



FOSS AND CALIFORNIA STANDARDS

The **Balance and Motion Module** supports the following Physical Sciences Content Standards for grade 2.*

PS1 The motion of objects can be observed and measured.

As a basis for understanding this concept, students know

- PS1a the position of an object can be described by locating it in relation to another object or to the background.
- PS1b an object's motion can be described by recording the change in position of the object over time.
- PS1c the way to change how something is moving is by giving it a push or a pull. The size of the change is related to the strength, or the amount of force, of the push or pull.
- PS1d tools and machines are used to apply pushes and pulls (forces) to make things move.
- PS1e objects fall to the ground unless something holds them up.
- PS1f magnets can be used to make some objects move without being touched.
- PS1g sound is made by vibrating objects and can be described by its pitch and volume.

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



The **Balance and Motion Module** supports the following Investigation and Experimentation Content Standards for grade 2.*

INVESTIGATION AND EXPERIMENTATION

I&E4 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&E4a make predictions based on observed patterns and not random guessing.
- I&E4b measure length, weight, temperature, and liquid volume with appropriate tools and express those measurements in standard metric system units.
- I&E4d write or draw descriptions of a sequence of steps, events, and observations.
- I&E4g follow oral instructions for a scientific investigation.

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

BALANCE AND MOTION MODULE MATRIX

SYNOPSIS

CA PHYSICAL SCIENCES STANDARDS

CA I&E STANDARDS

1. THE FIRST STRAW

Students learn the need for standard units of linear measurement. They measure objects with nonstandard units (straws), and then use a meter tape to measure objects in meters and centimeters. Later they apply linear metric measures to study motion.

I&E4b Measure length, weight, temperature, and liquid volume in metric units.
I&E4g Follow oral instructions for a scientific investigation.

2. BALANCE

Students explore numerous ways to balance two-dimensional shapes made out of tagboard by positioning counterweights (clothespins) in strategic locations. They make mobiles to apply their understanding of a stable position.

PS1a The position of an object can be described in relation to another object or to the background.

I&E4a Make predictions based on observed patterns.
I&E4d Write/draw descriptions of a sequence.
I&E4g Follow oral instructions for a scientific investigation.

3. SPINNERS

Students explore the variables that influence the spinning of a top, a zoomer, and twirlers (flying spinners). They explore the forces (pushes and pulls) that make tops and zoomers move. They observe the force of gravity causing objects to fall (twirlers).

PS1b An object's motion can be described by recording its change in position over time.
PS1c The way to change how something is moving is by giving it a push or a pull.
PS1e Objects fall to the ground unless something holds them up.

I&E4d Write/draw descriptions of a sequence.
I&E4g Follow oral instructions for a scientific investigation.

4. ROLLERS

Students investigate rolling objects—wheels, cups, and spheres—and describe change in position over time. They gain more experience with gravity causing objects to fall to the ground. Students use flexible marble runways to observe an object's change of position.

PS1b An object's motion can be described by recording its change in position over time.
PS1c The way to change how something is moving is by giving it a push or a pull.
PS1e Objects fall to the ground unless something holds them up.

I&E4a Make predictions based on observed patterns.
I&E4b Measure length, weight, temperature, and liquid volume in metric units.

5. BACK AND FORTH

Students explore the production of sound with a door fiddle, tuning forks, xylophone, kalimba, and a long gong. Through these explorations, students look for vibrations at the sound source and explore how to change pitch and volume of sound.

PS1c The way to change how something is moving is by giving it a push or a pull.
PS1g Sound is made by vibrating objects and has pitch and volume.

I&E4a Make predictions based on observed patterns.
I&E4b Measure length, weight, temperature, and liquid volume in metric units.
I&E4d Write/draw descriptions of a sequence.
I&E4g Follow oral instructions for a scientific investigation.

6. MAGNETS AND TOOLS

Students work with magnets and find that two magnets will either attract or repel one another, depending on their orientation (force at a distance). They read about and view a video on how tools and machines make things move.

PS1d Tools and machines are used to apply forces to make things move.
PS1f Magnets make some objects move without being touched.

I&E4a Make predictions based on observed patterns.

- The meter (m) is the standard metric unit of linear measurement; 100 centimeters (cm) make a meter.
- Length is how far it is from one point to another.

