North Carolina Science

Physics

Motion and Stability- Forces and Interactions

1. **Analyze the motion of objects using time, distance, displacement, speed, velocity, and acceleration.** PS.PHY.1
   1. Use models (graphs, equations, diagrams) to infer motion in one dimension. PS.PHY.1.1
   2. Use models (graphs, equations, diagrams) to infer motion in two dimensions. PS.PHY.1.2

2. **Analyze systems of forces and their interaction with matter.** PS.PHY.2
   1. Use free body models to qualitatively and quantitatively analyze systems of forces in one dimension and two dimensions. PS.PHY.2.1
   2. Carry out investigations to explain the interactions of forces on an object according to Newton's Laws of Motion. PS.PHY.2.2
   3. Use models to qualitatively and quantitatively analyze basic forces related to movement of an object in a circular path (centripetal force). PS.PHY.2.3
   4. Use models to qualitatively and quantitatively explain the relationship among the force of gravity, the distance between two objects, and the mass of the objects, according to the Law of Universal Gravitation. PS.PHY.2.4
   5. Analyze and interpret data to explain the effect of elastic force on objects (Hooke's Law). PS.PHY.2.5

3. **Analyze the motion of objects based on the principles of conservation of momentum and impulse in one dimension.** PS.PHY.3
   1. Use models to analyze inelastic and elastic collisions in terms of the conservation of momentum in one dimension. PS.PHY.3.1
   2. Use mathematics and computational thinking to analyze the relationship among impulse, momentum, and Newton's 3rd law. PS.PHY.3.2

4. **Explain charge interactions in electrostatic systems and in electric circuits.** PS.PHY.4
   1. Use models to qualitatively and quantitatively explain the fundamental properties and interactions (Coulomb's Law) of charged objects along with the conservation of charge. PS.PHY.4.1
   2. Use models to explain the mechanisms for producing electrostatically charged objects, including charging by friction, conduction, and induction. PS.PHY.4.2

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3 Use circuit models to qualitatively and quantitatively analyze the relationships among current, voltage, resistance, and power in series, parallel, and compound circuits. PS.PHY.4.3

5 Explain the concept of magnetism. PS.PHY.5

1 Use models to qualitatively explain the relationship between magnetic domains and magnetism. PS.PHY.5.1

2 Obtain, evaluate, and communicate information about the relationship between magnetism and electric currents to explain the role of magnets in current technology. PS.PHY.5.2

Energy

1 Understand the relationship among work, energy, and power. PS.PHY.6

1 Use models to qualitatively and quantitatively analyze the kinetic and potential energy in a system. PS.PHY.6.1

2 Analyze and interpret data to qualitatively and quantitatively explain the relationship among work, power, and energy. PS.PHY.6.2

2 Analyze the behavior of waves and their applications. PS.PHY.7

1 Obtain, evaluate, and communicate information to compare mechanical and electromagnetic waves (specifically light and sound) in terms of wave characteristics (frequency, wavelength, period, amplitude, velocity, and energy). PS.PHY.7.1

2 Use models to qualitatively and quantitatively compare reflection and refraction (Snell's Law). PS.PHY.7.2

3 Obtain, evaluate, and communicate information to summarize how instruments that transmit and detect waves are used in everyday life. PS.PHY.7.3