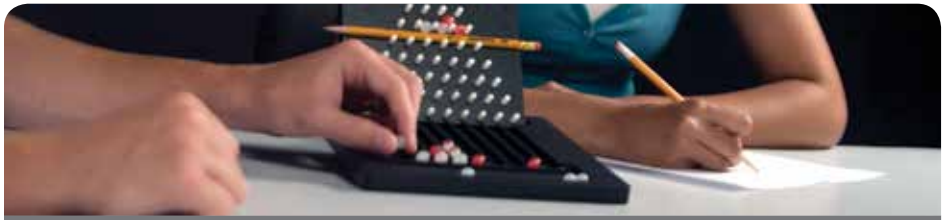
In *Sports Statistics*, students explore the role of mathematics in sports statistics. Students use various data representation techniques to find trends and make predictions using actual sports statistics. Students will also collect and analyze data from their own tabletop sports and use this data to create scatter plots, frequency tables, histograms, and box-and-whisker plots. They explore many different mathematical concepts including matrices, graphing, factorials, permutations, and combinations.

STUDENT OBJECTIVES

- Write sports data in matrix format and manipulate the data by adding, subtracting, and multiplying matrices.
- Create scatterplots and determine the line of best fit to represent sports data trends.
- Create frequency tables and histograms and then use the histograms to interpret statistical information.
- Create a box-and-whisker plot by calculating the range, quartiles, median, and outliers.
- Explore and learn to apply the fundamental counting principle to sports-related issues.
- Explore factorials, permutations, and combinations and how they relate to sports statistics.

ACTIVITIES

Students complete three performance assessments: 1) Matrices – explain how to add, subtract, and perform scalar multiplication on matrices; 2) Fundamental Counting Principle – define the fundamental counting principle *and explain how to use this principle to determine the number of outcomes for a given sports situation; and 3) Permutations and Combinations – explain the difference between permutations and combinations and solve problems related to each.*



Statistical Analysis

While engaged in *Statistical Analysis*, students create and conduct a survey and graph their data. Students explore histograms, box-and-whisker plots, stem-and-leaf plots, bar graphs, circle graphs, and line graphs. Students use data to display statistical information. Students complete probability activities ranging from tossing two-color counters and rolling dice to generating and using Pascal's triangle to calculate experimental and theoretical probabilities. Students also use their knowledge of probability to create a fair game.

STUDENT OBJECTIVES

- Define terms related to statistics and probability.
- Explore uses and misuses of statistics in everyday situations.
- Complete statistical analyses in music and sports.
- Explore a variety of graphs including box-and-whisker plots and stem-and-leaf plots.
- Conduct a survey and graph data using a histogram and a box-and-whisker plot.
- Calculate experimental and theoretical probabilities.
- Conduct probability experiments using two-color counters and dice.
- Generate Pascal's triangle and use the pattern to calculate probabilities.
- Create a fair game.

ACTIVITIES

Students complete three performance assessments: 1) Mean, Median, and Mode – define mean, median, *and* mode*; identify uses of statistics; and construct a bar graph of shooting statistics; 2) Survey Statistics – construct a valid and unbiased survey and graph the data using a stem-and-leaf plot, a histogram, and a box-and-whisker plot; and 3) Probability – define* theoretical *and* experimental probability, *define* dependent *and* independent events, *and create a histogram.*

Supply & Demand

In *Supply & Demand*, students learn about the law of supply and demand and how it affects their lives. Given data, they write equations that represent supply and demand and then use graphing skills to graph linear supply and demand equations. Students also learn multiple methods of solving systems of equations, including graphing, substitution, elimination, and using a graphing calculator to determine the equilibrium price and quantity of a given product. Finally, students use their ability to solve systems of equations to manage a simulated business.

STUDENT OBJECTIVES

- Explore the relationship between supply and demand and factors that affect each.
- Solve linear equations that represent supply or demand.
- Use a given data set to write linear equations that represent data trends.
- Graph equations that represent supply and demand to find the solution to the system of equations.
- Use substitution and elimination to solve systems of equations.
- Explore solving a system of equations with a graphing calculator.

ACTIVITIES

Students complete three performance assessments: 1) Supply & Demand Chart – explain the steps in solving a supply and demand system of equations through substitution and calculate the equilibrium point of a system; 2) Supply & Demand of Labor – use elimination to solve a system of equations that represents the supply and demand of labor with three unknowns; and 3) Company Cafeteria – solve systems of equations to help make pricing and supply decisions to run a simplified business.

Curriculum Titles

Sustainable Agriculture

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.

