FOSS AND CALIFORNIA STANDARDS

The **Matter and Energy Module** supports the following Physical Sciences and Investigation and Experimentation Content Standards for grade 3.*

PHYSICAL SCIENCES

PS1 Energy and matter have multiple forms and can be changed from one form to another.

As a basis for understanding this concept, students know

- PS1a energy comes from the Sun to Earth in the form of light.
- PS1b sources of stored energy take many forms, such as food, fuel, and batteries.
- PS1c machines and living things convert stored energy to motion and heat.
- PS1d energy can be carried from one place to another by waves, such as water waves and sound waves, by electric current, and by moving objects.
- PS1e matter has three forms: solid, liquid, and gas.
- PS1f evaporation and melting are changes that occur when the objects are heated.
- PS1g that when two or more substances are combined, a new substance may be formed with properties that are different from those of the original materials.
- PS1h all matter is made of small particles called atoms, too small to see with the naked eye.
- PS1i people once thought that earth, wind, fire, and water were the basic elements that made up all matter. Science experiments show that there are more than 100 different types of atoms, which are presented on the periodic table of the elements.

"The discussion of energy and matter in grade three is at a simple level, but it sets a foundation for further study in later grade levels. Students learn that energy may be stored in various ways and that both living organisms and machines convert stored energy into heat and motion... Atoms will be introduced as the smallest component of the elements that compose all matter... Light, like heat, is a form of energy...[Students] should know that light travels in a straight line away from its source and that the color of an object is affected by the color of light that strikes it."†

**Science Content Standards for California Public Schools: Kindergarten through Grade Twelve* (Sacramento: California Department of Education, 2000).

†*Science Framework for California Public Schools: Kindergarten through Grade Twelve (*Sacramento: California Department of Education, 2003), pages 45 and 49.

PS2 Light has a source and travels in a direction.

As a basis for understanding this concept, students know

PS2a sunlight can be blocked to create shadows.

PS2b light is reflected from mirrors and other surfaces.

PS2c the color of light striking an object affects the way the object is seen.

PS2d an object is seen when light traveling from the object enters the eye.

INVESTIGATION AND EXPERIMENTATION

I&E5 Scientific progress is made by asking meaningful questions and conducting careful investigations.

As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will

I&E5a repeat observations to improve accuracy and know that the results of similar scientific investigations seldom turn out exactly the same because of differences in the things being investigated, methods being used, or uncertainty in the observation.

I&E5b differentiate evidence from opinion and know that scientists do not rely on claims or conclusions unless they are backed by observations that can be confirmed.

I&E5c use numerical data in describing and comparing objects, events, and measurements.

I&E5d predict the outcome of a simple investigation and compare the result with the prediction.

I&E5e collect data in an investigation and analyze those data to develop a logical conclusion.

"Students can begin to make predictions based on observations, prior knowledge, and logic. Predictions should not be confused with random guesses. Students should know that their predictions must be verified by experiments and the analysis of data gathered from careful measurements."†

Science Content Standards for California Public Schools: Kindergarten through Grade Twelve (Sacramento: California Department of Education, 2000).

†*Science Framework for California Public Schools: Kindergarten through Grade Twelve* (Sacramento: California Department of Education, 2003), page 55.

