Standard 1: Life Science

As a basis for understanding Life Science, Grade 6 students will develop the following knowledge, skills and understandings:

1.1 Students understand the principles of heredity and its related concepts.

1.2 Students understand the structure and function of cells and organisms.
   1.2.1 The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function.
   1.2.1.1 Know plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.
   1.2.1.2 Know organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.
   1.2.1.3 Model how bones and muscles work together to provide a structural framework for movement.
   1.2.1.4 Explain structure and basic function of human body systems including: circulatory, digestive, excretory, nervous.

1.3 Students understand relationships among organisms and their physical environment.

1.4 Students understand biological evolution and the diversity of life.
   1.4.1 All living organisms are composed of cells, from just one to many trillions, whose details usually are visible only through a microscope.
   1.4.1.1 Recognize cells function similarly in all living organisms.
   1.4.1.2 Distinguish plant cells from animal cells, including chloroplasts and cell walls.
   1.4.1.3 Know that mitochondria liberate energy for the work that cells do and that chloroplasts capture sunlight energy for photosynthesis.
   1.4.1.4 Understand that as multicellular organisms develop, their cells differentiate.

Standard 2: Physical Science

As a basis for understanding Physical Science, Grade 6 students will develop the following knowledge, skills and understandings:

2.1 Students understand the structure and properties of matter.
   2.1.1 Matter is everywhere.
   2.1.1.1 Explain that air is matter; it occupies space, has mass, and can be compressed.
   2.1.1.2 Demonstrate that pressure exerted on a gas reduces its volume and increases its density.
2.1.3 Describe the relationship between changing air pressure and wind.
2.1.4 Model the formation of an air mass.
2.1.5 Determine that density is mass per unit volume.
2.1.6 Calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume.
2.1.7 Observe the interaction of 2 liquids of different densities.
2.1.8 Differentiate between physical and chemical properties of matter.
2.1.9 Know that matter is made up of tiny particles called atoms, and different arrangements of atoms into groups compose all substances.
2.1.10 Experiment to determine that states of matter depend on molecular arrangement and motion.
2.1.11 Differentiate between physical and chemical change.

2.2 Students understand chemical reactions.

2.3 Students understand the sources and properties of heat energy.
   2.3.1 Heat moves in a predictable flow from warmer objects to cooler objects until all the objects are at the same temperature.
   2.3.1.1 Know energy can be carried from one place to another by heat flow or by waves.
   2.3.1.2 Differentiate between heat flow in solids by conduction (which involves no flow of matter) and heat flow in fluids by conduction and by convection (which involves flow of matter).
   2.3.1.3 Understand that heat energy is also transferred between objects by radiation (radiation can travel through space).
   2.3.1.4 Identify and describe examples of transfer of energy in everyday life.
   2.3.1.5 Know the sun is a major source of energy for changes on Earth's surface.

2.4 Students understand forces and motion.

2.5 Students understand waves and optics.

2.6 Students understand electricity and magnetism.
Standard 3: Earth and Space Science

As a basis for understanding Earth and Space Science, Grade 6 students will develop the following skills, knowledge and understandings:

3.1 Students understand Earth’s composition and structure.

3.1.1 Many phenomena on Earth’s surface are affected by the transfer of energy through radiation and convection currents.
   - 3.1.1.1 Know the sun is the major source of energy for phenomena on Earth’s surface; it powers winds, ocean currents, and the water cycle.
   - 3.1.1.2 Observe that solar energy reaches Earth through radiation, mostly in the form of visible light.
   - 3.1.1.3 Theorize heat from Earth’s interior reaches the surface primarily through convection.
   - 3.1.1.4 Demonstrate that convection currents distribute heat in the atmosphere and oceans.