The Universe

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 a reflecting 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.*

Unsolved Mysteries

In *Unsolved Mysteries*, students use functions and coordinate graphing to determine who committed a fictional crime. Using cell phone records and coordinate graphing, students identify an area in which a stolen cell phone was last operated. Students use functions to estimate the time of the robbery as well as the approximate height of the suspect. Students link algebra skills to a real-world career in forensic science.

STUDENT OBJECTIVES

- Learn some of the basics of forensic science.
- Use coordinate graphing to graph locations of calls made from the stolen cell phone on a map of the city.
- Identify x- and y-intercepts.
- Determine the cooling rate of a liquid and graph the data on a graphing calculator.
- Identify functions and relations and determine equations for functions.
- Determine the heights from which several drops of liquid fell and graph the data on a graphing calculator.
- Use data collected over the course of the activities to identify a prime suspect.

ACTIVITIES

Students complete three performance assessments: 1) Coordinate Graphing – explain coordinates, identify quadrants, and explain predictions that can be made based on the locations; 2) Functions – explain functions, relationships, domain, and range and determine the function for the cooling rate of a liquid; and 3) Data Tables – determine whether or not data is representative of a function and create an equation to represent a given data table.

Video Production

In *Video Production*, students learn many facets of video production and communication. Students explore the working of a video camera, the editing process, and Federal Communications Commission regulations. They organize ideas, write scripts, outline a storyboard, shoot video, and edit their video productions. Students also study the effect of media in their own lives and use this information to produce a persuasive public service announcement.

STUDENT OBJECTIVES

- Examine electronic mass communication and its role in today's society.
- Identify various types of video and film productions.
- Demonstrate knowledge of storyboarding and effective script writing.
- Learn the difference between analog editing and digital editing.
- Examine different types of video productions.
- Learn about public service announcements.
- Write a storyboard and then videotape and edit a public service announcement.
- Explore communication technology.

ACTIVITIES

Students complete three performance assessments: 1) News Brief – write a news brief about a current event; record, edit, and export the news brief; 2) Record/Edit PSA – describe how public service announcements differ from other forms of video production; record and edit digital elements to create a final PSA video; and 3) Video Production – explain the differences between analog and digital editing and merge video clips to create a final production.

Curriculum Titles

Water Management

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.

Water Quality

In *Water Quality*, students complete an internship with the fictitious company Scientific Laboratory Services (SLS). As part of their internship, students analyze various standards and regulations relating to water quality and use. Through laboratory testing and activities, students experience real-world applications of inequalities and learn to solve and graph simple, multistep, and compound inequalities by using both paper and pencil and a graphing calculator.

STUDENT OBJECTIVES

- Identify inequalities and compound inequalities.
- Match graphs for inequalities.
- Solve simple inequalities.
- Solve inequalities with two variables.
- Create a T-chart and graph inequalities on a coordinate plane.
- Graph a linear system of inequalities on a graphing calculator.
- Define and graph absolute value inequalities.

ACTIVITIES

Students complete three performance assessments: 1) Simple Inequalities – identify situations in which inequalities are used in the real world and explain rules for graphing inequalities on a number line; 2) Multistep Inequalities – define multistep inequality, *explain how to solve one, and identify how to multiply or divide an inequality containing negative numbers; and 3) Systems of Inequalities – demonstrate the steps for solving a system of inequalities using the graphing calculator, perform a water test to measure dissolved oxygen, and correctly complete a Water Analysis Report.*

Weather

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 compose 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 to create 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

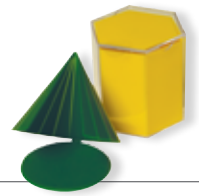
How many ounces of popcorn are contained in that large tub at the local multiplex? How many ounces of soda in the large cup? These are questions students answer as they learn about *Weights & Measures*. Students also learn to convert from international units to customary units of measurement and temperature,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



Curriculum Titles

Where in the World

In *Where in the World*, students learn how to simplify expressions and solve equations involving radicals. Students use a wall-size map and the Pythagorean Theorem to search for a sunken treasure. The Distance Formula and a software application are used to plan a trip around the world. An introduction to the concepts of trilateration and geocaching provides the basis for a review of adding, subtracting, simplifying, and reducing radical expressions, as well as solving radical equations. As an added bonus, students learn about map projections and how they relate to math.

STUDENT OBJECTIVES

- Learn to simplify radical expressions by using the product and quotient properties of square roots.
- Determine how the Distance Formula is related to the Pythagorean Theorem.
- Add and subtract radical expressions.
- Convert radical expressions to decimals.
- Plan a trip around the world by using the Distance Formula and a software application.
- Design a zip line course by using radical expressions and the Pythagorean Theorem.
- Relate various map projections to math.
- Complete a geocaching expedition around the world by using mathematical applications learned throughout *Where in the World*.