MATTER AND ENERGY MODULE MATRIX

SYNOPSIS	CA PHYSICAL SCIENCES STANDARDS	CA I&E STANDARDS
1. ENERGY		
Students investigate different forms of energy (light, heat, sound, and motion) and determine ways that energy is converted to make things happen. They explore ways that energy forms are carried from one place to another. Students explore energy working with materials (batteries, bulbs, candle, solar cells, spring toys, rolling balls), through readings, and through video.	PS1a Energy comes from the Sun to Earth in the form of light. PS1b Sources of stored energy take many forms. PS1c Machines and living things convert stored energy to motion and heat. PS1d Energy can be carried from one place to another by waves, by electric current, and by moving objects.	
2. LIGHT		
Students use mirrors to reflect light and learn that light travels in straight lines. They are introduced to blocked light (shadows), light absorption, and to white light as a mixture of all colors of light. They investigate firsthand and through simulations, video, and readings how the appearance of an object is affected by the color of light striking it.	PS2a Sunlight can be blocked to create shadows. PS2b Light is reflected from mirrors and other surfaces. PS2c The color of light striking an object affects the way the object is seen. PS2d An object is seen when light traveling from it enters the eye.	I&E5d Predict the outcome of an investigation and compare the result with the prediction.
3. MATTER		
Students work with different states of matter, measure mass and volume using metric standards and tools, and solve problems using their knowledge of metric measurement. They develop a set of defining characteristics for states of matter. They read about the difference between opinion and evidence.	PS1e Matter has three forms: solid, liquid, and gas.	I&E5a Repeat observations to improve accuracy. I&E5b Differentiate evidence from opinion. I&E5c Use numerical data in describing and comparing objects, events, and measurements. I&E5d Predict the outcome of an investigation and compare the result with the prediction. I&E5e Collect data and analyze them to develop a conclusion.
4. CHANGING MATTER		
Students use a thermometer to measure and record temperatures as they explore melting of common substances. The class conducts an evaporation investigation, and students use the data to draw conclusions. Students combine substances and observe the results of a chemical reaction. They read about atoms and elements.	PS1f Evaporation and melting are changes that occur when objects are heated. PS1g When two or more substances are combined, a new substance may be formed. PS1h All matter is made of small particles called atoms. PS1i People once thought that 4 basic elements made up all matter; the periodic table shows more than 100 different types of atoms.	I&E5a Repeat observations to improve accuracy. I&E5c Use numerical data in describing and comparing objects, events, and measurements. I&E5d Predict the outcome of an investigation and compare the result with the prediction.

CONCEPTS	READING AND WRITING	ASSESSMENT
• Energy makes things happen. • Energy takes many forms. • Most of the energy used by organisms, including humans, comes from the Sun in the form of light. • Stored energy can be converted to other forms of energy. • Machines and living things can convert energy into motion and heat. • Energy can be carried from one place to another by waves, electric current, and moving objects.	• *Energy Sources* • *Energy Conversion* • *Energy on the Move* • *Summary: Energy* • Science Notebook: Students write about their observations of energy sources and energy conversions.	**Pretest** **Embedded Assessment** • Science notebook • Response sheet **Benchmark Assessment** • I-Check 1
• Light is a form of energy that travels in straight lines from a light source. • Light can reflect off surfaces that it strikes. • An object is seen only when light from that object enters an eye. • White light is a mixture of all colors. • Light can be absorbed by matter. • The apparent color of an object is the result of the light it reflects. • The apparent color of an object is affected by the color of light striking it. • A shadow is created when objects block light.	• *Reflection* • *Throw a Little Light on Sight* • *Summary: Light* • Science Notebook: Students record the ways they worked with mirrors to solve mirror challenges and what happens to the appearance of objects when different colors of light are used to illuminate the objects.	**Embedded Assessment** • Teacher observation • Science notebook **Benchmark Assessment** • I-Check 2
• The behavior of a sample of matter in an open container indicates its state. • The gram (g) is the standard unit of measure used to quantify mass in the metric system. • Volume is a measure of the three-dimensional space occupied by matter. • The liter (L) is the standard for measuring fluid volume in the metric system. • Opinion is based on belief; scientific evidence is based on observation.	• *States of Matter* • *Opinion and Evidence* • *The Metric System* • *Summary: Matter* • Science Notebook: Students record predictions and measurements using metric tools for mass and volume.	**Embedded Assessment** • Science notebook • Teacher observation • Notebook sheet **Benchmark Assessment**
• Degree Celsius (°C) is the unit used when scientists measure temperature. • Melting occurs when solids are heated. • Different substances melt at different temperatures. • Evaporation occurs when liquids are heated. • When two substances are combined, a reaction may occur, producing a new substance with unique properties. • Matter is made of small particles, atoms.	• *Change of State* • *Atoms* • *Reactions* • *Summary: Changing Matter* • Science Notebook: Students explain the results of a chemical reaction.	**Embedded Assessment** • Teacher observation • Notebook sheet **Benchmark Assessment** • I-Check 4 **Posttest**

FOSS AND CALIFORNIA STANDARDS

The **Structures of Life Module** supports the following Life Sciences Content Standards for grade 3.*

PHYSICAL SCIENCES

LS3 Adaptations in physical structure or behavior may improve an organism's chance for survival.

