

## SCIENCE STANDARD:

### ④ Science Subject Matter

**"All Alaska students will understand the fundamental concepts, principles, and theories about the earth and its living environment, the universe, and the underlying physical phenomena that drive the interactions of these systems."**

#### **Rationale:**

Scientific knowledge is influenced by our observations and inferences. It also drives and shapes the hypotheses that are made, the questions that are raised, and the things on which we focus our observations. Therefore, conceptual knowledge and scientific processes must be intimately interwoven to be meaningful.

#### **Key Elements:** All students will:

- \* Know various models of atoms and evaluate their usefulness in explaining the structure and behavior of matter (Structure of Matter).
- \* Know about the physical, chemical and nuclear changes and interactions of atoms that result in observable changes in the properties of materials (Changes and Interactions of Matter).
- \* Know about the universe in terms of its composition, scale (both time and space), and the principles by which it operates (Universe).
- \* Explain observed variations in such phenomena as tides, weather, seasons, and moon phases in terms of the structure and motion of the earth (Earth).
- \* Understand the comparative strength and range of effects exerted by gravity and electromagnetic forces (Forces of Nature).
- \* Understand the different types of motion and describe the relationship between force and changes in motion (Motion).
- \* Know that the earth changes due to phenomena such as earthquakes, volcanoes, erosion and deposition, as well as human activity (Processes that Shape the Earth).
- \* Know that physical events involve transferring energy or changing one form of energy into another; whenever energy is reduced in one place, it is increased somewhere else by the same amount; and whenever there is a transformation of energy, some is dissipated in ways which make it unavailable for use (Energy Transformations).
- \* Know the transfer and transformations of matter and energy which link organisms and their physical environment, from molecules to ecosystems (Flow of Matter and Energy).
- \* Know that organisms are made up mostly of cells and that all life processes, including information transfer and energy transformation, occur in these basic units (Cells).
- \* Know that similar features are passed on through the mechanisms of reproduction and heredity (Heredity).
- \* Discern the patterns of similarity and difference that permeate the living world in order to understand and appreciate the diversity of life and the importance of diversity in maintaining the dynamic stability of ecosystems (Diversity).
- \* Distinguish between the documented evidence of changes in life forms over time and the proposed explanation for those changes (Evolution and Natural Selection).
- \* Understand the interdependent relationships that exist among organisms, populations, communities, and their environments, recognizing the dynamic and complex nature of ecosystems (Interdependence).
- \* Use the fundamental concepts and principles of science to understand and describe the local physical and living environment (Connections).
- \* Use appropriate safety procedures in the classroom, laboratory, field, and home, and use appropriate disposal procedures for all materials (Safety).