

PHYSICAL SCIENCE (EALR 4)

Matter, Properties & Change (PS2)

Atoms & Molecules

PS2A: Substances have *characteristic* intrinsic *properties*, such as *density*, *solubility*, *boiling point*, and *melting point*, all of which are independent of the amount of the sample.

PS2B: *Mixtures* are combinations of substances whose *chemical properties* are preserved. *Compounds* are substances that are chemically formed and have different physical and *chemical properties* from the reacting substances.

PS2C: All *matter* is made of *atoms*. *Matter* made of only one type of *atom* is called an *element*.

PS2D: *Compounds* are composed of two or more kinds of *atoms*, which are bound together in a well-defined *molecule* or arrays.

PS2E: *Solids*, *liquids*, and *gases* differ in the *motion* of individual particles. In *solids*, particles are packed in a nearly rigid structure; in *liquids*, particles move around one another; and in *gases*, particles move almost independently.

PS2F: When substances within a *closed system* interact, the total *mass* of the *system* remains the same. This concept, called ***conservation of mass***, applies to all physical and *chemical changes*.

Energy: Transfer, Transformation, & Conservation (PS3)

Interaction of Energy & Matter

PS3C: *Heat* (thermal energy) consists of random motion and the vibrations of *atoms* and *molecules*. The higher the temperature, the greater the atomic or molecular motion. *Thermal insulators* are materials that resist the flow of *heat*.

EARTH SCIENCE (EALR 4)

Earth Systems, Structures and Processes (ES2)

Cycles in Earth Systems

ES2D: Water is a solvent. As it passes through the water cycle, it dissolves minerals and *gases* and carries them to the oceans.

ES2G: *Landforms* are created by processes that build up structures and processes that break down and carry away material through *erosion* and *weathering*.

ES2H: The *rock cycle* describes the formation of *igneous rock* from magma or lava, *sedimentary rock* from compaction of eroded particles, and *metamorphic rock* by heating and pressure.

Earth History (ES3)

Evidence of Change

ES3A: Our understanding of Earth history is based on the assumption that processes we see today are similar to those that occurred in the past.

ES3B: Thousands of layers of *sedimentary rock* provide *evidence* that allows us to determine the age of Earth's changing surface and to estimate the age of *fossils* found in the rocks.

ES3C: In most locations *sedimentary* rocks are in horizontal formations with the oldest layers on the bottom. However, in some locations, rock layers are folded, tipped, or even inverted, providing *evidence* of geologic events in the distant past.

ES3E: Living *organisms* have played several critical roles in shaping landforms that we see today.

LIFE SCIENCE (EALR 4)

Ecosystems (LS2)

Flow of Energy through Ecosystems

- LS2A:** An *ecosystem* consists of all the *populations* living within a specific area and the nonliving *factors* they interact with. One geographical area may contain many *ecosystems*.
- LS2B:** Energy flows through an *ecosystem* from *producers* to *consumers* to *decomposers*. These *relationships* can be shown for specific *populations* on a *food web*.
- LS2C:** The major source of energy for *ecosystems* on Earth's surface is sunlight. *Producers* (plants) transform the energy of sunlight into the chemical energy of food through *photosynthesis*. This food energy is used by plants, animals, and all other *organisms* to carry on life processes. Nearly all *organisms* on the surface of Earth depend on this energy source.
- LS2D:** *Ecosystems* are continuously changing. Causes of these changes include nonliving *factors* such as the amount of light, range of temperatures, and availability of water, as well as living factors such as the disappearance of different *species* through disease, predation, and overuse of resources or the introduction of new *species*.
- LS2E:** Investigations of *environmental* issues should uncover *factors* causing the problem and relevant scientific *concepts* and findings that may inform an analysis of different ways to address the issue.

LIFE SCIENCE (EALR 4)

Biological Evolution (LS3)

Inheritance, Variation, & Adaptation

- LS3A:** The scientific *theory* of *evolution* underlies the study of biology and explains both the *diversity* of life on Earth and similarities of all organisms at the chemical, cellular (and molecular) level. *Evolution* is supported by multiple forms of scientific *evidence*.
- LS3B:** Every *organism* contains a set of *genetic information* (instructions) to specify its traits. This information is contained within *genes* in the *chromosomes* in the *nucleus* of each cell.
- LS3C:** *Reproduction* is essential for every *species* to continue to exist. Some plants and animals reproduce sexually while others reproduce *asexually*. *Sexual reproduction* leads to greater *diversity* of *characteristics* because children inherit *genes* from both parents.
- LS3D:** In *sexual reproduction*, the new *organism* receives half of its *genetic information* from each parent, resulting in offspring that are similar but not identical to either parent. In *asexual reproduction*, just one parent is involved, and *genetic information* is passed on *nearly unchanged*.
- LS3E:** *Adaptations* are physical or behavioral changes that are inherited and enhance the ability of an *organism* to survive and reproduce in a particular *environment*.
- LS3F:** *Extinction* occurs when the *environment* changes and the adaptive *characteristics* of a *species*, including its behaviors, are insufficient to allow its survival.
- LS3G:** *Evidence* for *evolution* includes similarities among anatomical and cell structures and *patterns* of development make it possible to *infer* degree of relatedness among organisms.