ACTIVITIES

Students complete three performance assessments: 1) Radical Expressions – simplify radical expressions using both the Product Property and the calculator and locate the sunken treasure; 2) Using Operations with Radical Expressions – add, subtract, and rationalize the denominator of radical expressions and use the Distance Formula to complete two geographic activities; and 3) GeoMath – learn how map projections differ geographically and mathematically and complete a mock geocaching activity to solve for the location of each cache.

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 and Ranchers
- Forest and Conservation Workers
- Pest Control Workers
- Veterinarians
- Veterinary Assistants

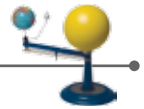
Applied Physics

- 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 and Ranchers
- Fish and Game Wardens
- Food Scientists
- Merchant Marines
- Water and Wastewater Treatment Plant and System 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

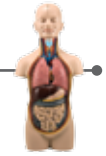
BioEngineering

- Athletes, Coaches, or Umpires
- Athletic Trainers
- Cardiovascular Technologists or Technicians
- Chiropractors
- Data Entry or Information Processing Workers
- Dietitians or Nutritionists
- Home Health Aides
- Orthopedic Surgeons
- Physical Therapists
- Recreational Therapists
- Weighers, Measurers, Checkers, Samplers, or Recordkeepers

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

CADD

- Architects
- Cabinetmakers
- Civil Engineers
- Electricians
- Mechanical Drafters
- Plumbers
- Roofers

Carbon Footprint

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

Career Connections

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)

Climate Change

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

CNC Manufacturing

- Machine Setters or Tenders
- Machinists
- Maintenance Workers
- Mechanical Drafters
- Mechanical Engineers
- Numerical Control Machine Tool Operators
- Precision Devices Inspectors or Testers
- Tool or Die Makers

Composites

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

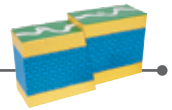
Computer Graphics & Animation

- Commercial Artists
- Computer Hardware Engineers
- Computer Operators
- Computer Programmers
- Computer Support Specialists
- Computer Systems Analysts
- Database Administrators
- Network Administrators
- Webmasters

Confident Consumer

- Agricultural Engineers
- Child Care Workers
- Dietitians or Nutritionists
- Fast Food Cooks
- Food Preparation Workers
- Food Scientists
- Food Service Managers
- Home Health Aides
- Waiters

Dynamic Earth



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

e-Design

- Advertising or Promotions Managers
- Architects
- Commercial Artists
- Computer Programmers
- Cosmetologists
- Desktop Publishers
- Fashion Designers
- Photographers
- Urban or Regional Planners

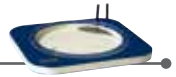
Eco-Architecture

- 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

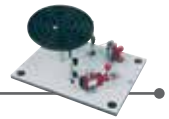


- Electrical Engineering Technicians
- Electrical Engineers
- Electrical Equipment Assemblers
- Electrical Power-Line Installers or Repairers
- Electricians
- Insulation Workers
- Security Systems Installers
- Telecommunications Line Installers
- Welders

Electronics

- Electricians
- Heating Mechanics or Installers
- Insulation Workers
- Security Systems Installers
- Surgical Technologists
- Telecommunications Line Installers
- Tool or Die Makers
- Welders

Energy, Power & Mechanics

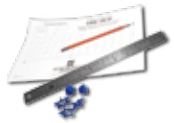


- Chemists and Materials Scientists
- Electricians
- Environmental Scientists and Specialists
- Mechanical Engineers
- Plumbers, Pipe Fitters, and Steamfitters
- Structural Iron and Steel Workers
- Welders, Cutters, Solderers, and Brazers
- Wind Turbine Technicians

Engineering Bridges

- Mechanical Drafters
- Paving Equipment Operators
- Sheet Metal Workers
- Steel Workers
- Surveyors
- Tool or Die Makers
- Woodworkers
- Woodworking Machine Operators

Engineering Towers



- Architects
- Carpenters
- Cement Masons
- Civil Engineers
- Environmental Engineers
- Mechanical Engineers
- Structural Iron and Steel Workers
- Welders

Engines

- Aerospace Engineers
- Aircraft Engine Specialists
- Automotive Technicians
- Diesel Engine Specialists
- Farm Equipment Mechanics
- Grader, Bulldozer, or Scraper Operators
- Industrial Machinery Mechanics
- Precision Assemblers

