Nebraska Science

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