Indiana Science/Computer Science Content Connectors

Earth and Space Science

From Molecules to Organisms: Structures and Processes

1. Explain that the sun has a life span, which means that it is changing and will eventually burn out. (E) HS-ESS1-1A
2. Use a model to describe how energy generated by the sun is transferred to the Earth through radiation. (E) HS-ESS1-1B
3. Use evidence (e.g., red shift of light from galaxies, cosmic microwave background, observed composition of ordinary matter) to support the Big Bang theory. HS-ESS1-2A
4. Use evidence to explain the chemical processes over stars' life cycles that produce elements. HS-ESS1-3A
5. Explain that some orbiting objects move in an elliptical pattern around the sun. HS-ESS1-4A
6. Use a representation to predict a change in orbits due to various effects (e.g., gravitational effects from, or collisions with, other objects). HS-ESS1-4B
7. Use evidence to describe how the movements of rocks at Earth's surface over time (i.e., plate tectonics) explains the ages of continental and oceanic crustal rocks. (E) HS-ESS1-5A
8. Use evidence to explain how objects in the solar system can provide information about Earth’s formation and early history. (E) HS-ESS1-6A

Earth's Systems

1. Use a model to compare the impact of Earth's internal and surface processes at various scales and timeframes on the formation of continental and ocean-floor features. HS-ESS2-1A
2. Use geoscience data to support the claim that Earth's systems are interconnected, illustrating how changes to Earth's surface can result in feedbacks to other Earth systems. (E) HS-ESS2-2A
3. Use a model of Earth to describe that the motion of the mantle and its plates occurs primarily through thermal convection. HS-ESS2-3A
4. Use a model to illustrate how radioactive decay functions as the primary source of heat within Earth's crust, driving thermal convection. HS-ESS2-3B

	5 **Explain that seismic waves and their reflection are used to learn about the structure of the Earth. [Clarification Statement: Emphasis is on both a one-dimensional model of Earth, with radial layers determined by density, and a three-dimensional model, which is controlled by mantle convection and the resulting plate tectonics. Examples of evidence include maps of Earth's three-dimensional structure obtained from seismic waves, records of the rate of change of Earth's magnetic field (as constraints on convection in the outer core), and identification of the composition of Earth's layers from high-pressure laboratory experiments.]** HS-ESS2-3C
	6 **Use a model to describe how variations in the Earth's orbit and tilt affects climate on a very long-term scale.** HS-ESS2-4A
	7 **Use evidence to describe the properties of water and the effects of water on Earth materials and surface processes. (E)** HS-ESS2-5A
	8 **Create a model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.** HS-ESS2-6A
	9 **Use evidence to support claims related to the coevolution of Earth's systems and life on Earth.** HS-ESS2-7A
Earth and Human Activity	1 **Use evidence to describe relationships between human activity and the availability of natural resources, occurrence of natural hazards, or changes in climate. (E)** HS-ESS3-1A
	2 **Compare cost-benefit ratios of design solutions for developing, managing, and utilizing energy and mineral resources.** HS-ESS3-2A
	3 **Use data to describe the relationships among management of natural resources, the sustainability of human populations, and biodiversity.** HS-ESS3-3A
	4 **Evaluate or refine technological solutions by comparing how each solution addresses the impact of human activity on natural systems. Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).** HS-ESS3-4A
	5 **Use evidence from data and global climate models to predict the future impact of global or regional climate change on Earth systems. (E)** HS-ESS3-5A
	6 **Use representations to illustrate how the relationships among Earth systems are changed by human activities. An example of the impacts from human activity is how an increase in atmospheric carbon dioxide results in an increase in photosynthetic biomass on land and an increase in ocean acidification, with resulting impacts on sea organism health and marine populations.** HS-ESS3-6A