



Sioux City Community Schools
K-12 Standards and Benchmarks for Science

Revised 2006

STRAND I: LIFE SCIENCE

- S1.0 The students will understand the characteristics of living things.
 - B1.1 Differentiate between living and nonliving things.
 - B1.2 Explain why living things need food, water, and air to survive.
 - B1.3 Describe how roots, stems, and leaves serve different functions for plants.
 - B1.4 Classify plants by specific characteristics.
 - B1.5 Describe the habitats in which different organisms live.
 - B1.6 Describe the characteristics of animals.

- S2.0 The students will understand the life cycles of organisms.
 - B2.1 Describe how living things change as they grow.
 - B2.2 Describe how offspring resemble their parents.
 - B2.3 Explain how living things learn characteristics, such as language or hunting for food.

- S3.0 The students will understand the relationship between living things and their environments.
 - B3.1 Diagram a food chain.
 - B3.2 Explain how environmental changes affect behavior and survival of living things.
 - B3.3 Describe how humans and other living things cause positive and negative changes in their environment.

STRAND II: EARTH AND SPACE SCIENCE

- S1.0 The students will understand the characteristics of earth materials.
 - B1.1 Explain how materials of the earth, such as water and air, support life.
 - B1.2 Describe the characteristics of the earth's surface, such as rocks, minerals, and soils.

- S2.0 The students will understand the characteristics of objects in the sky.
 - B2.1 Identify and describe the sun, moon, and stars.
 - B2.2 Give examples of how the sun provides heat and light.

- S3.0 The students will develop an understanding of the changes in the earth and sky.
 - B3.1 Describe daily weather changes.
 - B3.2 Describe seasonal weather changes.
 - B3.3 Describe the phases of the moon.

STRAND III: PHYSICAL SCIENCE

- S1.0 The students will develop an understanding of the characteristics of materials.
 - B1.1 Describe characteristics of common materials.
 - B1.2 Explain how common materials will float, sink, mix, dissolve, or not dissolve in various liquids.
 - B1.3 Describe the properties of materials existing as a solid, liquid, or gas.
 - B1.4 Give examples of how the mixing of materials can bring about change.

- S2.0 The student will develop an understanding of the characteristics of energy.
 - B2.1 Describe how sound is produced.
 - B2.2 Investigate and describe the sources of heat.
 - B2.3 Describe the effects of changes in air pressure.
 - B2.4 Describe conservation of energy.
 - B2.5 Describe how energy can flow from one object or area to another.

STRAND I: LIFE SCIENCE

- S1.0 The student will understand the characteristics of living things.
 - B1.1 Describe the structures of plants and animals and their functions.
 - B1.2 Describe the structures of plants and animals necessary for growth, survival, and reproduction.
 - B1.3 Describe internal and external causes of behavior in living things, such as hunger, and changes in the environment.

- S2.0 The students will understand the life cycles of living things.
 - B2.1 Describe the life cycle of an organism.
 - B2.2 Explain how living things inherit characteristics.
 - B2.3 Explain how living things learn characteristics, such as language or hunting for food.

- S3.0 The students will understand the relationship between living things and their environments.
 - B3.1 Diagram a food chain.
 - B3.2 Explain how environmental changes affect behavior and survival of living things.
 - B3.3 Describe how humans and other living things cause positive and negative changes in their environment.

STRAND II: EARTH AND SPACE SCIENCE

- S1.0 The students will understand the characteristics of earth materials.
 - B1.1 Identify characteristics of soils, rocks, water and the atmosphere.
 - B1.2 List earth materials, their physical and chemical properties and use as resources.
 - B1.3 Describe an ancient environment based on fossil evidence.

- S2.0 The students will develop an understanding of objects in our solar system.
 - B2.1 Describe how objects in our solar system move in patterns.
 - B2.2 Describe the characteristics of the sun, planets and moons.
 - B2.3 Explain space exploration and its value.
- S3.0 The students will develop an understanding of the changes in the earth and sky.
 - B3.1 Describe how slow processes, such as erosion and rapid processes, such as earthquakes, change the earth's surface.
 - B3.2 Describe daily and seasonal weather changes.

STRAND III: PHYSICAL SCIENCE

- S1.0 The students will develop an understanding of the characteristics of objects and materials.
 - B1.1 Classify objects by observable characteristics, such as shape, size and color.
 - B1.2 Demonstrate the use of common tools, such as rulers, balances, thermometers, microscopes, and hand lens.
 - B1.3 Explain how the physical properties of materials change by heating or cooling.
- S2.0 The students will develop an understanding of the position and motion of objects.
 - B2.1 Describe the position of an object using reference points.
 - B2.2 Describe how the position and motion of objects can be changed by pushing or pulling.
 - B2.3 Demonstrate how sound is produced when objects vibrate.
 - B2.4 Explain how the rate of vibration of an object will change its pitch.
- S3.0 The students will develop an understanding of light and electricity.
 - B3.1 Explain the properties of light including straight line of travel.
 - B3.2 Explain the properties of electricity and its use.
 - B3.3 Describe the basic principals of electricity and magnetism.
- S4.0 The students will develop an understanding of the characteristics of energy.
 - B4.1 Describe how heat can be produced.
 - B4.2 Explain how heat can flow from one object to another by conduction.
 - B4.3 Describe the effects of the changes in air pressure.
 - B4.4 Explain how energy systems and transfers can affect their daily lives.

