

California State Science Standards – Adopted 1997

Grades 6-

Drawing from:

<http://www.cde.ca.gov/ci/sc/cf/documents/scienceframework.pdf>

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6th Grade

Standard Set 1 Plate Tectonics and Earth's Structure

1. Plate tectonics accounts for important features of Earth's surface and major geologic events. As a basis for understanding this concept:

a. *Students know* evidence of plate tectonics is derived from the fit of the continents; the location of earthquakes, **volcanoes**, and midocean ridges; and the distribution of fossils, rock types, and **ancient climatic zones**.

1. **d.** *Students know* that earthquakes are sudden motions along breaks in the crust called faults and that **volcanoes** and fissures are locations where magma reaches the surface.
1. **e.** *Students know* major geologic events, such as earthquakes, **volcanic eruptions**, and mountain building, result from plate motions.
1. **f.** *Students know* how to explain major features of California geology (including mountains, faults, **volcanoes**) in terms of plate tectonics.

Standard Set 2 Shaping Earth's Surface

2. **c.** *Students know* **beaches are dynamic systems in which the sand is supplied by rivers and moved along the coast by the action of waves.**

2. **d.** *Students know* earthquakes, **volcanic eruptions**, landslides, and floods change human and wildlife habitats.

Standard Set 3 Heat (Thermal Energy) Physical Science

3. Heat moves in a predictable flow from warmer objects to cooler objects until all the objects are at the same temperature. As a basis for understanding this concept:

a. *Students know* energy can be carried from one place to another by heat flow or by waves, including water, light and sound waves, or by moving objects.

3. **b. *Students know* that when fuel is consumed, most of the energy released becomes heat energy.**
- c. *Students know* heat flows in solids by conduction (which involves no flow of matter) and in fluids by conduction and by convection (which involves flow of matter).**
3. **d. *Students know* heat energy is also transferred between objects by radiation (radiation can travel through space).**

Standard Set 4 Energy in the Solar System

4. Many phenomena on Earth's surface are affected by the transfer of energy through radiation and convection currents. As a basis for understanding this concept:

a. *Students know* the sun is the major source of energy for phenomena on Earth's surface; it powers winds, ocean currents, and the water cycle.

4. b. *Students know* solar energy reaches Earth through radiation, mostly in the form of visible light.

4. c. *Students know* heat from Earth's interior reaches the surface primarily through convection.

d. *Students know* convection currents distribute heat in the atmosphere and oceans.

4. e. *Students know* differences in pressure, heat, air movement, and humidity result in changes of weather.

Standard Set 5 Ecology (Life Sciences)

5. Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. As a basis for understanding this concept:

a. *Students know* energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis and then from organism to organism through food webs.

5. c. *Students know* populations of organisms can be categorized by the functions they serve in an ecosystem.

6. e. *Students know* the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition.

Standard Set 5 Resources

6. Sources of energy and materials differ in amounts, distribution, usefulness, and the time required for their formation. As a basis for understanding this concept:

a. *Students know* the utility of energy sources is determined by factors that are involved in converting these sources to useful forms and the consequences of the conversion process.

7. b. *Students know* different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water, wildlife, and forests, and know how to classify them as renewable or nonrenewable.

6. c. *Students know* the natural origin of the materials used to make common objects.

Standard Set 7 Investigation and Experimentation

7. 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:

a. Develop a hypothesis.

b. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.

c. Construct appropriate graphs from data and develop qualitative statements about the relationships between variables.

d. Communicate the steps and results from an investigation in written reports and oral presentations.

e. Recognize whether evidence is consistent with a proposed explanation.

f. Read a topographic map and a geologic map for evidence provided on the maps and construct and interpret a simple scale map.

g. Interpret events by sequence and time from natural phenomena (e.g., the relative ages of rocks and intrusions).

h. Identify changes in natural phenomena over time without manipulating the phenomena (e.g., a tree limb, a grove of trees, a stream, a hillslope).

Grade 7 -- Focus on Life Sciences

Standard Set 1 Cell Biology

1. d. *Students know* that mitochondria liberate energy for the work that cells do and that **chloroplasts capture sunlight energy for photosynthesis.**

Standard Set 2 Genetics

Standard Set 3 Evolution

3. Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept:

a. *Students know* **both genetic variation and environmental factors are causes of evolution and diversity of organisms.**

3. e. *Students know* that **extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.**

Standard Set 4 Earth and Life History

4. b. *Students know* the **history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impacts of asteroids.**

4. d. *Students know* that evidence from geologic layers and **radioactive dating** indicates Earth is approximately 4.6 billion years old and that life on this planet has existed for more than 3 billion years.

4. f. *Students know* how movements of Earth's continental and oceanic plates through time, **with associated changes in climate and geographic connections**, have affected the past and present distribution of organisms.

4. g. *Students know* how to explain significant developments and extinctions of plant and animal life on the geologic time scale.

Standard Set 5 Structure and Function in Living Systems

5. b. *Students know* organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.

Students learned in grade five how blood circulates through the body and how oxygen, O₂, and carbon dioxide, CO₂, are exchanged in the lungs and tissues.

