

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

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PHYSICAL SCIENCE	Boardworks High School Physics Presentation
Competency Goal 2: The learner will construct an understanding of forces and motion.	Acceleration Displacement, Velocity and Acceleration
2.01 Measure and mathematically/graphically analyze motion:	
Frame of reference (all motion is relative - there is no motionless frame).	–
Uniform motion.	Displacement, Velocity and Acceleration
Acceleration.	Acceleration Displacement, Velocity and 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.	Newton's First Law
Change in motion of an object (acceleration) is directly proportional to the unbalanced outside force and inversely proportional to the mass.	Newton's Second Law
Whenever one object exerts a force on another, an equal and opposite force is exerted by the second on the first.	Newton's Third Law
Competency Goal 3: The learner will analyze energy and its conservation.	
3.01 Investigate and analyze storage of energy:	
Kinetic energy.	Energy Transfers Kinetic Energy
Potential energies: gravitational, chemical, electrical, elastic, nuclear.	Energy Transfers Gravitational and Potential Energy
Thermal energy.	Energy Transfers
3.02 Investigate and analyze transfer of energy by work:	
Force.	Work
Distance.	Work
3.03 Investigate and analyze transfer of energy by heating:	
Thermal energy flows from a higher to a lower temperature.	Conduction and Convection
Energy will not spontaneously flow from a lower temperature to a higher temperature.	Conduction and Convection

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:	
<i>General characteristics of waves: amplitude, frequency, period, wavelength, velocity of propagation.</i>	Longitudinal Waves Transverse Waves Waves
<i>Mechanical waves.</i>	Sound Waves
<i>Sound waves.</i>	Sound
<i>Electromagnetic waves (radiation).</i>	Electromagnetic Waves
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>	Static Electricity
<i>Opposite charges attract and like charges repel.</i>	Static Electricity
<i>Analyze the electrical charging of objects due to the transfer of charge.</i>	Static Electricity
4.02 Investigate and analyze direct current electrical circuits:	
<i>Ohm's law.</i>	Calculating Resistance
<i>Series circuits.</i>	Series and Parallel Circuits
<i>Parallel circuits.</i>	Series and Parallel Circuits
4.03 Investigate and analyze magnetism and the practical applications of the characteristics of magnets.	
<i>Permanent magnets.</i>	–
<i>Electromagnetism.</i>	Magnetism, Current and Force Motors
<i>Movement of electrical charges.</i>	Magnetism, Current and Force Motors
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.	
<i>Dalton's atomic theory.</i>	Structure of the Atom
<i>J.J. Thomson's model of the atom.</i>	Structure of the Atom
<i>Rutherford's gold foil experiment.</i>	Structure of the Atom
<i>Bohr's planetary model.</i>	Structure of the Atom
<i>Electron cloud model.</i>	–
5.02 Examine the nature of atomic structure:	
<i>Protons.</i>	Structure of the Atom

Neutrons.	Structure of the Atom
Electrons.	
Atomic mass.	*
Atomic number.	*
Isotopes.	Structure of the Atom
<i>5.03 Identify substances through the investigation of physical properties:</i>	
<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).	*
Periods.	*
6.02 Investigate and analyze the formation and nomenclature of simple inorganic compounds.	
Ionic bonds (including oxidation numbers).	*
Covalent bonds.	*
Metallic bonds.	*
6.03 Identify the reactants and products of chemical reactions and balance simple equations of various types:	
Single replacement.	*
Double replacement.	*
Decomposition.	*
Synthesis.	*
6.04 Measure and analyze the indicators of chemical change including:	
Development of a gas.	*
Formation of a precipitate.	*
Release/absorption of energy (heat or light).	*
6.05 Investigate and analyze the properties and composition of solutions:	
Solubility curves.	*
Concentration.	*
Polarity.	*
pH scale.	*
Electrical conductivity.	*
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.	*

* See Boardworks High School
Chemistry for relevant
presentations.

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