- Objects can be balanced in many ways.
- A stable position is one that is steady; the object is not falling over.
- Counterweights positioned in certain ways can help balance an object.
- A mobile is a system of balanced beams and objects.

- A force is a push or pull; gravity is a pulling force.
- Objects and systems that turn on a central axis exhibit rotational motion.
- The amount and position of mass affect how an object rotates.
- The motion of an object can be changed by pushing or pulling.

- Wheels and spheres roll down a slope because of gravity.
- Wheel-and-axle systems with wheels of different sizes roll toward the smaller wheel.
- The amount and location of mass can change the way a system rolls.

- Sound is caused by vibrations.
- Pitch is how high or low a sound is; differences in pitch are caused by differences in the rate at which objects vibrate.
- Volume is how loud or soft a sound is.

- Two magnets attract or repel when they come together.
- The magnetic force (push or pull) acts through space and most materials.
- Tools and machine can apply pushes and pulls to make things move.

- Science Notebook: Students measure and record lengths in metric units. They make their own meter tape.

- *FOSS Science Resources: Balance and Motion, "Make it Balance"*
- Science Notebook: Students draw and write a how-to guide describing the sequence of steps to balance a shape. Students respond to questions on a reading about balance.

- *FOSS Science Resources: Balance and Motion, "Push or Pull" and "Things that Spin"*
- Science Notebook: Students respond to questions about pushes and pulls.

- *FOSS Science Resources: Balance and Motion, "Rolling, Rolling, Rolling"*
- Science Notebook: Students analyze drawings to describe the outcome of a rolling-marble event.

- *FOSS Science Resources: Balance and Motion, "Strings in Motion"*
- Science Notebook: Students observe and describe what is vibrating to make a sound.

- *FOSS Science Resources: Balance and Motion, "Move It, But Don't Touch It" and "Tools and Machines"*
- Science Notebook: Students describe what happens when two magnets come together.

Teacher Observation/Notebook Sheet

- Estimates, measures, and records linear metric measurements.

Teacher Observation/Notebook Sheet

- Predicts which shapes will balance in a stable position.

Teacher Observation

- Understands that a push or a pull can change the way things move.
- Understands that speed and mass can affect how an object spins.

Teacher Observation/Notebook Sheet

- Observes, describes, and compares motion of rolling objects.
- Predicts the motion of cups rolling down slopes.
- Understands that a sphere rolls from a higher to a lower position.

Teacher Observation/Notebook Sheet

- Understands that the source of sound is a vibrating object.
- Demonstrates understanding of the role length plays in the change of pitch.

Teacher Observation

- Describes examples of how magnets interact and how tools apply forces (push or pull) to make things move.

End-of-Module Assessment



FOSS AND CALIFORNIA STANDARDS

The **Insects and Plants Module** supports the following Life Sciences Content Standards for grade 2.*

LS2 Plants and animals have predictable life cycles.

As a basis for understanding this concept, students know

- LS2a that organisms reproduce offspring of their own kind and that the offspring resemble their parents and one another.
- LS2b the sequential stages of life cycles are different for different animals, such as butterflies, frogs, and mice.
- LS2c many characteristics of an organism are inherited from the parents. Some characteristics are caused or influenced by the environment.
- LS2d there is variation among individuals of one kind within a population.
- LS2e light, gravity, touch, or environmental stress can affect the germination, growth, and development of plants.
- LS2f flowers and fruits are associated with reproduction in plants.

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



The **Insects and Plants Module** supports the following Investigation and Experimentation Content Standards for grade 2.*

INVESTIGATION AND EXPERIMENTATION

I&E4 *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&E4a make predictions based on observed patterns and not random guessing.
- I&E4b measure length, weight, temperature, and liquid volume with appropriate tools and express those measurements in standard metric system units.
- I&E4c compare and sort common objects according to two or more physical attributes (e.g., color, shape, texture, size, weight).
- I&E4d write or draw descriptions of a sequence of steps, events, and observations.
- I&E4e construct bar graphs to record data, using appropriately labeled axes.
- I&E4f use magnifiers or microscopes to observe and draw descriptions of small objects or small features of objects.
- I&E4g follow oral instructions for a scientific investigation.

