

North Carolina Essential Standards for Physical Science

Forces and Motion

Essential Standard 1.1: Understand motion in terms of speed, velocity, acceleration, and momentum.

Objective 1.1.1: Explain motion in terms of frame of reference, distance, and displacement.

Objective 1.1.2: Compare speed, velocity, acceleration, and momentum using investigations, graphing, scalar quantities, and vector quantities.

Essential Standard 1.2: Understand the relationship between forces and motion.

Objective 1.2.1: Explain how gravitational force affects the weight of an object and the velocity of an object in freefall.

Objective 1.2.2: Classify frictional forces into one of four types: static, sliding, rolling, and fluid.

Objective 1.2.3: Explain forces using Newton's three laws of motion.

Matter: Properties and Change

Essential Standard 2.1: Understand types, properties, and structure of matter.

Objective 2.1.1: Classify matter as: homogeneous or heterogeneous; pure substance or mixture; element or compound; metals, nonmetals, or metalloids; solution, colloid, or suspension.

Objective 2.1.2: Explain the phases of matter and physical changes that matter undergoes.

Objective 2.1.3: Compare physical and chemical properties of various types of matter.

Objective 2.1.4: Interpret the data presented in the Bohr model diagrams and Lewis Structure dot diagrams for atoms and ions of elements 1 through 18.

Essential Standard 2.2: Understand chemical bonding and chemical interactions.

Objective 2.2.1: Infer valence electrons, oxidation numbers, and reactivity of an element based on its location in the periodic table.

Objective 2.2.2: Infer the type of chemical bond that occurs, whether covalent, ionic, or metallic, in a given substance.

Objective 2.2.3: Predict chemical formulas and names for simple compounds based on knowledge of bond formation and naming conventions.

Objective 2.2.4: Exemplify the law of conservation of mass by balancing chemical equations.

Objective 2.2.5: Classify types of reactions such as synthesis, decomposition, single replacement, or double replacement.

Objective 2.2.6: Summarize the characteristics and interactions of acids and bases.

Essential Standard 2.3: Understand the role of the nucleus in radiation and radioactivity.

Objective 2.3.1: Compare nuclear reactions including alpha decay, beta decay, and gamma decay; nuclear fusion and nuclear fission.

Objective 2.3.2: Exemplify the radioactive decay of unstable nuclei using the concept of half-life.

Energy: Conservation and Transfer

Essential Standard 3.1: Understand types of energy, conservation of energy, and energy transfer.

Objective 3.1.1: Explain thermal energy and its transfer.

Objective 3.1.2: Explain the law of conservation of energy in a mechanical system in terms of kinetic energy, potential energy, and heat.

Objective 3.1.3: Explain work in terms of the relationship among the applied force to an object, the resulting displacement of the object, and the energy transferred to an object.

Objective 3.1.4: Explain the relationship among work, power, simple machines both qualitatively and quantitatively.

Essential Standard 3.2: Understand the nature of waves.

Objective 3.2.1: Explain the relationships among wave frequency, wave period, wave velocity, amplitude, and wavelength through calculation and investigation.

Objective 3.2.2: Compare waves (mechanical, electromagnetic, and surface) using their characteristics.

Objectives 3.2.3: Classify waves as transverse or compressional (longitudinal).

Objective 3.2.4: Illustrate the wave interactions of reflection, refraction, diffraction and interference.

Essential Standard 3.3: Understand electricity and magnetism and their relationship.

Objective 3.3.1: Summarize static and current electricity.

Objectives 3.3.2: Explain simple series and parallel DC circuits in terms of Ohm's law.

Objective 3.3.3: Explain how current is affected by changes in composition, length, temperature, and diameter of wire.

Objective 3.3.4: Explain magnetism in terms of domains, interactions of poles, and magnetic fields.

Objective 3.3.5: Explain the practical application of magnetism.