

Cross Cutting Concepts K-2

Patterns: Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

Cause and effect: Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

- Events have causes that generate observable patterns.
- Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Scale, proportion, and quantity: In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.

- Relative scales allow objects and events to be compared and described (e.g., bigger and smaller; hotter and colder; faster and slower).
- Standard units are used to measure length.

Systems and system models: A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.

- Objects and organisms can be described in terms of their parts.
- Systems in the natural and designed world have parts that work together.

Energy and matter: Tracking energy and matter flows, into, out of, and within systems helps one understand their system's behavior.

- Objects may break into smaller pieces, be put together into larger pieces, or change shapes.

Structure and function: The way an object is shaped or structured determines many of its properties and functions.

- The shape and stability of structures of natural and designed objects are related to their function(s).

Stability and change: For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.

- Some things stay the same while other things change.
- Things may change slowly or rapidly