PHYSICS

FORCES AND INTERACTIONS

Priority Standards

1. **Analyze and interpret data** to determine the cause and effect relationship between the net force on an object and its change in motion as summarized by Newton's Second Law of Motion.

2. **Use mathematics and computational thinking** to support the claim that the total momentum of a system is conserved when there is no net force acting on the system.

3. **Design a solution** that has the function of minimizing the impact force on an object during a collision.

ENERGY

Priority Standards

1. **Analyze and interpret data** to track and calculate the transfer of energy within a system.

2. **Plan and conduct an investigation** to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system.

3. **Develop and use models** on the macroscopic scale to illustrate that energy can be accounted for as a combination of energies associated with the motion of objects and energy associated with the relative positions of objects.

4. **Design a solution** by constructing a device that converts one form of energy into another form of energy to solve a complex real-life problem.

Supporting Standard

1. **Design a solution** to a major global problem that accounts for societal energy needs and wants.

FIELDS

Priority Standards

1. **Use mathematics and computational thinking** to compare the scale and proportion of gravitational and electric fields using Newton's Law of Gravitation and Coulomb's Law.

2. **Plan and conduct an investigation** to provide evidence that an electric current causes a magnetic field and that a changing magnetic field causes an electric current.

3. **Analyze and interpret data** to compare the effect of changes in position of interacting objects on electric and gravitational forces and energy.

4. **Develop and use a model** to evaluate the effects on a field as characteristics of its source and surrounding space are varied.

WAVES

Priority Standards

1. **Analyze and interpret data** to derive both qualitative and quantitative relationships based on patterns observed in frequency, wavelength, and speed of waves traveling in various media.

2. **Engage in argument based on evidence** that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model better explains interactions within a system than the other.

3. **Evaluate information** about the effects that different frequencies of electromagnetic radiation have when absorbed by biological materials.

Supporting Standard

1. **Ask questions** and **construct an explanation** about the stability of digital transmission and storage of information and their impacts on society.