

**North Carolina Physical Science Grade 9-12
Learning Objectives Mapping**

© Boardworks 2009

PHYSICAL SCIENCE	Boardworks High School Chemistry Presentation
Competency Goal 2: The learner will construct an understanding of forces and motion.	
2.01 Measure and mathematically/graphically analyze motion:	
Frame of reference (all motion is relative - there is no motionless frame).	*
Uniform motion.	*
Acceleration.	*
2.02 Investigate and analyze forces as interactions that can change motion:	
In the absence of a force, an object in motion will remain in motion or an object at rest will remain at rest until acted on by an unbalanced force.	*
Change in motion of an object (acceleration) is directly proportional to the unbalanced outside force and inversely proportional to the mass.	*
Whenever one object exerts a force on another, an equal and opposite force is exerted by the second on the first.	*
Competency Goal 3: The learner will analyze energy and its conservation.	
3.01 Investigate and analyze storage of energy:	
Kinetic energy.	Energy Transfers
Potential energies: gravitational, chemical, electrical, elastic, nuclear.	Energy Transfers
Thermal energy.	Energy Transfers
3.02 Investigate and analyze transfer of energy by work:	
Force.	*
Distance.	*
3.03 Investigate and analyze transfer of energy by heating:	
Thermal energy flows from a higher to a lower temperature.	Heat
Energy will not spontaneously flow from a lower temperature to a higher temperature.	Heat
It is impossible to build a machine that does nothing but convert thermal energy into useful work.	—
3.04 Investigate and analyze the transfer of energy by waves:	
General characteristics of waves: amplitude, frequency, period, wavelength, velocity of propagation.	*
Mechanical waves.	*
Sound waves.	*
Electromagnetic waves (radiation).	*
Competency Goal 4: The learner will construct an understanding of electricity and magnetism.	
4.01 Investigate and analyze the nature of static electricity and the conservation of electrical charge:	*

<i>Positive and negative charges.</i>	*
<i>Opposite charges attract and like charges repel.</i>	*
<i>Analyze the electrical charging of objects due to the transfer of charge.</i>	*
4.02 Investigate and analyze direct current electrical circuits:	
<i>Ohm's law.</i>	*
<i>Series circuits.</i>	*
<i>Parallel circuits.</i>	*
4.03 Investigate and analyze magnetism and the practical applications of the characteristics of magnets.	
<i>Permanent magnets.</i>	*
<i>Electromagnetism.</i>	*
<i>Movement of electrical charges.</i>	*
Competency Goal 5: The learner will build an understanding of the structure and properties of matter.	
5.01 Develop an understanding of how scientific processes have led to the current atomic theory.	
Dalton's atomic theory.	Introducing Atoms
J.J. Thomson's model of the atom.	Introducing Atoms
Rutherford's gold foil experiment.	Introducing Atoms
Bohr's planetary model.	–
Electron cloud model.	–
5.02 Examine the nature of atomic structure:	
Protons.	Atomic Structure
Neutrons.	Atomic Structure
Electrons.	Atomic Structure Electron Configuration
Atomic mass.	Atomic Number and Mass Number
Atomic number.	Atomic Number and Mass Number
Isotopes.	Isotopes
5.03 Identify substances through the investigation of physical properties:	
<i>Density.</i>	*
<i>Melting point.</i>	*
<i>Boiling point.</i>	*
Competency Goal 6: The learner will build an understanding of regularities in chemistry.	
6.01 Analyze the periodic trends in the physical and chemical properties of elements.	
Groups (families).	Electron Structure and the Periodic Table Patterns of Behavior The Periodic Table

Periods.	Electron Structure and the Periodic Table Patterns of Behavior The Periodic Table
6.02 Investigate and analyze the formation and nomenclature of simple inorganic compounds.	
Ionic bonds (including oxidation numbers).	Ionic Bonding Naming Compounds Oxidation Numbers
Covalent bonds.	Covalent Bonding
Metallic bonds.	Metallic Bonding
6.03 Identify the reactants and products of chemical reactions and balance simple equations of various types:	Neutralization Redox Reactions Reacting Masses Thermal Decomposition
Single replacement.	Redox
Double replacement.	Neutralization
Decomposition.	Thermal Decomposition
Synthesis.	Reacting Masses
6.04 Measure and analyze the indicators of chemical change including:	Rates of Reactions
Development of a gas.	Combustion
Formation of a precipitate.	
Release/absorption of energy (heat or light).	Endothermic Reactions Exothermic Reactions
6.05 Investigate and analyze the properties and composition of solutions:	
Solubility curves.	Solubility
Concentration.	Solutions
Polarity.	–
pH scale.	pH and Indicators
Electrical conductivity.	Ionic Compounds
6.06 Describe and explain radioactivity and its practical application as an alternative energy source:	
Alpha, beta, and gamma decay.	Types of Radiation
Fission.	Nuclear Fission
Fusion.	Nuclear Fusion
Nuclear waste.	Nuclear Waste

* See Boardworks High School Physics for relevant presentations.