Environmental Issues

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

Environmental Math

- Applied Mathematicians
- Civil Engineering Technicians
- Environmental Engineering Technicians
- Environmental Science or Protection Technicians
- Environmental Scientists or Hydrologists
- Forest or Conservation Technicians
- Landscape Architects
- Mechanical Engineering Technicians
- Surveyors, Cartographers, or Surveying Technicians

Factoring & Polynomials

- Architects
- Carpenters
- Computer Programmers
- Computer Scientists
- Database Administrators
- Economists
- Engineers
- Mathematicians

Fitness & Health

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

Flight Technology

- Aerospace Engineers
- Air Traffic Controllers
- Aircraft Engine Specialists
- Airline Pilots
- Avionics Technicians
- Emergency Management Specialists
- Flight Attendants
- Travel Agents

Career Connections

Food Science

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

Forces

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

Forensic Math

- Applied Mathematicians
- Chemical Engineers
- Claims Examiners
- Criminal Investigators
- Emergency Medical Technicians
- Epidemiologists
- Fire Inspectors
- General Practitioners
- Insurance Investigators

Forensic Science

- Chemical Engineers
- Claims 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
- Dietitians or Nutritionists
- Epidemiologists
- Family Practitioners
- Farmers or Ranchers
- Nursery or Greenhouse Managers
- Registered Nurses

Geometric Packing

- Advertising Managers
- Architects
- Building Inspectors
- Cabinetmakers
- Cost Estimators
- Fabricators
- Market Research Analysts
- Mechanical Drafters
- Precision Assemblers

Going Green

- Environmental Engineers
- Farmers
- HVAC Technicians
- Woodworkers

Graphic Communications

- Cabinetmakers
- Carpenters
- CNC Operators
- Commercial Designers
- Hand Grinders or Polishers
- Mechanical Drafters
- Mechanical Engineering Technicians
- Mechanical Engineers

Gravity

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

Gravity of Algebra

- 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

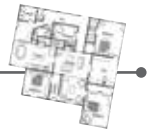
Heart Fitness

- Athletes or Sports Competitors
- Cardiovascular Technicians
- Dietitians 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
- Firefighters
- Food Scientists or Technologists
- Industrial Safety or Health Engineers
- Nuclear Engineers
- Petroleum Engineers

Home Makeover



- Architects
- Carpenters
- Concrete Finishers
- Construction Managers
- Construction or Building Inspectors
- Drywall Installers
- Electricians
- Heating, AC, or Refrigeration Installers
- Masons
- Plumbers

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

Hotel Management

- Hotel Detectives
- Hotel General Managers
- Hotel, Motel, or Resort Desk Clerks
- Housekeepers
- Laundry or Dry-Cleaning Workers
- Marketing Specialists
- Reservation Agents
- Security Officers

Ideas & Innovations

- Assemblers or Fabricators
- Drafters
- Industrial Engineers
- Mathematicians
- Mechanical Engineers
- Mechanics
- Physicists
- Technicians or Technologists

Immunology

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

Intelligent Homes

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

Interior Design

- Floral Designers
- Interior Designers
- Laundry Workers
- Purchasing Agents or Buyers
- Retail Salespersons
- Sales Floor Clerks
- Sales Order Fillers
- Upholsterers
- Window Trimmers

Investigating Careers

- Child, Family, or School Social Workers
- College or University Faculty
- Educational, Vocational, or School Counselors
- Human Resources Managers
- Personnel Recruiters
- Preschool Teachers
- Registered Nurses
- Rehabilitation Counselors
- Restaurant Cooks

Laser Geometry

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

Career Connections

Lenses & Optics

- Dispensing Opticians
- Math Teachers
- Ophthalmic Laboratory Technicians
- Optical Instrument Assemblers
- Optometrists
- Photographers
- Videographers

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
- Brickmasons
- Carpenters
- Ceiling Tile Installers
- Cement Masons
- Chemical Engineers
- Construction Laborers
- Petroleum Engineers

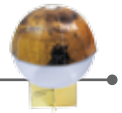
Math Behind Your Meals

- Advertising Managers
- Agricultural Scientists
- Chefs or Restaurant Cooks
- Counseling Psychologists
- Dietetic Technicians
- Dietitians or Nutritionists
- Food Scientists
- Food Service Managers
- Health Psychologists

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

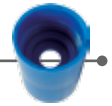
Money Management

- Accountants or Auditors
- Adjustment Clerks
- Bookkeeping, Accounting, or Auditing Clerks
- Credit Analysts
- Financial Managers
- Loan Officers
- Personal Financial Advisers
- Tax Preparers