As a basis for understanding this concept, students know

- LS3a plants and animals have structures that serve different functions in growth, survival, and reproduction.
- LS3b examples of diverse life forms in different environments, such as oceans, deserts, tundra, forests, grasslands, and wetlands.
- LS3c living things cause changes in the environment in which they live: some of these changes are detrimental to the organism or other organisms, and some are beneficial.
- LS3d when the environment changes, some plants and animals survive and reproduce; others die or move to new locations.
- LS3e that some kinds of organisms that once lived on Earth have completely disappeared and that some of those resembled others that are alive today.

"The life sciences standards in grade three continue to develop students' concepts of ecology and evolution by relating adaptation to the survival and fitness of the organism. Although natural selection is not formally discussed at this level, the foundation is set for teaching that principle in later grade levels. A significant effort is made to enhance students' knowledge of the types of plants and animals in different environments as this understanding becomes an important base of knowledge."†

**Science Content Standards for California Public Schools: Kindergarten through Grade Twelve* (Sacramento: California Department of Education, 2000).

†*Science Framework for California Public Schools: Kindergarten through Grade Twelve* (Sacramento: California Department of Education, 2003), page 50.

The **Structures of Life Module** supports the following Investigation and Experimentation Content Standards for grade 3.*

INVESTIGATION AND EXPERIMENTATION

I&E5 Scientific progress is made by asking meaningful questions and conducting careful investigations.

As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will

- I&E5a repeat observations to improve accuracy and know that the results of similar scientific investigations seldom turn out exactly the same because of differences in the things being investigated, methods being used, or uncertainty in the observation.
- I&E5c use numerical data in describing and comparing objects, events, and measurements.
- I&E5d predict the outcome of a simple investigation and compare the result with the prediction.
- I&E5e collect data in an investigation and analyze those data to develop a logical conclusion.

"Students can begin to make predictions based on observations, prior knowledge, and logic. Predictions should not be confused with random guesses. Students should know that their predictions must be verified by experiments and the analysis of data gathered from careful measurements."[t]

**Science Content Standards for California Public Schools: Kindergarten through Grade Twelve* (Sacramento: California Department of Education, 2000).

[t]*Science Framework for California Public Schools: Kindergarten through Grade Twelve* (Sacramento: California Department of Education, 2003), page 55.

STRUCTURES OF LIFE MODULE MATRIX

SYNOPSIS	CA LIFE SCIENCES STANDARDS	CA I&E STANDARDS
1. ORIGIN OF SEEDS Students conduct a seed hunt by opening fresh fruit and locating the seeds. They describe and compare seed properties and structures. They investigate the effect water has on the seeds by setting up seed sprouters and observing and recording changes over a week. Students systematically find out how much water lima beans soak up in a day.	LS3a Plants and animals have structures that serve different functions. LS3c Living things change their environment: some of these changes are detrimental, and some are beneficial.	I&E5a Repeat observations to improve accuracy. I&E5c Use numerical data in describing and comparing objects, events, and measurements. I&E5d Predict the outcome of an investigation and compare the result with the prediction. I&E5e Collect data and analyze them to
2. GROWING FURTHER Students examine germinated seeds to determine similarities and differences in the way the plants grow. They set up a hydroponic garden to observe the life cycle of a bean plant. Through direct observations and readings students learn about plant structures and functions.	LS3a Plants and animals have structures that serve different functions.	I&E5c Use numerical data in describing and comparing objects, events, and measurements. I&E5e Collect data and analyze them to develop a conclusion.
3. MEET THE CRAYFISH Students observe and record some of the structures of a crustacean, the crayfish. Students investigate crayfish behavior and map where the crayfish spend their time within their habitat. Students investigate crayfish territorial behavior. Through readings, organisms cards, and a video, students learn about adaptations of organisms in different environments.	LS3a Plants and animals have structures that serve different functions. LS3b Diverse life forms live in different environments.	I&E5d Predict the outcome of an investigation and compare the result with the prediction. I&E5e Collect data and analyze them to develop a conclusion.
4. MEET THE LAND SNAIL Students study snail structures and behaviors and set up an appropriate habitat for the animals. They compare the structures and behaviors of the snail (a gastropod) to the crayfish (a crustacean). Through readings students study examples of organisms that change the environment. And they read about what can happen to organisms when environments change.	LS3c Living things change their environment: some of these changes are detrimental, and some are beneficial. LS3d When the environment changes, some plants and animals survive and reproduce; others die or move. LS3e Some kinds of organisms that once lived on Earth have completely disappeared, and some resembled others that are alive today.	I&E5c Use numerical data in describing and comparing objects, events, and measurements. I&E5e Collect data and analyze them to develop a conclusion.