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

INSECTS AND PLANTS MODULE MATRIX

SYNOPSIS

CA LIFE SCIENCES STANDARDS

CA I&E STANDARDS

1. MEALWORMS

Each student receives two larval mealworms in a vial to care for and observe. Over 10 weeks students observe the larvae grow, molt, pupate, and turn into beetles (adults), which mate, lay eggs, and die. They read two articles about insects in the environment.

- LS2a Organisms reproduce offspring that resemble their parents and one another.
- LS2c Many characteristics of an organism are inherited from the parents. Some are influenced by the environment.

- I&E4d Write/draw descriptions of a sequence.
- I&E4f Use magnifiers to observe and draw small objects.
- I&E4g Follow oral instructions for a scientific investigation.

2. BRASSICA SEEDS

Each student plants tiny rapid-cycling brassica seeds in a planter cup. The brassica plants grow under continuous light and develop for a month. Students observe and record the complete life cycle from seed to seed. They read about flower and seeds.

- LS2d Individuals of one kind vary within a population.
- LS2e Light, gravity, touch, or environmental stress can affect the germination, growth, and development of plants.
- LS2f Flowers and fruits are associated with reproduction in plants.

- I&E4d Write/draw descriptions of a sequence.
- I&E4e Construct bar graphs to record data.
- I&E4f Use magnifiers to observe and draw small objects.
- I&E4g Follow oral instructions for a scientific investigation.

3. MILKWEED BUGS

Groups of students receive vials of milkweed bug eggs. Each group prepares a habitat for the bugs, providing air, space, food, and water. They observe structure, pattern, and behavior as the insects advance through simple metamorphosis. They read two articles about insect variation, shape, and color.

- LS2a Organisms reproduce offspring that resemble their parents and one another.
- LS2d Individuals of one kind vary within a population.

- I&E4b Measure length, weight, temperature, and liquid volume in metric units.
- I&E4d Write/draw descriptions of a sequence.
- I&E4f Use magnifiers to observe and draw small objects.
- I&E4g Follow oral instructions for a scientific investigation.

4. SILKWORMS

Students observe the life history of one of the most commercially successful insects. They start with eggs and observe the growth and changes to larvae, pupae, and adults who produce eggs. Students study the structure of a moth larva, and read two articles about insects

- LS2a Organisms reproduce offspring that resemble their parents and one another.
- LS2d Individuals of one kind vary within a population.

- I&E4a Make predictions based on patterns.
- I&E4d Write/draw descriptions of a sequence.
- I&E4f Use magnifiers to observe and draw small objects.
- I&E4g Follow oral instructions for a scientific investigation.

5. BUTTERFLIES

The class observes the painted lady larvae grow, pupate, and emerge as adults. Students experience the stages of complete metamorphosis and compare the behaviors of moths and butterflies. They read about life cycles of other animals and compare to insects.

- LS2a Organisms reproduce offspring that resemble their parents and one another.
- LS2b The sequential stages of life cycles are different for different animals.
- LS2c Many characteristics of an organism are inherited from the parents. Some are influenced by the environment.
- LS2d Individuals of one kind vary within a population.

- I&E4a Make predictions based on observed patterns.
- I&E4d Write/draw descriptions of a sequence.
- I&E4f Use magnifiers to observe and draw small objects.
- I&E4g Follow oral instructions for a scientific investigation.

- Insects need air, food, water, and space; environment affects growth.
- Insects have characteristic structures and behaviors; some are inherited from parents.
- The life cycle of the beetle is egg, larva, pupa, and adult, which produces eggs.

- Seeds need water, light, air, and nutrients to grow and develop.
- As plants grow, they develop roots, stems, leaves, buds, flowers, and seeds in a sequence called life cycle.
- Environment affects growth.

- Insects have three body parts: head, thorax, and abdomen.
- Insects have different structures for eating different kinds of food.
- Some insects go through simple metamorphosis (egg, nymph, adult).
- Offspring resemble parents.
- There is variation in a population.
- Insect larvae have characteristic structures.
- Insect adults have characteristic structures.
- Male and female insects mate. The life cycle of silkworms is egg, larva, pupa, and adult, which produces eggs.

- Insect larvae and adults have structures in common.
- The life cycle of the butterfly is egg, larva, pupa, and adult, which produces eggs.
- There are similarities and differences in the life cycles of different kinds of animals.

