

Plus Standards: Physical

Forces, Interactions, and Motion SC.HSP.1

1 Gather, analyze, and communicate evidence of forces, interactions, and motion. SC.HSP.1.1

- a Generate and interpret mathematical and graphical representations to describe the relationships between position, velocity, acceleration and time. SC.HSP.1.1.A
 - b Use mathematical and pictorial models as applied to Newton's second law of motion describing the relationship among the net force on a macroscopic object, its mass, and its acceleration. SC.HSP.1.1.B
 - c Use mathematical representations of momentum to predict the outcome of a collision. SC.HSP.1.1.C
 - d Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. SC.HSP.1.1.D
 - e Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. SC.HSP.1.1.E
-

Waves, Electromagnetic Radiation, and Optics SC.HSP.2

2 Gather, analyze, and communicate evidence of the interactions of waves and optics. SC.HSP.2.2

- a Use mathematical representations to describe the relationships among the frequency, wavelength, and speed of waves traveling in various media. SC.HSP.2.2.A
 - b Develop and use models to predict interactions of longitudinal and transverse waves in various media. SC.HSP.2.2.B
 - c Develop and use models to describe the behavior of light at the boundary of various media. SC.HSP.2.2.C
 - d 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 SC.HSP.2.2.D
 - e Use evidence to support explanations for causes of emission and absorption spectra of electromagnetic radiation. SC.HSP.2.2.E
 - f Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy. SC.HSP.2.2.F
-

**Energy:
Physics** SC.HSP.4

3 Gather, analyze, and communicate evidence of the interactions of energy. SC.HSP.4.3

- a 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. SC.HSP.4.3.A
- b Plan and conduct an investigation to rate the power and efficiency used in performing work on a system. SC.HSP.4.3.B
- c Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. SC.HSP.4.3.C
- d Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. SC.HSP.4.3.D
- e Plan and conduct an investigation to provide evidence for the transfer of thermal energy within a system based on the Laws of Thermodynamics. SC.HSP.4.3.E
- f Develop and use a model of two objects interacting through gravitational, electric, or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. SC.HSP.4.3.F

**Electricity and
Magnetism** SC.HSP.16

4 Gather, analyze, and communicate evidence of electricity and magnetism. SC.HSP.16.4

- a Use mathematical representations of field forces to describe and predict forces at a distance between objects. SC.HSP.16.4.A
- b Use models to visualize and describe gravitational, magnetic and electrical fields and predict resulting forces on nearby objects. SC.HSP.16.4.B
- c Use mathematical representations to provide evidence that describes and predicts relationships between power, current, voltage, and resistance. SC.HSP.16.4.C
- d Evaluate competing design solutions for construction and use of electrical consumer products accounting for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. SC.HSP.16.4.D
- e Obtain and communicate technical information about how some technological devices use alternating current and others use direct current. SC.HSP.16.4.E
- f Design a solution to a problem using the fact that an electric current can produce a magnetic field and/or that a changing magnetic field can produce an electric current. SC.HSP.16.4.F
- g Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. SC.HSP.16.4.G