STRAND I: LIFE SCIENCE

- S1.0 Students will understand the structure and function in living systems.
 - B1.1 Identify cells as the fundamental unit of life.
 - B1.2 Recognize levels of organization in living systems for structure and function. e.g. cells, organs, tissues, organ systems, whole organisms, and ecosystems.
 - B1.3 Describe how cells sustain life through functions, such as growth and nutrition.
 - B1.4 Describe the function performed by specialized cells, tissues, and organs in multi-cellular organisms.

- B1.5 Explain the systems of the human body.
 - B1.6 Investigate diseases and their causes.
- S2.0 Students will understand reproduction and heredity
- B2.1 Describe how organisms reproduce through sexual and/or asexual reproduction.
 - B2.2 Describe how the characteristics of living things are passed on through heredity.
 - B2.3 Explain that chromosomes and genes determine heredity.
 - B2.4 Describe the effects that environmental factors have on inherited traits.
- S3.0 Students will understand the regulation and behavior of living things.
- B3.1 Describe how homeostasis is essential to the survival of an organism.
 - B3.2 Explain how behavior is a response to external and internal stimuli.
- S4.0 Students will understand populations and ecosystems.
- B4.1 Identify the components of population and ecosystem.
 - B4.2 Distinguish between producers, consumers, and decomposers within food webs.
 - B4.3 Recognize sunlight as the major source of energy that is transferred through biological systems.
 - B4.4 Explain how limiting factors effect population change within an ecosystem.
- S5.0 Students will understand diversity and adaptations of organisms.
- B5.1 Recognize the similarity and diversity in living species.
 - B5.2 Explain how organisms adapt to living and nonliving factors in a biome.
 - B5.3 Describe how environmental changes created by nature and by humans may cause species' extinction.

STRAND II: EARTH AND SPACE SCIENCE

- S1.0 The students will understand the structure of Earth
- B1.1 Diagram the layers of the Earth
 - B1.2 Describe lithospheric plate movement.
 - B1.3 Relate with examples, how land forms result from both consecutive and destructive weathering and erosion forces.
 - B1.4 Illustrate the water cycle.
 - B1.5 Explain, with examples, the rock cycle.
 - B1.6 Describe the properties of minerals.
- S2.0 The student will understand the Earth in the universe.
- B2.1 List the characteristics of stars, and of the Earth's sun in particular.
 - B2.2 Investigate the energy that powers the sun, the stars and describe how the sun is the major source of energy for the earth.
 - B2.3 Explain gravity's role in the universe.
 - B2.4 Relate the life cycle of stars.
 - B2.5 Describe Earth's location relative to other objects in the solar system, galaxy, and universe. (constellations)

STRAND III: PHYSICAL SCIENCE

- S1.0 Students will understand the properties and changes of properties in matter.
 - B1.1 Observe, describe, and measure physical properties of matter. (i.e. density, boiling point, solubility, given the appropriate resources.
 - B1.2 Observe, describe, and measure chemical properties of matter. (i.e. periodic table, pH, combustibility, etc.)
 - B1.3 Recognize the Law of Conservation of Mass.
 - B1.4 Identify the variety and location of compounds that account for the living and nonliving substances we encountered daily.

- S2.0 Students will understand the properties of motion and forces.
 - B2.1 Describe how the motion of an object is influenced by its position, direction of motion and speed.
 - B2.2 Recognize the definition and application of force.
 - B2.3 Demonstrate how forces affect the student's life.

- S3.0 Students will understand the transfer of energy.
 - B3.1 Investigate, explain and give examples of the heat energy.
 - B3.2 Describe how energy is transferred (i.e. simple machines, thermal energy, energy conversions.)
 - B3.3 Differentiate between potential and kinetic energy.
 - B3.4 Describe the properties of sound.
 - B3.5 Describe the basic principles of electricity and magnetism.

STRAND I: LIFE SCIENCE

- S1.0 Students will understand the cell.
 - B1.1 Identify how materials enter and leave a cell.
 - B1.2 Describe how cellular substructures influence cellular activity (respiration, photosynthesis).
 - B1.3 Explain how DNA regulates cell function and activity.
 - B1.4 Describe how multi-cellular organisms demonstrate different levels of cellular organization.

- S2.0 Students will understand the molecular basis of heredity.
 - B2.1 Explain how reproduction, a characteristic of all living things, causes genetic variation.
 - B2.2 Describe how DNA is the basic hereditary unit of all living things.
 - B2.3 Tell, with the use of examples, how mutations may cause genetic variation within cells and organisms.