- *FOSS Science Resources: Insects and Plants, "So Many Kinds, So Many Places" and "Environment"*
- Science Notebook: Students draw and write about mealworms and their life cycle.

- *FOSS Science Resources: Insects and Plants, "Flowers and Seeds"*
- Science Notebook: Students draw and write about the growth of brassica and its life cycle.

- *FOSS Science Resources: Insects and Plants, "Variation" and "Insect Shapes and Colors"*
- Science Notebook: Students draw and write about milkweed bugs and their life cycle.

- *FOSS Science Resources: Insects and Plants, "What Makes an Insect an Insect?" and "Same but Different"*
- Science Notebook: Students draw and write about silkworms and their life cycle.

- *FOSS Science Resources: Insects and Plants, "Insect Life Cycles," and "Life Goes Around"*
- Science Notebook: Students draw and write about butterflies and their life cycle.

Notebook Sheets

- Observes and records detailed structures of mealworms using magnifier.
- Understands mealworm life cycle.

Notebook Sheet

- Observes and records detailed structures of brassica using magnifier.

Notebook Sheets

- Observes and records detailed structures of milkweed bugs using magnifier.
- Sequences the stages of generic insect as it progresses through simple metamorphosis.

Teacher Observation/Notebook Sheet

- Observes, describes, and compares details of structures of organisms and uses new vocabulary appropriately.
- Makes models of insects.
- Writes about silkworm life cycle.

Teacher Observation/Notebook Sheet

- Predicts how larvae will develop based on experience with other organisms.
- Sequences the life cycle of a generic moth.

End-of-Module Assessment



FOSS AND CALIFORNIA STANDARDS

The **Pebbles, Sand, and Silt Module** supports the following Earth Sciences Content Standards for grade 2.*

ES3 *Earth is made of materials that have distinct properties and provide resources for human activities.*

As a basis for understanding this concept, students know

- ES3a how to compare the physical properties of different kinds of rocks and know that rock is composed of different combinations of minerals.
- ES3b smaller rocks come from the breakage and weathering of larger rocks.
- ES3c that soil is made partly from weathered rock and partly from organic materials and that soils differ in their color, texture, capacity to retain water, and ability to support the growth of many kinds of plants.
- ES3d that fossils provide evidence about the plants and animals that lived long ago and that scientists learn about the past history of Earth by studying fossils.
- ES3e rock, water, plants, and soil provide many resources, including food, fuel, and building materials, that humans use.

“The focus of earth sciences in grade two is on the composition, processes, and materials of Earth’s crust.”†

**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 41.



The **Pebbles, Sand, and Silt Module** supports the following Investigation and Experimentation Content Standards for grade 2.*

INVESTIGATION AND EXPERIMENTATION

I&E4 *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&E4a make predictions based on observed patterns and not random guessing.
- I&E4b measure length, weight, temperature, and liquid volume with appropriate tools and express those measurements in standard metric system units.
- I&E4c compare and sort common objects according to two or more physical attributes (e.g., color, shape, texture, size, weight).
- I&E4d write or draw descriptions of a sequence of steps, events, and observations.
- I&E4e construct bar graphs to record data, using appropriately labeled axes.
- I&E4f use magnifiers or microscopes to observe and draw descriptions of small objects or small features of objects.
- I&E4g follow oral instructions for a scientific investigation.

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

PEBBLES, SAND, AND SILT MODULE MATRIX

SYNOPSIS

CA EARTH SCIENCES STANDARDS

CA I&E STANDARDS

1. FIRST ROCKS

Students are introduced to the mineral portion of Earth. They investigate several kinds of rocks and begin to understand the properties of rocks and describe rocks based on their physical properties. Students rub rocks, wash rocks, sort rocks, and describe rocks. They also begin to organize a class rock collection. Through two readings, students learn about the properties of rocks and the colorful minerals they contain.

- ES3a Compare the physical properties of different rocks. Rock is composed of different combinations of minerals.
- ES3b Small rocks come from the breakage and weathering of larger rocks.

- I&E4c Compare/sort common objects according to two or more physical attributes.
- I&E4f Use magnifiers to observe and draw small objects.
- I&E4g Follow oral instructions for a scientific investigation.

