

**Colorado High School Science
Science Contents Standards Mapping**

© Boardworks 2009

PHYSICAL SCIENCE	Boardworks High School Physics Presentations
Observe, explain, and predict natural phenomena governed by Newton's laws of motion, acknowledging the limitations of their application to very small or very fast objects	
1. Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations	
a. Gather, analyze and interpret data and create graphs regarding position, velocity and acceleration of moving objects	Acceleration Displacement, Velocity and Acceleration Newton's First Law Speed and Velocity
b. Develop, communicate and justify an evidence-based analysis of the forces acting on an object and the resultant acceleration produced by a net force	Newton's Second Law
c. Develop, communicate and justify an evidence-based scientific prediction regarding the effects of the action-reaction force pairs on the motion of two interacting objects	Newton's Third Law
<i>d. Examine the effect of changing masses and distance when applying Newton's law of universal gravitation to a system of two bodies</i>	–
<i>e. Identify the limitations of Newton's laws in extreme situations</i>	–
Apply an understanding of atomic and molecular structure to explain the properties of matter, and predict outcomes of chemical and nuclear reactions	
2. Apply an understanding of atomic and molecular structure to explain the properties of matter, and predict outcomes of chemical and nuclear reactions	
a. Develop, communicate, and justify an evidence-based scientific explanation supporting the current model of an atom	Structure of the Atom
<i>b. Gather, analyze and interpret data on chemical and physical properties of elements such as density, melting point, boiling point, and conductivity</i>	–
<i>c. Use characteristic physical and chemical properties to develop predictions and supporting claims about elements' positions on the periodic table</i>	*
<i>d. Develop a model that differentiates atoms and molecules, elements and compounds, and pure substances and mixtures</i>	*
3. Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy	

a. Recognize, analyze, interpret, and balance chemical equations (synthesis, decomposition, combustion, and replacement) or nuclear equations (fusion and fission)	*
b. Predict reactants and products for different types of chemical and nuclear reactions	*
c. Predict and calculate the amount of products produced in a chemical reaction based on the amount of reactants	*
d. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate the conservation of mass and energy	*
4. Atoms bond in different ways to form molecules and compounds that have definite properties	
a. Develop, communicate, and justify an evidence-based scientific explanation supporting the current models of chemical bonding	*
b. Gather, analyze, and interpret data on chemical and physical properties of different compounds such as density, melting point, boiling point, pH, and conductivity	Conductors and Insulators
c. Use characteristic physical and chemical properties to develop predictions and supporting claims about compounds' classification as ionic, polar or covalent	*
d. Describe the role electrons play in atomic bonding	*
e. Predict the type of bonding that will occur among elements based on their position in the periodic table	*
Apply an understanding that energy exists in various forms, and its transformation and conservation occur in processes that are predictable and measurable	
5. Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined	
a. Develop, communicate, and justify an evidence-based scientific explanation regarding the potential and kinetic nature of mechanical energy	Kinetic Energy Gravitational and Potential Energy
b. Use appropriate measurements, equations and graphs to gather, analyze, and interpret data on the quantity of energy in a system or an object	Conservation of Energy Energy Transfers
c. Use direct and indirect evidence to develop predictions of the types of energy associated with objects	Energy Transfers
d. Identify different energy forms, and calculate their amounts by measuring their defining characteristics	Energy Transfers Gravitational and Potential Energy Kinetic Energy
6. When energy changes form, it is neither created nor destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases	
a. Use direct and indirect evidence to develop and support claims about the conservation of energy in a variety of systems, including transformations to heat	Energy Transfers Conservation of Energy
b. Evaluate the energy conversion efficiency of a variety of energy transformations	–

c. Describe energy transformations both quantitatively and qualitatively	Energy Transfers Conservation of Energy
d. Differentiate among the characteristics of mechanical and electromagnetic waves that determine their energy	Electromagnetic Waves Longitudinal Waves Transverse Waves Sound Waves
e. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate energy conservation and loss	Conservation of Energy

* See Boardworks High School Chemistry for relevant presentations.