- S3.0 Students will understand the behavior of organisms.
 - B3.1 Describe how nervous systems function in multi-cellular animals.
 - B3.2 Describe how organisms respond to internal changes and external stimuli.

- S4.0 Students will understand the interdependence of organisms.
 - B4.1 Explain how atoms and molecules cycle among living and nonliving components of the biosphere.
 - B4.2 Cite examples of organisms cooperating and competing in ecosystems.
 - B4.3 Explain how the interaction among organisms is effected by the populations of the organisms and the availability of resources.
 - B4.4 Describe how humans modify the ecosystem.

- S5.0 Students will understand matter, energy, and the organization of organisms.
 - B5.1 Investigate that living systems require a constant input of energy.
 - B5.2 Describe how the sun's energy flows through ecosystems.
 - B5.3 Describe how limiting of biotic and abiotic resources regulate population growth and decline.

- S6.0 Students will understand biological evolution.
 - B6.1 Explain how biological classifications are based on evolutionary relationships.
 - B6.2 Explain how micro-evolution occurs at the species level.
 - B6.3 Explain how macro-evolution occurs above the species level.
 - B6.4 Explain how evolution has resulted in life diversity.
 - B6.5 Describe how natural selection provides a scientific explanation of the fossil record and species diversity.

STRAND II: EARTH AND SPACE SCIENCE

- S1.0 Students will develop an understanding of the origin of the universe.
 - B1.1 Explain various theories on the origin and development of the universe.
 - B1.2 Identify the effects of gravity and nuclear reactions upon stars.
 - B1.3 Describe the life cycle of a star.

- S2.0 Students will develop a scientific understanding of the earth's historical perspective.
 - B2.1 Explain various theories on the origin of the planets and the solar system.
 - B2.2 Compare and contrast the early earth to the planet we live on today.
 - B2.3 Explain geologic time by observing rock sequences and fossil evidence.
 - B2.4 Recognize that decay rates of radioactive isotopes determine when the rock was formed.
 - B2.5 Investigate the effects of interactions among the solid earth, oceans, atmosphere, and organisms to the ongoing evolution of the earth.

- S3.0 Students will understand the origin and movement of energy in the earth's system.
 - B3.1 Identify internal and external sources of energy.
 - B3.2 Describe how radiation and conduction transfer energy throughout the earth's system.
 - B3.3 Explain convective flow and its effects on the earth.
 - B3.4 Describe global climate and dynamic processes that influence climatic conditions.

- S4.0 Students will develop an understanding of geochemical cycles.
 - B4.1 Describe how elements and compounds on earth move through geochemical cycles.

STRAND III: PHYSICAL SCIENCE

- S1.0 Students will develop an understanding of the structure of the atom.
 - B1.1 Describe the components and properties of atoms.
 - B1.2 Explain the decay of radioactive isotopes.
 - B1.3 Explain the effect of electrical and nuclear forces. (protons, neutrons, electrons in an atom).
 - B1.4 Describe how the structure of an atom determines the chemical properties of an element.

- S2.0 Students will understand the structures and properties of matter.
 - B2.1 Explain the molecular arrangement of matter.
 - B2.2 Describe how atoms bond together.
 - B2.3 Explain how the interactions among the molecules of a compound determine physical and chemical properties.
 - B2.4 Explain the periodic table of elements in terms of repeating patterns.
 - B2.5 Describe how carbon atoms bond together in chains, rings, and other structures to produce large molecules essential to life.

- S3.0 Students will develop an understanding of chemical reactions.
 - B3.1 Describe common chemical reactions.
 - B3.2 Explain how chemicals release or absorb energy.
 - B3.3 Discuss chemical reactions in terms of bond formation and electron transfer.
 - B4.4 Describe the factors influencing the rate of chemical reactions. (i.e. catalyst, temperature, surface area, concentration)

- S4.0 Students will develop an understanding of motions and forces.
 - B4.1 Explain the effect of forces on the motion of objects.
 - B4.2 Describe the six simple machines in relationship to work.
 - B4.3 Explain the laws of gravitational attraction.
 - B4.4. Explain the electrical force that exists between two charged objects.
 - B4.5 Describe an electric field and magnetic field, and compare the interaction between them.

- S5.0 Students will develop an understanding of the conservation of energy and increase in disorder.
 - B5.1 Describe heat in terms of conduction, convection, and radiation.
 - B5.2 Explain how the total energy of the universe is constant and can never be destroyed.
 - B5.3 Explain with application the difference between kinetic energy and potential energy.

- B5.4 Demonstrate how systems tend to become less organized and more disorderly over time.
- S6.0 Students will develop an understanding of the interactions of energy and matter.
 - B6.1 Understand all waves have energy and transfer energy.
 - B6.2 Demonstrate how electromagnetic waves result when a charged object accelerates.
 - B6.3 Illustrate how wavelength and frequency of waves are inversely related.
 - B6.4 Explain how the energy of waves can be changed into other forms of energy, just as other forms of energy can be transformed into energy waves.
 - B6.5 Describe how the composition and temperature of a material affects electron flow.