2. RIVER ROCKS

Students investigate a river rock mixture of earth materials of different sizes. They separate the rocks, using a series of three screens to identify five sizes of rocks: large pebbles, small pebbles, large gravel, small gravel, and sand. They add water to a vial of sand to discover silt and clay. Students learn how sand is formed by reading the Story of Sand.

- ES3b Small rocks come from the breakage and weathering of larger rocks.

- I&E4b Measure length, weight, temperature, and liquid volume in metric units.
- I&E4d Write/draw descriptions of a sequence.
- I&E4e Construct bar graphs to record data.
- I&E4f Use magnifiers to observe and draw small objects.
- I&E4g Follow oral instructions for a scientific investigation.

3. USING ROCKS

Students learn how people use earth materials to construct objects. They make rubbings from sandpaper, sculptures from sand, decorative jewelry from clay, and bricks from clay soil. Students find places where people have used earth materials in building materials. They also read two articles about how rocks move, and how people use large rocks, gravel, sand, and clay to build things.

- ES3b Small rocks come from the breakage and weathering of larger rocks.
- ES3e Rock, water, plants, and soil provide many resources that humans use.

- I&E4f Use magnifiers to observe and draw small objects.
- I&E4g Follow oral instructions for a scientific investigation.

4. SOIL EXPLORATIONS

Students put together and take apart soils. They are introduced to humus as an ingredient in soil. They compare homemade and local soils for texture, water retention capacity, color, and components. Through a video, students learn about what fossils tell us about Earth's past. Through readings, students learn more about soil, why soil is important for plants, and a famous dinosaur fossil.

- ES3c Soil is made from weathered rock and organic materials. Soils differ in their characteristics.
- ES3d Fossils provide evidence about organisms that lived long ago, and scientists learn about the history of Earth by studying fossils.
- ES3e Rock, water, plants, and soil provide many resources that humans use.

- I&E4a Make predictions based on observed patterns and not random guessing.
- &E4b Measure length, weight, temperature, and liquid volume in metric units.
- I&E4d Write/draw descriptions of a sequence.
- I&E4g Follow oral instructions for a scientific investigation.

- Rocks have a variety of properties including color, hardness, shape, texture, and size.
- Rocks can be sorted by their properties.
- Rocks are all around us.
- Rocks are the solid material of the earth.
- Rocks are made of minerals.

- *FOSS Science Resources: Pebbles, Sand, and Silt, "Exploring Rocks" and "Colorful Rocks"*
- Science Notebook: Students draw and write their observations about rocks.

- Teacher Observation/Notebook Sheet**
- Observes and records properties of rocks.
 - Compares and sorts rocks.

- Rocks can be categorized by size.
- Screens and water can be used to sort the sizes of earth materials.
- Five sizes of rocks, from smallest to largest, are clay, silt, sand, gravel, and pebbles.

- *FOSS Science Resources: Pebbles, Sand, and Silt, "The Story of Sand"*
- Science Notebook: Students draw and write about the results of sorting river rock mixture, using screens and water.

- Teacher Observation/Notebook Sheet**
- Observes and seriates rocks based on the property of size and uses appropriate vocabulary.
 - Uses a balance to weigh rocks and record in grams.
 - Describes the appropriate sequence of steps to weigh an object.
 - Observes and compares results of earth materials in water.

- Notebook Sheet**
- Observes uses for earth materials and describes these uses.

- Earth materials are natural resources.
- The properties of different earth materials make each suitable for specific uses.
- Earth materials can be used in a variety of constructions.

- *FOSS Science Resources: Pebbles, Sand, and Silt, "Rocks Move" and "Making Things with Rocks"*
- Science Notebook: Students write about the uses of earth materials.

- Teacher Observation/Notebook Sheet**
- Accurately observes and records observations.
 - Applies methods and tools to study properties of soil.
 - Writes the sequence of steps in an investigation.
 - Uses measurement tools.

End-of-Module Assessment

- Soil is a mixture of earth materials.
- Soils vary from place to place.
- Soils have properties of color and texture.
- Soils differ in their abilities to support plants and retain water.
- Soils can be composed of humus and different amounts and sizes of rocks.
- Fossils are the remains of plants and animals that lived a long time ago.

- *FOSS Science Resources: Pebbles, Sand, and Silt, "What Is in Soil?" "Testing Soil," and "Fossils"*
- Science Notebook: Students describe soil samples, using drawings and words. Students write a sequence of steps in an investigation.