5. g. *Students know* how to **relate the structures of the eye and ear to their functions.**

Standard Set 5 Physical Principles in Living Systems

6. **Physical principles underlie biological structures and functions. As a basis for understanding this concept:**

a. *students know* **visible light is a small band within a very broad electromagnetic spectrum.**

6. b. *Students know* that for an **object to be seen, light emitted by or scattered from it must be detected by the eye.**

6. c. *Students know* light travels in straight lines if the medium it travels through does not change.

6. d. *Students know* how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope.

6. e. *Students know* that white light is a mixture of many wavelengths (colors) and that retinal cells react differently to different wavelengths.

6. f. *Students know* **light can be reflected, refracted, transmitted, and absorbed by matter.**

6. g. *Students know* the angle of reflection of a light beam is equal to the angle of incidence.

Standard Set 7 Investigation and Experimentation

7. **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:**

a. **Select and use appropriate tools and technology** (including calculators, computers, balances, spring scales, microscopes, and binoculars) **to perform tests, collect data, and display data.**

b. **Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.**

c. **Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.**

d. **Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e.g., motion of Earth's plates and cell structure).**

e. **Communicate the steps and results from an investigation in written reports and oral presentations**

8th Grade – Focus on Physical Sciences

Standard Set 1 Motion

Standard Set 2 Forces

2. b. *Students know* when an object is subject to two or more forces at once, the result is the cumulative effect of all the forces.

d. *Students know* how to identify separately the two or more forces that are acting on a single static object, including gravity, elastic forces due to tension or compression in matter, and friction.

e. *Students know* that when the forces on an object are unbalanced, the object will change its velocity (that is, it will speed up, slow down, or change direction).

3. f. *Students know* the greater the mass of an object, the more force is needed to achieve the same rate of change in motion.

Standard Set 3 Structure of Matter

3. Each of the more than 100 elements of matter has distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements. As a basis for understanding this concept:

a. *Students know* the structure of the atom and know it is composed of protons, neutrons, and electrons

b. *Students know* that compounds are formed by combining two or more different elements and that compounds have properties that are different from their constituent elements.

3. d. *Students know* the states of matter (solid, liquid, gas) depend on molecular motion.

e. *Students know* that in solids the atoms are closely locked in position and can only vibrate; in liquids the atoms and molecules are more loosely connected and can collide with and move past one another; and in gases the atoms and molecules are free to move independently, colliding frequently.

3. f. *Students know* how to use the periodic table to identify elements in simple compounds.

Standard Set 4 Earth in the Solar System (Earth Sciences)

4. b. *Students know* that the Sun is one of many stars in the Milky Way galaxy and that stars may differ in size, **temperature, and color**

4. c. *Students know* how to use astronomical units and light years as measures of distance between the Sun, stars, and Earth

d. *Students know* that stars are the source of light for all bright objects in outer space and that the Moon and planets shine by reflected sunlight, not by their own light.

4. e. *Students know* the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids.

Standard Set 5 Reactions

5. Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept:

- a. *Students know* reactant atoms and molecules interact to form products with different chemical properties.
5. b. *Students know* the idea of atoms explains the conservation of matter: In chemical reactions the **number of atoms stays the same no matter how they are arranged, so their total mass stays the same.**
- c. *Students know* **chemical reactions usually liberate heat or absorb heat.**
- d. *Students know* physical processes include **freezing and boiling, in which a material changes form with no chemical reaction.**
- e. *Students know* **how to determine whether a solution is acidic, basic, or neutral.**

Standard Set 6 Chemistry of Living Systems (Life Sciences)

6. Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept:

- a. *Students know* that carbon, because of its ability to combine in many ways with itself and other elements, has a central role in the chemistry of living organisms.
6. b. *Students know* that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur.

Standard Set 7 Periodic Table

7. The organization of the periodic table is based on the properties of the elements and reflects the structure of atoms. As a basis for understanding this concept:

- a. *Students know* how to identify regions corresponding to metals, nonmetals, and inert gases.
7. b. *Students know* each element has a specific number of protons in the nucleus (the atomic number) and **each isotope of the element has a different but specific number of neutrons in the nucleus.**
7. c. *Students know* **substances can be classified by their properties, including their melting temperature, density, hardness, and thermal and electrical conductivity.**

Standard Set 8 Density and Buoyancy

8. All objects experience a buoyant force when immersed in a fluid. As a basis for understanding this concept:

- a. *Students know* density is mass per unit volume.
- c. *Students know* the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced.
8. d. *Students know* how to predict whether an object will float or sink.

Standard Set 9 Investigation and Experimentation

9. 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:

Plan and conduct a scientific investigation to test a hypothesis.

Evaluate the accuracy and reproducibility of data.

Distinguish between variable and controlled parameters in a test.

d. Recognize the slope of the linear graph as the constant in the relationship $y = kx$ and apply this principle in interpreting graphs constructed from data.

e. Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.

f. Apply simple mathematical relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed = distance/time, density = mass/volume, force = pressure · area, volume = area · height).

g. Distinguish between linear and nonlinear relationships on a graph of data.

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Standard Set 1

Standard Set 2

Standard Set 3

Standard Set Investigation and Experimentation