

The Physics of Earth and Space Essential Curriculum

Earth's Systems

Apply evidence of Earth's materials, meteorites and other planetary objects to construct an explanation of Earth's formation and early history. ([HS-ESS1-6](#))

Use evidence, such as seismic waves and records of Earth's change in magnetic field, to develop a model of Earth's interior to describe the cycling of matter by thermal convection which is driven by radioactive decay. ([HS-ESS2-3](#))

Evaluate evidence, including radioactive decay, of the age of crustal rocks through the theory of plate tectonics. ([HS-ESS1-5](#))

Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks. ([HS-ESS1-5](#))

Use algebraic relationships to determine the effect of various media on frequency, wavelength and speed of waves. ([HS-PS4-1](#))

Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. ([HS-PS2-5](#))

Develop and construct a model to illustrate the forces between objects interacting through electric or magnetic fields. ([HS-PS3-5](#))

Earth and Human Activity

Analyze geoscience data to explain how changes to Earth's surface can create feedbacks that cause changes to other Earth systems. ([HS-ESS2-2](#))

Create a computational model to calculate the change in energy based on the Law of Conservation of Energy and energy transfer. ([HS-PS3-1](#))

Develop and use a model to demonstrate the energy of particles is a combination of their motion and relative position. ([HS-PS3-2](#))

Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. ([HS-PS3-1](#))

Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. ([HS-ESS3-6](#))

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. ([HS-LS2-7](#))

Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. ([HS-ESS2-4](#))

Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. ([HS-ESS2-5](#))

Earth's Place in the Universe

Explain the Big Bang theory based on light spectra, motion of distant galaxies and composition of matter in the universe. ([HS-ESS1-2](#))

Communicate scientific ideas about the way stars, over their life cycle, produce elements. ([HS-ESS1-3](#))

Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. ([HS-PS1-8](#))

Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. ([HS-PS1-1](#))

Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. ([HS-PS 4-1](#))

Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. ([HS-PS-4-3](#))

Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. ([HS-PS-4-4](#))

Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy in the form of radiation. ([HS-ESS1-1](#))

Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. ([HS-PS3-3](#))

Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. ([HS-PS4-4](#))

Use mathematical or computational representations to predict the motion of orbiting objects in the solar system. ([HS-ESS1-4](#))

Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. ([HS-PS2-1](#))

Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. ([HS-PS2-4](#))