CONCEPTS	READING AND WRITING	ASSESSMENT
• Seeds are found in the plant part called a fruit. • Different kinds of fruits have different kinds and numbers of seeds. • Seeds have a variety of properties. • Seeds undergo changes in the presence of water. • A seed is an organism, a living thing.	• *The Reason for Fruit* • *The Most Important Seed* • *Barbara McClintock* • Science Notebook: Students record properties and structures of seeds and how they change during germination. They record numerical data on the amount of water lima beans soak up.	**Pretest** **Embedded Assessment** • Response sheet • Teacher observation **Benchmark Assessment** • I-Check 1
• Germination is the onset of a plant's growth. • Plants need water, light, and nutrients to grow. • The life cycle is the process of a seed growing into a mature plant, which in turn produces seeds. • The fruit of the plant develops from the flower.	• *Germination* • *Life cycle* • *Summary: Growing Further* • Science Notebook: Students describe the life cycle of a bean plant.	**Embedded Assessment** • Teacher observation • Notebook sheet **Benchmark Assessment** • I-Check 2
• Crayfish have observable structures such as legs, pincers, antennae, eyes, swimmerets, tail, and mouth parts. These structures have functions that help the organism survive in its environment. • Behavior is what an animal does. • Some animals claim a territory that they protect from other animals. • Different organisms can live in different environments; organisms have adaptations that allow them to survive.	• *Crayfish* • *Adaptations* • *Life on Earth* • *Summary: Meet the Crayfish* • Science Notebook: Students record observations about crayfish structures and behaviors and write about animal adaptations. Students record observations of an investigation on crayfish territory.	**Embedded Assessment** • Notebook sheet **Benchmark Assessment** • I-Check 3
• Land snails have a coiled shell, a large foot on which they glide, and a body with a variety of structures. • An organism's structures have functions that help it survive in its habitat. • The structures found on different kinds of organisms show some similarities and some differences. • Some organisms that once lived on Earth died out when the environment changed. • Organisms can change their environment; this can be detrimental or beneficial.	• *Inside a Snail's Shell* • *A Change in the Environment* • *Frogs* • *Life in Los Angeles* • *Summary: Meet the Land Snail* • Science Notebook: Students compare structures and functions of two organisms. They write about the results of changes in the environment.	**Embedded Assessment** • Teacher observation • Notebook sheet **Benchmark Assessment** • I-Check 4 **Posttest**

FOSS AND CALIFORNIA STANDARDS

The **Sun, Moon, and Stars Module** supports the following Physical and Earth Sciences Content Standards for grade 3.*

EARTH SCIENCES

ES4 Objects in the sky move in regular and predictable patterns.

As a basis for understanding this concept, students know

ES4a the patterns of stars stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons.

ES4b the way in which the Moon's appearance changes during the four-week lunar cycle.

ES4c telescopes magnify the appearance of some distant objects in the sky, including the Moon and the planets. The number of stars that can be seen through telescopes is dramatically greater than the number that can be seen by the unaided eye.

ES4d that Earth is one of several planets that orbit the Sun and that the Moon orbits Earth.

ES4e the position of the Sun in the sky changes during the course of the day and from season to season.

PHYSICAL SCIENCES

PS2 Light has a source and travels in a direction.

As a basis for understanding this concept, students know

PS2a sunlight can be blocked to create shadows.

"Earth sciences standards in grade three center on the concept that objects in the sky move in regular and predictable patterns. It is important that students know and are familiar with the patterns and movements of the Sun, Moon, and stars, both as those bodies actually move and as they appear to move when viewed from Earth."†

**Science Content Standards for California Public Schools: Kindergarten through Grade Twelve* (Sacramento: California Department of Education, 2000).

†*Science Framework for California Public Schools: Kindergarten through Grade Twelve* (Sacramento: California Department of Education, 2003), page 52.

The **Sun, Moon, and Stars Module** supports the following Investigation and Experimentation Content Standards for grade 3.*

INVESTIGATION AND EXPERIMENTATION

I&E5 Scientific progress is made by asking meaningful questions and conducting careful investigations.

As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will

I&E5d predict the outcome of a simple investigation and compare the result with the prediction.

