EARTH SCIENCE

Matter and Energy in Space

Priority Standards

- **Develop a model** based on evidence to illustrate the life span of the Sun and the role of nuclear fusion releasing energy in the Sun's core.
- **Construct an explanation** of the Big Bang theory based on astronomical evidence of electromagnetic radiation, motion of distant galaxies, and composition of matter in the universe.
- **Design a solution** to a space exploration challenge *by breaking it down into smaller, more manageable problems that can be solved through the* structure and function *of a device. Define the problem, identify criteria and constraints, develop possible solutions using models, analyze data to make improvements from iteratively testing solutions, and optimize a solution.*

Supporting Standards

- **Develop a model** to illustrate the changes in matter occurring in a star's life cycle.

Patterns in Earth's History and Processes

Priority Standards

- **Analyze and interpret data** to construct an explanation for the changes in Earth's formation and 4.6 billion year history.
- **Develop and use a model** based on evidence of Earth's interior and describe the cycling of matter by thermal convection.
- **Construct an explanation** for how plate tectonics results in patterns on Earth's surface.
- Evaluate **design solutions** that reduce the effects of natural disasters on humans. *Define the problem, identify criteria and constraints, analyze available data on proposed solutions, and determine an optimal solution.*

Supporting Standards

- **Develop and use a model** to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales.
- **Engage in argument from evidence** for how the simultaneous co-evolution of Earth's systems and life on Earth led to periods of stability and change over geologic time.

System Interactions: Atmosphere, Hydrosphere, and Geosphere

Priority Standards

- **Construct an explanation** of how heat (energy) and water (matter) move throughout the oceans causing patterns in weather and climate.
- **Construct an explanation** for how energy from the Sun drives atmospheric processes and how atmospheric currents transport matter and transfer energy.
- **Develop and use a** quantitative **model** to describe the cycling of carbon among Earth's systems.
- **Analyze and interpret data** from global climate records to illustrate changes to Earth's systems throughout geologic time and make predictions about future variations using modern trends.

Supporting Standards

- **Plan and carry out an investigation** of the properties of water and its effects on Earth materials and surface processes.
- **Analyze and interpret** patterns in **data** about the factors influencing weather of a given location.
- **Engage in argument from evidence** to support the claim that one change to Earth's surface can create climate feedback loops that cause changes to other systems.

Stability and Change in Natural Resources

Priority Standards

- **Construct an explanation** for how the availability of natural resources, the occurrence of natural hazards, and changes in climate affect human activity.
- **Use computational thinking** to explain the relationships between the sustainability of natural resources and biodiversity within Earth systems.
- Evaluate **design solutions** for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios on large and small scales. *Define the problem, identify criteria and constraints, analyze available data on proposed solutions, and determine an optimal solution.*
- Evaluate **design solutions** for a major global or local environmental problem based on one of Earth's systems. *Define the problem, identify criteria and constraints, analyze available data on proposed solutions, and determine an optimal solution.*