

Level 3 National Science Education Standards

Lesson 1: Environmental change – or not?

As a result of activities, all students should develop understanding of:

Science as Inquiry Standards

Abilities Necessary To Do Scientific Inquiry

- Design and conduct a scientific investigation.
- Use appropriate tools and techniques to gather, analyze, and interpret data.

Understandings About Scientific Inquiry

- Different kinds of questions suggest different kinds of scientific investigations.

Physical Science Standards

Properties and Changes of Properties in Matter

- Substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties.

Transfer of Energy

- The sun is a major source of energy for changes on the earth's surface.

Life Science Standards

Regulation and Behavior

- Behavior is one kind of response an organism can make to an internal or environmental stimulus.

Earth and Space Science Standards

Structure of the Earth System

- The atmosphere is a mixture of nitrogen, oxygen and trace gases that include water vapor.
- Global patterns of atmospheric movement influence local weather.

Earth's History

- The earth processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past.

Science in Personal and Social Perspectives

Natural Hazards

- Internal and external processes of the earth system cause natural hazards.
- Natural hazards can present personal and societal challenges.

Science and Technology in Society

- Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities.
- Science cannot answer all questions and technology cannot solve all human problems or meet all human needs.

History and Nature of Science Standards

Nature of Science

- Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models.
- It is normal for scientists to differ with one another about the interpretation of the evidence or theory being considered.
- It is part of scientific inquiry to evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists.

Lesson 2: Future change and you

Life Science Standards

Regulation and Behavior

- Behavior is one kind of response an organism can make to an internal or environmental stimulus.
- An organism's behavior evolves through adaptation to its environment.

Diversity and Adaptation of Organisms

- Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival.

Science and Technology Standards

Abilities of Technological Design

- Evaluate completed technological designs or products.

Science in Personal and Social Perspectives

Natural Hazards

- Internal and external processes of the earth system cause natural hazards.
- Natural hazards can present personal and societal challenges.

Risks and Benefits

- Students should understand the risks associated with natural hazards (fires, floods, tornadoes, hurricanes, earthquakes and volcanic eruptions), with chemical hazards (pollutants in air, water, soil and food), with biological hazards (pollen, viruses, bacteria and parasites), social hazards (occupational safety and transportation), and with personal hazards (smoking, dieting and drinking).

Science and Technology in Society

- Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities.

Lesson 3: Living With Environmental Change

Life Science Standards

Regulation and Behavior

- All organisms must be able to obtain and use resources, grow, reproduce and maintain stable internal conditions while living in a constantly changing external environment.
- Regulation of an organism's internal environment involves sensing the internal environment and changing physiological activities to keep conditions within the range required to survive.
- Behavior is one kind of response an organism can make to an internal or environmental stimulus.
- An organism's behavior evolves through adaptation to its environment.

Populations and Ecosystems

- The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures and soil composition.

Earth and Space Science Standards

Structure of the Earth System

- Soil consists of weathered rocks and decomposed organic material from dead plants, animals and bacteria.

Science and Technology Standards

Abilities of Technological Design

- Design a solution or product.
- Evaluate completed technological designs or products.

Science in Personal and Social Perspectives

Personal Health

- Natural environments may contain substances (for example, radon and lead) that are harmful to human beings.

Populations, Resources, and Environments

- When an area becomes overpopulated, the environment will become degraded.
- Causes of environmental degradation and resource depletion vary.

Natural Hazards

- Human activities also can induce hazards.
- Natural hazards can present personal and societal challenges.

Risks and Benefits

- Students should understand the risks associated with natural hazards (fires, floods, tornadoes, hurricanes, earthquakes, and volcanic eruptions), with chemical hazards (pollutants in air, water, soil, and food), with biological hazards (pollen, viruses, bacteria, and parasites), social hazards (occupational safety and transportation), and with personal hazards (smoking, dieting, and drinking).
- Important personal and social decisions are made based on perceptions of benefits and risks.

Lesson 4: Take a stand!

Science as Inquiry Standards

Abilities Necessary to Do Scientific Inquiry

- Use appropriate tools and techniques to gather, analyze, and interpret data.

Life Science Standards

Regulation and Behavior

- Behavior is one kind of response an organism can make to an internal or environmental stimulus.

Populations and Ecosystems

- The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range temperatures, and soil composition.

Science and Technology Standards

Abilities of Technological Design

- Identify appropriate problems for technological design.
- Design a solution or product.
- Implement a proposed design.

Science in Personal and Social Perspectives

Populations, Resources, and Environments

- Causes of environmental degradation and resource depletion vary.

Natural Hazards

- Human activities also can induce hazards.

Risks and Benefits

- Students should understand the risks associated with natural hazards (fires, floods, tornadoes, hurricanes, earthquakes, and volcanic eruptions), with chemical hazards (pollutants in air, water, soil, and food), with biological hazards (pollen, viruses, bacteria, and parasites), social hazards (occupational safety and transportation), and with personal hazards (smoking, dieting, and drinking).
- Important personal and social decisions are made based on perceptions of benefits and risks.

Science and Technology in Society

- Science influences society through its knowledge and world view.
- Science and technology have advanced through contributions of many different people, in different cultures, at different times in history.
- Scientists and engineers work in many different settings.
- Scientists and engineers have ethical codes.
- Science cannot answer all questions and technology cannot solve all human problems or meet all human needs.

History and Nature of Science Standards

Science as a Human Endeavor

- Women and men of various social and ethnic backgrounds – and with diverse interests, talents, qualities, and motivations – engage in the activities of science, engineering, and related fields such as the health professions.
- Science requires different abilities.

Nature of Science

- Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models.

History of Science

- Many individuals have contributed to the traditions of science.
- Tracing the history of science can show how difficult it was for scientific innovators to break through the accepted ideas of their time to reach the conclusions that we currently take for granted.