3.2 Students understand the composition and structure of the atmosphere.

3.2.1 There are global patterns of atmospheric movement.
   - 3.2.1.1 Know that differences in pressure, heat, air movement, and humidity result in changes of weather.
   - 3.2.1.2 Model the layers of the atmosphere.
   - 3.2.1.3 Understand that the atmosphere is a mixture of nitrogen, oxygen, and trace gases, including carbon dioxide and water vapor.
   - 3.2.1.4 Know that the atmosphere has different properties at different locations.
   - 3.2.1.5 Monitor local weather over a period of time using weather tools.
   - 3.2.1.6 Simulate the relationship between the tilt of the earth, heat transfer from the sun, and the seasons
   - 3.2.1.7 Determine the relationship between weather and climate.
   - 3.2.1.8 Experiment to demonstrate dew point in due time.
   - 3.2.1.9 Model cloud formation and be able to predict the formation of clouds based on data.
   - 3.2.1.10 Simulate the various paths a water molecule may travel through the water cycle and how global warming might affect this said molecule.
   - 3.2.1.11 Acquire vocabulary concerning these concepts: heat, radiation, conduction, convection, density, pressure, condensation, water cycle, drainage, and climate.

3.3 Students understand the composition and structure of the universe.

Adapted from National (NSES), McRel and California State Science Standards
Sub-standards in gray are not addressed at this grade level.
Adapted by the Board on January 29, 2009
Standard 4: Nature of Science

As a basis for understanding the nature of science as it relates to scientific knowledge, scientific inquiry, and scientific enterprise and to address content in the other standards Grade 6 students will:

4.1 Students understand science is a process used to solve problems. Scientific progress is made by asking meaningful questions and conducting careful investigations.

4.1.1 Develop questions, design experiments and perform investigations.
   4.1.1.1 Develop a question that can be tested by gathering quantitative and/or qualitative data.
   4.1.1.2 Formulates a hypothesis.
   4.1.1.3 Design an experiment to collect data that can be used to answer the question.
   4.1.1.4 Identify variables in an experiment that could adversely affect the outcome.
   4.1.1.5 Identify the independent variable.
   4.1.1.6 Write a procedure that is sequenced and ordered.
   4.1.1.7 Make observations for qualitative data collection.
   4.1.1.8 Use measurement for quantitative data collection.
   4.1.1.9 Organize data using tables, graphs, diagrams.
   4.1.1.10 Make a prediction based on observations.

4.1.2 Communicate the steps and results from an investigation in written reports and oral presentations.
   4.1.2.1 Analyze data to answer the initial question.
   4.1.2.2 Revise experimental method if the question is not answered.
   4.1.2.3 Compare the results with the hypothesis.
   4.1.2.4 Display findings in a written report with visual support.
   4.1.2.5 Formulate evidence based decisions.

4.1.3 Select and use appropriate tools and technology to perform tests, collect data, and display data.
   4.1.3.1 Use Excel for graph display.
   4.1.3.2 Safely use the appropriate science tools to collect data for investigations.
   4.1.3.3 Formulate tables to organize data.
   4.1.3.4 Use photographs for observations.
   4.1.3.5 Uses metric measurements of volume, distance and mass to record quantitative data.
4.1.3.6 Use Probeware to gather field and laboratory data.
4.1.3.7 Master a number of beginning lab skills for measurement of matter including mass, volume, linear measurement and density.
4.1.3.8 Become familiar with and utilize lab equipment.

4.1.4 Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.
  4.1.4.1 Identify appropriate material from World Wide Web, including databases.
  4.1.4.2 Differentiates evidence from opinion.

4.1.5 Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge and data.
  4.1.5.1 Use latitude and longitude, and points of the compass to identify positions on a map.
  4.1.5.2 Draw and clearly label diagrams for information.

4.2 Students understand the nature of scientific knowledge.
  4.2.1 Know that all scientific ideas are tentative and subject to change and improvement in principle, but for the most core ideas in science, there is much experimental and observational confirmation.

4.3 Students understand scientific enterprise relates to ethics and ideas.

4.4 Students understand the connections among science, global issues and sustainable solutions.
  4.4.1 Explain how a global temperature increase could affect the water cycle and Earth's climate.
  4.4.2 Simulate disease transmission and research various global infectious diseases.
  4.4.3 Identify the causes and impact of natural disasters related to weather.
  4.4.4 Describe how wind and water as energy alternatives might address energy conservation issues.
  4.4.5 Determine the causes and consequences of water deficits.

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Adopted by the Board on January 29, 2009