# Physical Sciences—Grade Five

# Alternate Item Content Specifications

**Prepared for the California Department of Education by Educational Testing Service**



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## 3-PS2-1 Motion and Stability: Forces and Interactions

| California Science Connector | Focal Knowledge, Skills, and Abilities | Essential Understanding |
| --- | --- | --- |
| Identify through observation and demonstration ways to change the motion of an object (e.g., size or mass of the object, direction of forces).  | 1. Ability to identify ways to change the motion of an object.
 | Identify a push or a pull as a way to change the motion of an object.  |

### CA NGSS Performance Expectation

Students who demonstrate understanding can:

**Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object**. [Clarification Statement: Examples could include an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all.] *[Assessment Boundary*: *Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.]*

### Mastery Statements

Students will be able to:

* Identify a push
* Identify a pull
* Identify whether a push or a pull is responsible for moving an object
* Identify forces that will move or stop objects
* Identify forces that will change the motion of a moving object

### Possible Phenomena or Contexts

*Note that the list in this section is not exhaustive or prescriptive.*

**Possible contexts include the following:**

* A force acting on an object initially at rest (e.g., kicking a ball)
* A force acting on an object already in motion (e.g., tapping a rolling marble, stopping a rolling bicycle)

### Additional Assessment Boundaries

None listed at this time

### Additional References

California Science Test Item Specification for 3-PS2-1

<https://www.cde.ca.gov/ta/tg/ca/documents/itemspecs-3-ps2-1.docx>

Environmental Principles and Concepts <http://californiaeei.org/abouteei/epc/>

The *2016 Science Framework for California Public Schools Kindergarten through Grade Twelve* <https://www.cde.ca.gov/ci/sc/cf/cascienceframework2016.asp>

Appendix 1: Progression of the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts in Kindergarten through Grade Twelve

<https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix1.pdf>

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## 4-PS3-2 Energy

| California Science Connector | Focal Knowledge, Skills, and Abilities | Essential Understanding |
| --- | --- | --- |
| Through observation of a model, identify that energy can be moved from place to place (e.g., by moving objects, through sound, light, or electric currents). | 1. Ability to identify a model showing that energy can be moved from place to place.
 | Identify evidence that an object has energy (e.g., heat, lighted light bulb). |

### CA NGSS Performance Expectation

Students who demonstrate understanding can:

**Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.** *[Assessment Boundary*: *Assessment does not include quantitative measurements of energy]*

### Mastery Statements

Students will be able to:

* Identify objects giving off light as having energy
* Identify objects giving off sound as having energy
* Identify objects giving off heat as having energy
* Identify energy that is transferred by electricity to produce motion, sound, heat, or light
* Identify energy that is transferred by sound traveling from one place to another
* Identify energy that is transferred by light or heat traveling from one place to another

### Possible Phenomena or Contexts

*Note that the list in this section is not exhaustive or prescriptive.*

**Possible contexts include the following:**

* Light energy moves from the Sun to Earth
* The movement of energy involved during the operation of simple household appliances
* The movement of thermal energy when using a stove or a heater
* Sound energy moves from a musical instrument to the ear

### Additional Assessment Boundaries

* Items should not assess the transfer of energy by moving objects, such as a ball or the wind, and should not assess energy transformations.

### Additional References

California Science Test Item Specification for 4-PS3-2

<https://www.cde.ca.gov/ta/tg/ca/documents/itemspecs-4-ps3-2.docx>

Environmental Principles and Concepts <http://californiaeei.org/abouteei/epc/>

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## 4-PS3-3 Energy

| California Science Connector | Focal Knowledge, Skills, and Abilities | Essential Understanding |
| --- | --- | --- |
| Identify the change in energy (e.g., speeds as objects interact) when objects collide. | 1. Ability to identify the change in energy (e.g., speeds as objects interact) when objects collide.
 | Identify the outcome of a large moving object hitting a small stationary object. |

