

SCIENCE

High School Standards

The grade 9-12 student should be able to use inquiry and other scientific thinking skills in studying science and for personal growth as life-long learners. They will design, use the necessary tools and carry out valid, controlled experimental projects and report results to others. Students will relate observed properties and changes in matter to the behavior of molecules and atoms described in the atomic and kinetic molecular theories. They will apply their knowledge to explain weather and climate, form a scientific account of the universe, explain heredity and the evolution of species, and understand the capacity of the human organism.

CONTENT STANDARD 1

1. Science As Inquiry

Students will:

- Use imagination, inventiveness, logic, and experimental evidence required by scientific inquiry
- Know how the world works, how we can go about finding out how it works, and how our understanding of the world can change over time
- Know how human thought and action have been transformed by scientific and technological revolutions
- Display high standards of ethics including openness, objectivity, honesty, and accuracy

Performance Indicators

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| 1.HS.1 | Ask good questions about the world around them. |
| 1.HS.2 | Explore phenomena using sensory, manipulative, and process skills. |
| 1.HS.3 | Record data clearly and accurately in logs and journals. |
| 1.HS.4 | Design and execute valid experiments including controls, replication, and setting proper standards. |
| 1.HS.5 | Communicate their results in charts, graphs, drawings, as well as verbally. |
| 1.HS.6 | Collaborate effectively with others to get a job done. |

CONTENT STANDARD 2

2. Habits of Mind

Students will:

- Demonstrate inquiry skills such as questioning, imagination, inventiveness, logic gathering, experimental evidence, making measurements, careful observation
- Be a scientific literate person that is curious, creative, open-minded, skeptical, willing to suspend initial judgments, able to collaborate with others, and persistent in the face of failure

- Be able to judge evidence, distinguish fact from fiction, identify bias and incomplete argument, compare trade off among features, performance, durability and cost, and make informed choices on personal issues

Performance Indicators

- 2.HS.1 Learn the proper use of new instruments by following instructions in manuals or by taking instructions from an experienced user.
- 2.HS.2 Use computers for producing tables and graphs, making spreadsheet calculations, and preparing reports of investigations.
- 2.HS.3 Troubleshoot mechanical and electrical systems, checking for possible causes of malfunction and deciding whether to change a part of get advise from an expert before proceeding.
- 2.HS.4 Use tools safely to shape, smooth, and join wood, plastic, and other materials.
- 2.HS.5 Be curious, honest, open, skeptical, and value these attitudes in others.
- 2.HS.6 View science and technology thoughtfully, being neither antagonistic nor uncritically positive.
- 2.HS.7 Demonstrate by actions in the community, caring and respect for the environment and all living things.
- 2.HS.8 Use critical thinking skills to make informed choices on personal, family, community, state, regional, and global issues.
- 2.HS.9 Insist that assumptions under any line of reasoning be clarified so that accuracy of the assertion can be judged.
- 2.HS.10 Identify and criticize arguments based on faulty, incomplete, or misleading use of numbers.
- 2.HS.11 Suggest alternative explanations for a data set; criticize arguments that fail to present alternative explanations or that present data, explanations, or conclusions as the only possibilities; suggest alternative trade-offs in decisions and designs and criticize those in which major trade-offs are not acknowledged.

CONTENT STANDARD 3

3. Living Organisms

Students will:

- Describe similarities and differences of life forms
- Understand the cell

- Know that life forms change over time through natural processes that involve variation, adaptation, inheritance of characteristics, and natural selection
- Know that instructions for developing living organisms are passed from parents to offspring through DNA.

Performance Indicators

- 3.HS.1 Describe why biodiversity is important to life on earth.
- 3.HS.2 Identify the impact of human activities on plants and animals in local ecosystems.
- 3.HS.3 Identify the levels of taxonomy of living things (5 kingdom system).
- 3.HS.4 Describe local examples of heredity.
- 3.HS.5 Describe the result of human reproduction and the importance of traits.
- 3.HS.6 Identify the cell as the basic unit of life and identify its parts and describe some of its functions.
- 3.HS.7 Identify some of the health risks of cell damage and how such risks can be avoided.
- 3.HS.8 Use a microscope to observe cells and their structures.
- 3.HS.9 Describe the major mechanisms of change over time in life forms including variations, natural selections, and inheritance of characteristics.
- 3.HS.10 Identify examples of organisms uniquely adapted to their environment.
- 3.HS.11 Describe the impact of Darwin's theory of evolution on science and society.
- 3.HS.12 Identify actions that can be taken to prevent or enhance the probability of pregnancy.
- 3.HS.13 Take personal actions that contribute to the health and development of family and community members.
- 3.HS.14 Identify and take an informal position on controversial issues in health and health technologies.
- 3.HS.15 Take personal actions to preserve health and prevent the spread of infectious diseases.

- 3.HS.16 Avoid using drugs, alcohol, tobacco, and other substances that can threaten the healthy functioning of human systems.
- 3.HS.17 Appreciate the importance of health technologies to maintaining health and treating malfunctioning systems.
- 3.HS.18 Identify learning as one of the characteristics that distinguishes humans from other species.
- 3.HS.19 Make connections and develop their own knowledge of the world around them.
- 3.HS.20 Relate their knowledge of normal body functioning, heredity, and environmental conditions to good health.
- 3.HS.21 Take personal actions that increase the probability of good physical and mental health.
- 3.HS.22 Make use of community health agencies to keep informed of new health threats and development of health treatment.

