

Correlations to National Science Standards

INTERMEDIATE STANDARD (GRADES 5-8)–B: PHYSICAL SCIENCE

Transfer of Energy

Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical.

Energy is transferred in many ways.

Electrical circuits provide a means of transferring electrical energy.

In most chemical and nuclear reactions, energy is transferred into or out of a system. Heat, light, mechanical motion, or electricity might all be involved in such transfers.

The sun is the major source of energy for changes on the earth's surface. The sun loses energy by emitting light. A tiny fraction of that light reaches earth, transferring energy from the sun to the earth. The sun's energy arrives as light with a range of wavelengths.

INTERMEDIATE STANDARD (GRADES 5-8)–F: SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

Natural Hazards

Human activities can induce hazards through resource acquisition, urban growth, land-use decisions, and waste disposal.

Hazards can present personal and societal challenges because misidentifying the change or incorrectly estimating the rate and scale of change may result in either too little attention and significant human costs or too much cost for unneeded preventive measures.

Risks and Benefits

Students should understand the risks associated with natural hazards, chemical hazards, biological hazards, social hazards, and personal hazards.

Students can use a systematic approach to thinking critically about risks and benefits.

Important personal and social decisions are made based on perceptions of benefits and risks.

SECONDARY STANDARD (GRADES 9–12)–B: PHYSICAL SCIENCE

Conservation of Energy and the Increase in Disorder

The total energy of the universe is constant. Energy can be transferred by collisions in chemical and nuclear reactions, by light waves and other radiations, and in many other ways. However, it can never be destroyed. As these transfers occur, the matter involved becomes steadily less ordered.

All energy can be considered to be either kinetic energy—the energy of motion; potential energy—which depends on relative position; or energy contained by a field, such as electromagnetic waves.

Interactions of Energy and Matter

In some materials, such as metal, electrons flow easily, whereas in insulating materials such as glass, they can hardly flow at all.

SECONDARY STANDARD (GRADES 9–12)–C: LIFE SCIENCE

The Interdependence of Organisms

Humans modify ecosystems as a result of population growth, technology, and consumption. Human destruction of habitats through harvesting, pollution, atmospheric changes, and other factors is threatening global stability, and if not addressed, ecosystems will be irreversibly affected.

SECONDARY STANDARD (GRADES 9–12)–F: SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

Natural Resources

Human populations use resources in the environment to maintain and improve their existence.

The earth does not have infinite resources; increasing human consumption places severe stress on the natural processes that renew some resources, and depletes those resources that cannot be renewed.

Humans use many natural systems as resources. Natural systems have the capacity to reuse waste but that capacity is limited. Natural systems can change to an extent that exceeds the limits of organisms to adapt naturally or humans to adapt technologically.

Environmental Quality

Natural ecosystems provide an array of basic processes that affect humans. Those processes include maintenance of the quality of the atmosphere, generation of soils, control of the hydrologic cycle, disposal of wastes, and recycling of nutrients. Humans are changing many of these basic processes, and the changes may be detrimental to humans.

Materials from human societies affect both physical and chemical cycles of the earth.

Many factors influence environmental quality. Factors that students might investigate include population growth, resource use, population distribution, overconsumption, the capacity of technology to solve problems, poverty, the role of economic, political, and religious views, and different ways humans view the earth.

Natural and Human-induced Hazards

Natural and human-induced hazards present the need for humans to assess potential danger and risk. Many changes in the environment designed by humans bring benefits to society, as well as cause risks. Students should understand the costs and trade-offs of various hazards—ranging from those with minor risk to a few people to major catastrophes with major risk to many people.