I&E5e collect data in an investigation and analyze those data to develop a logical conclusion.

"Students can begin to make predictions based on observations, prior knowledge, and logic. Predictions should not be confused with random guesses. Students should know that their predictions must be verified by experiments and the analysis of data gathered from careful measurements."†

Science Content Standards for California Public Schools: Kindergarten through Grade Twelve (Sacramento: California Department of Education, 2000).

†*Science Framework for California Public Schools: Kindergarten through Grade Twelve* (Sacramento: California Department of Education, 2003), page 55.

SUN, MOON, AND STARS MODULE MATRIX

SYNOPSIS	CA SCIENCE STANDARDS	CA I&E STANDARDS
1. THE SUN		
Students use a compass to study the position of the Sun in the sky at different times during the day. They observe the Sun's position, record, make predictions, and make new observations later in the day to check their predictions. Students explore shadows created by blocking sunlight on the schoolyard. They trace shadows, predict where shadows will be later in the day, and return to check their predictions. Students read about the changing position of the Sun in the sky.	ES4e The position of the Sun in the sky changes during the course of the day and from season to season. PS2a Sunlight can be blocked to create shadows.	I&E5d Predict the outcome of an investigation and compare the result with the prediction. I&E5e Collect data and analyze them to develop a conclusion.
2. THE MOON		
Students observe the Moon in the sky during the day and night for a period of 4 weeks. They record the appearance of the Moon and analyze the data to discover a sequence of changes, the lunar cycle. Students learn the names of the Moon phases and how to predict the next step in the sequence. Concepts are reinforced through simulations, readings, a video, and writing.	ES4b The Moon's appearance changes during the 4-week lunar cycle. ES4d Earth is one of several planets that orbit the Sun; the Moon orbits Earth.	I&E5e Collect data and analyze them to develop a conclusion.
3. THE STARS		
Students look to the night sky to observe the stars and are introduced to the constellations people have named. Students engage in simulations to understand why the stars appear to move across the sky during the night and why different stars can be seen from Earth at different seasons. Students read about the role of telescopes in astronomy research and about star scientists.	ES4a The patterns of stars stay the same, and different stars can be seen in different seasons. ES4c Telescopes magnify the appearance of some distant objects in the sky. Many more stars can be seen through telescopes than by the unaided eye.	

CONCEPTS	READING AND WRITING	ASSESSMENT
• The Earth spins on its axis. • The Sun rises in the east and sets in the west every day. • A compass is a tool used to determine directions (east, west, north, and south). • Shadows are the areas of darkness created when an opaque object blocks light. • The shapes of shadows change over a day and depend on the position of the Sun in the sky. • Day happens when a location on Earth is facing toward the Sun. • Night happens when a location on Earth is facing away from the Sun. • The exact path the Sun takes in the sky varies by season.	• *Sunrise/Sunset* • *Changing Shadows* • *Summary: The Sun* • Science Notebook: Students record and predict the movement of the Sun. They respond to questions on sun and shadows.	**Pretest** **Embedded Assessment** • Science notebook **Benchmark Assessment** • I-Check 1
• Objects in the night sky include the Moon, stars, and other planets. • Earth is one of several planets that orbit the Sun in the solar system. • The Moon orbits Earth. • The Moon can appear in the sky during both night and day. • The Moon changes its appearance, or phase, in a regular pattern over 4 weeks. • Moon phase is the portion of the illuminated half of the Moon that is visible from Earth.	• *The Night Sky* • *Changing Moon* • *Summary: The Moon* • Science Notebook: Students record their observations of the Moon over time. They show their understanding of the lunar cycle.	**Embedded Assessment** • Science notebook **Benchmark Assessment** • I-Check 2
• Stars are suns positioned at great distances from Earth. • Groups of stars form patterns called constellations. • Stars (constellations) appear to move together across the night sky because Earth rotates. • Stars can be observed from Earth's surface only at night. • Different constellations can be observed during different seasons because Earth revolves around the Sun. • Stars are different sizes and have different brightnesses. • Telescopes make distant objects look closer and larger.	• *Stargazing* • *Looking through Telescopes* • *Star Scientists* • *Summary: The Stars* • Science Notebook: Students explain the apparent motion of the stars across the night sky.	**Embedded Assessment** • Science notebook **Benchmark Assessment** • I-Check 3 **Posttest**