

Heat Light and Sound Standard VI and ILOs

Science Benchmark:

Heat, light, and sound are all forms of energy. Heat can be transferred by radiation, conduction and convection. Visible light can be produced, reflected, refracted, and separated into light of various colors. Sound is created by vibration and cannot travel through a vacuum. Pitch is determined by the vibration rate of the sound source.

STANDARD IV:

Students will understand properties and behavior of heat, light, and sound.

STANDARD VI: Students will understand properties and behavior of heat, light, and sound.

Objective 1: Investigate the movement of heat between objects by conduction, convection, and radiation.

- a. Compare materials that conduct heat to materials that insulate the transfer of heat energy.
- b. Describe the movement of heat from warmer objects to cooler objects by conduction and convection.
- c. Describe the movement of heat across space from the sun to Earth by radiation.
- d. Observe and describe, with the use of models, heat energy being transferred through a fluid medium (liquid and/or gas) by convection currents.
- e. Design and conduct an investigation on the movement of heat energy

Objective 2: Describe how light can be produced, reflected, refracted, and separated into visible light of various colors.

- a. Compare light from various sources (e.g., intensity, direction, color).
- b. Compare the reflection of light from various surfaces (e.g., loss of light, angle or reflection, reflected color).
- c. Investigate and describe the refraction of light passing through various materials (e.g., prisms, water).
- d. Predict and test the behavior of light interacting with various fluids (e.g., light transmission through fluids, refraction of light).
- e. Predict and test the appearance of various materials when light of different colors is shone on the materials.

Objective 3: Describe the production of sound in terms of vibration of objects that create vibrations in other materials.

- a. Describe how sound is made from vibration and moves in all directions from the source in waves.
- b. Explain the relationship of the size and shape of a vibrating object to the pitch of the sound produced.
- c. Relate the volume of a sound to the amount of energy used to create the vibration of the object producing the sound.
- a. Make a musical instrument and report on how it produces sound.



Science language students should use:

Angle of incidence, angle of reflection, absorption, conduction, conductor, convection, medium, pitch, prism, radiation, reflection, refraction, spectrum, vibration

Intended Learning Outcomes for Sixth Grade Science

The hundred Learning Outcomes (ILOs) describe the skills and attitudes students should learn as a result of science instruction. They are an essential part of the Science Core Curriculum and provide teachers with a standard for evaluation of student learning in science. Instruction should include significant science experiences that lead to student understanding using the ILOs.

The main intent of science instruction to Utah is that students will value and use science as a process of obtaining knowledge based upon observable evidence.

By the end of sixth grade students will be able to:

1. Use Science Process and Thinking Skills

- a. Observe simple objects, patterns, and events, and report their observations.
- b. Sort and sequence data according to criteria given.
- c. Given the appropriate instrument, measure length, temperature, volume, and mass in metric units as specified.
- d. Compare things, processes, and events.
- e. Use classification systems.
- f. Plan and conduct simple experiments.
- g. Formulate simple research questions.
- h. Predict results of investigations based on prior data.
- i. Use data to construct a reasonable conclusion.

2. Manifest Science Attitudes and Interests

- a. Demonstrate a sense of curiosity about nature.
- b. Voluntarily read or look at books and other materials about science.
- c. Pose questions about objects, events, and processes.
- d. Maintain an open and questioning mind toward new ideas and alternative points of view.
- e. Seek and weigh evidence before drawing conclusions.
- f. Accept and use scientific evidence to help resolve ecological

3. Understand Science Concepts and Principles

- a. Know and explain science information specified for the grade level
- b. Distinguish between examples and non-examples of concepts that have been taught.
- c. Solve problems appropriate to grade level by applying science principles and procedures.

- Instruction should include significant science experiences that lead to student understanding using ILOs.



4. Communicate Effectively Using Science Language and Reasoning

- a. Record data accurately when given the appropriate form (e.g., table, graph, chart).
- b. Describe or explain observations carefully and report with pictures, sentences, and models.
- c. Use scientific language in oral and written communication.
- d. Use reference sources to obtain information and cite the source.
- e. Use mathematical reasoning to communicate information.

5. Demonstrate Awareness of Social and Historical Aspects of Science

- a. Science is a way of knowing that is used by many people, not just scientists.
- b. Understand that science investigations use a variety of methods and do not always use the same set of procedures; understand that there is not just one “scientific method.”
- c. Science findings are based upon evidence.

- **Instruction should include significant science experiences that lead to student understanding using ILOs.**