Music & Sound

- Film Laboratory Technicians
- Fine Artists
- Instrumental Musicians
- Musicians
- Radio or Television Announcers
- Rehabilitation Counselors
- Safety or Health Engineers
- Speech-Language Pathologists

Natural Disasters



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

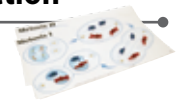
Nuclear Energy

- Inspectors
- Nuclear Engineers
- Nuclear Medicine Technologists
- Nuclear Power Reactor Operators
- Nuclear Technicians
- Pipe Fitters

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

Package Design

- Advertising Managers
- Architects
- Building Inspectors
- Cabinetmakers
- Cost Estimators
- Fabricators
- Market Research Analysts
- Mechanical Drafters

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
- Brickmasons
- Chemical Engineers
- Chemical Plant Operators
- Chemists
- Hazardous Materials Removal Workers
- Industrial Safety Engineers
- Manufacturing Bakers

Population Perspectives

- Ecologists
- Geographers
- Social Workers
- Sociologists
- Statistical Analysts
- Statisticians
- Urban and Regional Planners

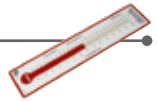
Practical Skills

- Hotel Detectives
- Hotel General Managers
- Hotel, Motel, or Resort Desk Clerks
- Housekeepers
- Laundry or Dry-Cleaning Workers
- Marketing Specialists
- Reservation Agents
- Security Officers

Projectile Motion

- Aerospace Engineers
- Air Traffic Controllers
- Aircraft Mechanics
- Airline and Commercial Pilots
- Assemblers and Fabricators
- Civil Engineers
- Drafters

Properties of Math



- Accountants
- Auditors
- Budget Analysts
- Economists
- Financial Analysts
- Market Researchers
- Mathematicians
- Personal Financial Advisers
- Statisticians

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

Research & Design

- Advertising or Promotions Managers
- Architects
- Cabinetmakers
- Commercial or Industrial Designers
- Fashion Designers
- Interior Designers
- Market Research Analysts
- Urban or Regional Planners
- Webmasters

Robots

- Aerospace Engineers
- Automotive Technicians
- Computer Programmers
- Hazardous Materials Removal Workers
- Industrial Designers
- Industrial Safety Engineers
- Mechanical Engineers
- Robotics Technicians

Rocket Science

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

Rocketry & Space

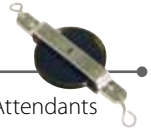
- Aerospace Engineers
- Air Traffic Controllers
- Aircraft Engine Specialists
- Airline Pilots
- Avionics Technicians
- Legislators
- Personnel Recruiters
- Radio or Television Announcers

Career Connections

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

Soils

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

Sports Statistics

- Athletic Directors
- Athletic Trainers
- Coaches
- Sports Book Writers
- Sports Officials
- Sportscasters
- Statisticians
- Umpires

Statistical Analysis

- Advertising or Promotions Managers
- Cost Estimators
- Financial Managers
- Insurance Underwriters
- Real Estate Brokers
- Urban or Regional Planners

Supply & Demand

- Appraisers
- Brokers
- Budget Analysts
- Economists
- Financial Advisers
- Insurance Agents
- Marketing Research Analysts
- Sales Representatives

Sustainable Agriculture

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

The Universe

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

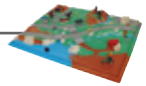
Unsolved Mysteries

- Applied Mathematicians
- Chemical Engineers
- Claims Examiners
- Criminal or Insurance Investigators
- Emergency Medical Technicians
- Epidemiologists
- Fire Inspectors
- General Practitioners

Video Production

- Announcers
- Broadcast and Sound Engineering Technicians
- Film and Video Editors
- Fitness Trainers and Instructors
- Musicians
- Producers and Directors
- Writers and Authors

Water Management



- Biologists
- Chemical Plant Operators
- Conservation Officers
- Environmental Engineers
- Hazardous Materials Removal Workers
- Longshoremen
- Plumbers
- Public Safety Personnel
- Safety and Health Engineers

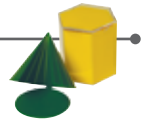
Water Quality

- Agricultural Engineers
- Chemists
- Ecologists
- Environmental Engineers
- Hydrologic Scientists
- Laboratory Scientists
- Microbiologists
- Physicists

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 and University Faculty
- Epidemiologists
- Food Scientists and Technologists
- Medical Records and Health Information Technicians

Where in the World

- Cartographers
- City Planners
- Civil Engineers
- Geoscientists
- GIS Geographers
- Photogrammetrists
- Software Engineers
- Surveying Technicians
- Surveyors

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