### CA NGSS Performance Expectation

Students who demonstrate understanding can:

**Ask questions and predict outcomes about the changes in energy that occur when objects collide.** [Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.] *[Assessment Boundary*: *Assessment does not include quantitative measurements of energy.]*

### Mastery Statements

Students will be able to:

* Identify the outcome of a larger object colliding with a smaller object
* Identify the object that caused a specified change in energy of another object
* Identify the change in motion of one or both objects when two objects interact
* Identify the change in energy of one or both objects when two objects interact

### Possible Phenomena or Contexts

*Note that the list in this section is not exhaustive or prescriptive.*

**Possible contexts include the following:**

* Collisions involving two carts
* Collisions involving two balls
* Collisions involving a moving object and a stationary object
* An object strikes another, producing movement

### Additional Assessment Boundaries

* Do not use arrows to represent the magnitude of speed.
* Do not include violent collisions (car crashes, football tackle).

### Additional References

California Science Test Item Specification for 4-PS3-3

<https://www.cde.ca.gov/ta/tg/ca/documents/itemspecs-4-ps3-3.docx>

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## 4-PS4-2 Waves and Their Applications in Technologies for Information Transfer

| California Science Connector | Focal Knowledge, Skills, and Abilities | Essential Understanding |
| --- | --- | --- |
| Recognize that an object can be seen when light reflected from its surface enters the eye. | 1. Ability to recognize that an object can be seen when light reflected from its surface enters the eye.
 | Compare the quality of sight before and after dimming a light source. |

### CA NGSS Performance Expectation

Students who demonstrate understanding can:

**Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.** *[Assessment Boundary*: *Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works. (Comparisons should be absolute (light vs. dark) rather than incremental changes in brightness.)]*

### Mastery Statements

Students will be able to:

* Identify light as necessary to see
* Identify darkness as a condition that impairs sight
* Identify the resulting views when the brightness of light changes
* Identify the correct path of light that enables a person to see
* Identify that light must enter the eye in order to see
* Identify that light must reflect off an object in order for the object to be seen
* Identify that light must reflect off an object and enter a person’s eye for the person to see the object
* Complete a diagram to create the correct path light must travel in order for an object to be seen

### Possible Phenomena or Contexts

*Note that the list in this section is not exhaustive or prescriptive.*

**Possible contexts include the following:**

* Removing, turning off, completely blocking, or decreasing the intensity of a light source
* Producing shadows by partially blocking a light source
* Using a translucent/opaque barrier between an object and an eye
* Using the path of light reflecting off an object to the eye
* Showing that an object cannot be observed without light reflecting off of its surface

### Additional Assessment Boundaries

* None listed at this time

### Additional References

California Science Test Item Specification for 4-PS4-2

<https://www.cde.ca.gov/ta/tg/ca/documents/itemspecs-4-ps4-2.docx>

Environmental Principles and Concepts <http://californiaeei.org/abouteei/epc/>

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## 5-PS1-1 Matter and Its Interactions

| California Science Connector | Focal Knowledge, Skills, and Abilities | Essential Understanding |
| --- | --- | --- |
| Identify in a model (e.g., picture, diagram) that all matter can be broken down into smaller and smaller pieces until they are too small to be seen by human eyes. | 1. Ability to identify in a model (e.g., picture, diagram) that all matter can be broken down into smaller and smaller pieces until they are too small to be seen by human eyes.
 | Match a means of detecting the existence of matter by means other than by the human eye (e.g., use of an inflated vs. flat balloon, breath of air on hand, microscope magnifying). |

### CA NGSS Performance Expectation

Students who demonstrate understanding can:

**Develop a model to describe that matter is made of particles too small to be seen.** [Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] *[Assessment Boundary*: *Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]*

### Mastery Statements

Students will be able to:

* Identify a phenomenon that provides evidence of the presence of matter
* Identify the resulting image from looking through a microscope
* Identify tools that magnify objects
* Identify a magnified object
* Identify an example in which a substance dissolved in a liquid produces a change in the appearance of the liquid, which is evidence that the dissolved substance still exists
* Identify an object as being composed of particles that are too small to be seen

### Possible Phenomena or Contexts

*Note that the list in this section is not exhaustive or prescriptive.*

**Possible contexts include the following:**

* Materials that seem to disappear when they dissolve or evaporate
* Materials that seem to appear when they condense or precipitate
* Objects that are expanded or compressed by air
* Windswept objects
* Materials that are mixed in water and cause its physical appearance to change

### Additional Assessment Boundaries

* Assessment of molecules or atoms is not appropriate. Focus is simply on matter being made of tiny particles.

### Additional References

California Science Test Item Specification for 5-PS1-1

<https://www.cde.ca.gov/ta/tg/ca/documents/itemspecs-5-ps1-1.docx>

Environmental Principles and Concepts <http://californiaeei.org/abouteei/epc/>

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## 5-PS1-2 Matter and Its Interactions

| California Science Connector | Focal Knowledge, Skills, and Abilities | Essential Understanding |
| --- | --- | --- |
| Recognize through observation that the total weight of matter is conserved by comparing the weight of an object before and after it changes from a liquid to a solid and from a solid to a liquid. | 1. Ability to recognize that the total weight of matter is conserved by comparing the weight of an object before and after it changes from a liquid to a solid and from a solid to a liquid (e.g., water in a clear plastic bag that is frozen and defrosted has the same weight).
 | Recognize the change in state from liquid to solid or from solid to liquid of the same material. |

### CA NGSS Performance Expectation

Students who demonstrate understanding can:

**Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.** [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.] *[Assessment Boundary: Assessment does not include distinguishing mass and weight.]*

### Mastery Statements

Students will be able to:

* Identify whether a substance is a liquid or a solid
* Recognize that when a substance changes from one state to another it is still the same substance
* Identify the weight of the substance after it has changed states
* Identify that the weight is not changed when a substance changes state
* Recognize that conservation of weight can be observed by measuring the weight of the object before and after it changes state

### Possible Phenomena or Contexts

*Note that the list in this section is not exhaustive or prescriptive.*

**Possible contexts include the following:**

* Materials changing from a solid to a liquid and vice versa
* The weight of common foods before and after they have melted or been frozen

### Additional Assessment Boundaries

* Do not assess phase changes to the gaseous state or formation of solutions.

### Additional References

California Science Test Item Specification for 5-PS1-2

<https://www.cde.ca.gov/ta/tg/ca/documents/itemspecs-5-ps1-2.docx>

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## 5-PS1-3 Matter and Its Interactions

| California Science Connector | Focal Knowledge, Skills, and Abilities | Essential Understanding |
| --- | --- | --- |
| Classify through observation materials (e.g., shape, texture, buoyancy, color, magnetism, solubility) by physical properties. | 1. Ability to classify materials by physical properties.
 | Match materials with similar physical properties (e.g., color, hardness, response to magnets). |

### CA NGSS Performance Expectation

Students who demonstrate understanding can:

**Make observations and measurements to identify materials based on their properties.** [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] *[Assessment Boundary: Assessment does not include density or distinguishing mass and weight.]*

### Mastery Statements

Students will be able to:

* Identify a shared property between two objects
* Classify objects into groups based on a shared property
* Classify objects into groups based on multiple shared properties

### Possible Phenomena or Contexts

*Note that the list in this section is not exhaustive or prescriptive.*

**Possible contexts include the following:**

* Color/luster
* Magnetism
* Shape
* Texture—hard/soft, rough/smooth
* Clear/opaque
* Reflective/non-reflective
* Flexible/rigid

### Additional Assessment Boundaries

* None listed at this time

### Additional References

California Science Test Item Specification for 5-PS1-3

<https://www.cde.ca.gov/ta/tg/ca/documents/itemspecs-5-ps1-3.docx>

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