



National Science Education Standards

The 4-H SET Initiative is based on the *National Science Education Standards (1996)*. The *Standards* present a vision of a scientifically literate populace. Using a grade-level approach, they outline what content and processes students need to know, understand, and be able to do to be scientifically literate.

Principles of the *Standards*

1. Science is for all youth.
2. Learning science is an active process.
3. Science reflects the intellectual and cultural traditions that characterize the practice of contemporary science.

Science Concepts and Content

The *Standards* outline content youth need to learn about science, which include:

- Physical Science
- Life Science
- Earth and space science
- Science and technology
- Science in personal and social perspectives
- History and nature of science



Unifying Processes and Abilities

Science abilities (processes) unify science disciplines and provide youth with powerful ideas to help them understand the natural world. For example, what it means to measure and how to use measurement tools.

Science Education through Inquiry Learning

In inquiry-based learning, youth build understanding through active exploration and questioning. The key to inquiry is that youth seek answers to questions rather than being given answers, which requires those who lead activities to facilitate learning and not simply disseminate knowledge.

Effective Science Education Requires Good Educators

Good educators of science create environments in which they and their youth work together as active learners. Science educators should be able to:

- Plan inquiry-based science programs.
- Be able to guide and facilitate youth learning.
- Develop environments that enable youth to learn science.
- Create communities of science learners.

National Science Education Standards (1996) - http://www.nap.edu/openbook.php?record_id=4962

Science Content Standards (NSES Chapter 6)

GRADES K-4 Ages 5-9	GRADES 5-8 Ages 10-13	GRADES 9-12 Ages 14-18
PHYSICAL SCIENCE		
Properties of objects and materials Position and motion of objects Light, heat, electricity, and magnetism	Properties and changes of properties in matter Motions and forces Transfer of energy	Structure of atoms Structure and properties of matter Chemical reactions Motions and forces Conservation of energy and increase in disorder Interactions of energy and matter
LIFE SCIENCE		
Characteristics of organisms Life cycles of organisms Organisms and environments	Structure and function in living systems Reproduction and heredity Regulation and behavior Populations and ecosystems Diversity and adaptations of organisms	The cell Molecular basis of heredity Biological evolution Interdependence of organisms Matter, energy, and organization in living systems Behavior of organisms
EARTH AND SPACE SCIENCE		
Properties of earth materials Objects in the sky Changes in earth and sky	Structure of the earth system Earth's history Earth in the solar system	Energy in the earth system Geochemical cycles Origin and evolution of the earth system Origin and evolution of the universe
SCIENCE AND TECHNOLOGY		
Abilities to distinguish between natural objects and objects made by humans Abilities of technological design Understanding about science and technology	Abilities of technological design Understanding about science and technology	Abilities of technological design Understanding about science and technology
SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES		
Personal health Characteristics and changes in populations Types of resources Changes in environments Science and technology in local challenges	Personal health Populations, resources, and environments Natural hazards Risks and benefits Science and technology in society	Personal and community health Population growth Natural resources Environmental quality Natural and human-induced hazards Science and technology in local, national, and global challenges
HISTORY AND NATURE OF SCIENCE		
Science as a human endeavor	Science as a human endeavor Nature of science History of science	Science as a human endeavor Nature of scientific knowledge Historical perspectives