



COSEE-West Lecture, November 16, 2005
"Glaciers and Global Sea Level Rise"

California Content Standards for Ice Sheets and Sea Level Rise, Topographic Mapping, and How Water Holds Heat

Sixth Grade

Heat (Thermal Energy) (Physical Sciences)

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:
- d Students know heat energy is also transferred between objects by radiation (radiation can travel through space).

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).

Seventh Grade

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.
 - 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.

Eighth Grade

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:
- 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.

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:
- a Plan and conduct a scientific investigation to test a hypothesis.
 - b Evaluate the accuracy and reproducibility of data.
 - c 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.
 - g. Distinguish between linear and nonlinear relationships on a graph of data.

Earth Science (9-12)

Energy in the Earth System

6. Climate is the long-term average of a region's weather and depends on many factors. As a basis for understanding this concept:
- a. Students know weather (in the short run) and climate (in the long run) involve the transfer of energy into and out of the atmosphere.
 - c Students know how Earth's climate has changed over time, corresponding to changes in Earth's geography, atmospheric composition, and other factors, such as solar radiation and plate movement.
 - d. Students know how computer models are used to predict the effects of the increase in greenhouse gases on climate for the planet as a whole and for specific regions.

Biology/Life Science (9-12)

Ecology

6. Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:
- b. students know how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size.

Investigation & Experimentation (9-12)

- 1 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 four strands, students should develop their own questions and perform investigations. Students will:
- a Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.
 - f. Distinguish between hypothesis and theory as scientific terms.
 - g Recognize the usefulness and limitations of models and theories as scientific representations of reality.
 - h Read and interpret topographic and geologic maps.
 - i Analyze the locations, sequences, or time intervals that are characteristic of natural phenomena (e.g., relative ages of rocks, locations of planets over time, and succession of species in an ecosystem).