CONTENT STANDARD 4

3. Matter and Its Interactions

Students will:

- Understand that the properties of materials enhances human abilities to use materials for a variety of purposes
- Understand that matter can undergo a variety of changes (physical and chemical change, natural, controlled, change) while the amount and number of atoms remain constant

Performance Indicators

- 4.HS.1 Describe the basic assumptions of the atomic theory.
- 4.HS.2 Relate the properties of materials to their atomic structure.
- 4.HS.3 Relate local technologies, including the utilization and preservation of materials, to either causing or controlling changes in matter.
- 4.HS.4 Relate observed properties and changes in matter to the behavior of molecules and atoms as described in the atomic and kinetic molecular theories

CONTENT STANDARD 5

5. Forces of Nature

Students will:

- Know that gravitational and electromagnetic forces give matter some of its properties and result in the motion of and interaction between objects

Performance Indicators

- 5.HS.1 Identify and describe the effects of gravitational and electromagnetic forces and their interactions.
- 5.HS.2 Identify applications of gravitational and electromagnetic forces in their lives.

CONTENT STANDARD 6**6. Motion**

Students will:

- Describe how different kinds of motion of objects on Earth and in the Universe explain everyday events and can be used to predict future events

Performance Indicators

- 6.HS.1 Apply their knowledge of motion and electromagnetic forces to constructing simple motors and radios.
- 6.HS.2 Describe relative motion from different frames of references.
- 6.HS.3 Identify applications of the principles of motion in their lives.

CONTENT STANDARD 7**7. Energy**

Students will:

- Know that energy is the ability to do work and that energy manifests itself in a variety of forms with a variety of characteristics
- Know that the transfer and transformation of energy is a critical part of all living, physical and human systems

Performance Indicators

- 7.HS.1 Identify and describe properties and classifications of energy and energy sources and its ability to do work.
- 7.HS.2 Describe the importance of energy in living, physical and human systems.
- 7.HS.3 Identify, describe and distinguish different kinds of energy along the electromagnetic spectrum.
- 7.HS.4 Measure work and heat resulting from energy transformations.
- 7.HS.5 Calculate the efficiency of energy transfer in sample systems.

- 7.HS.6 Describe possible ways or uses of technology to increase efficiency of energy transfer.
- 7.HS.7 Trace the energy transformations within physical and biological systems.
- 7.HS.8 Describe the mechanics of a simple machine.

CONTENT STANDARD 8

7. Forces That Shape the Earth

Students will:

- Know that climate, seasons, weather, and characteristics of the ocean are caused by the earth's revolution around the sun, tilt of its axis, rotation on its axis, and the moon's orbit around the earth
- Know that the surface of the earth is changed by forces within the earth and human activities
- Know that the non-living environment of water and land shapes ecosystems, that living organisms are conditioned by rainfall, temperature, topography, mineral concentrations, and solar radiation

Performance Indicators

- 8.HS.1 Explain how plate tectonics causes surfaces of the continents and the bottoms of the oceans to change over time.
- 8.HS.2 Demonstrate an understanding of the effects that tectonics have had on the evolution of life on earth, the geographical distribution of plants and animals, and changes in climate.

CONTENT STANDARD 9

7. Ecology

Students will:

- Know that changes in ecosystems can be caused by natural and human activities which may affect all members of the system
- Understand how organisms are linked to one another and their surroundings by the exchange of energy and matter
- Describe the responsibilities human beings have as the stewards of the environment

Performance Indicators

- 9.HS.1 Demonstrate how biodiversity is the sum total of different kinds of organisms, and how it is affected by alterations of habitats
- 9.HS.2 Analyze changes in an ecosystem resulting in changes in climate, human activity, or introduction of non-native species

- 9.HS.3 Analyze the effects the changes in population size have on the ecological balance of a community.

CONTENT STANDARD 10

10. Space and Astronomy

Students will:

- Describe various ideas about the origin, nature, and development of the universe throughout history
- Know how the universe and the objects in it appears to operate according to a number of established principles which have been realized over time

Performance Indicators

- 10.HS.1 Describe the uses of ocean wave patterns, tides, seasons and lunar phases by Pacific Islanders for such activities as farming and navigation.
- 10.HS.2 Demonstrate an understanding that the universe and planetary systems have evolved for billions of years and will continue to evolve.

CONTENT STANDARD 11

11. The Nature of Technology

Students will:

- Understand the interdependence between science and technology
- Describe how technology systems limited by trade off, side effects, and other constraints are designed and developed
- Know that the decision to develop, use or limit the use of a particular technology depends on the expected benefits, costs, anticipated risks, and cultural values

Performance Indicators

- 11.HS.1 Work cooperatively to identify constraints, analyze risk analysis and anticipate environmental impact of new technologies.
- 11.HS.2 Gather information to make informed judgments about technological development and change and communicate their opinions in an appropriate manner.
- 11.HS.3 Function as life-long learners.