

**Alabama Science Grades 9-12
Curriculum Standards**

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PHYSICAL SCIENCE	Boardworks High School Physics Presentation
1 Recognize periodic trends of elements, including the number of valence electrons, atomic size, and reactivity.	See Boardworks High School Chemistry for relevant presentations.
- Categorizing elements as metals, nonmetals, metalloids, and noble gases	
- Differentiating between families and periods	
- Using atomic number and mass number to identify isotopes	
2 Identify solutions in terms of components, solubility, concentration, and conductivity.	
- Comparing saturated, unsaturated, and supersaturated solutions	
- Comparing characteristics of electrolytes and nonelectrolytes	
- Describing factors that affect solubility and rate of solution, including nature of solute and solvent, temperature, agitation, surface area, and pressure on gases	
3 Contrast the formation of ionic and covalent bonds based on the transfer or sharing of valence electrons.	
- Demonstrating the formation of positive and negative monatomic ions by using electron dot diagrams	
4 Use nomenclature and chemical formulas to write balanced chemical equations.	
- Explaining the law of conservation of matter	
- Identifying chemical reactions as composition, decomposition, single replacement, or double replacement	
- Defining the role of electrons in chemical reactions	
5 Describe physical and chemical changes in terms of endothermic and exothermic processes	
6 Identify characteristics of gravitational, electromagnetic, and nuclear forces.	Gravity Structure of the Atom
7 Relate velocity, acceleration, and kinetic energy to mass, distance, force, and time.	Speed and Velocity Acceleration Displacement, Velocity and Acceleration Kinetic Energy Newton's Second Law
- Interpreting graphic representations of velocity versus time and distance versus time	Displacement, Velocity and Acceleration

- Solving problems for velocity, acceleration, force, work, and power	Speed and Velocity Acceleration Displacement, Velocity and Acceleration Work Power
- Describing action and reaction forces, inertia, acceleration, momentum, and friction in terms of Newton's three laws of motion	Acceleration Momentum Friction Newton's First Law Newton's Second Law Newton's Third Law
- Determining the resultant of collinear forces acting on a body. Example: solving problems involving the effect of a tailwind or headwind on an airplane	Newton's First Law
- Solving problems for efficiency and mechanical advantage of simple machines	-
8 Relate the law of conservation of energy to transformations of potential energy, kinetic energy, and thermal energy.	Conservation of energy Gravitational and Potential Energy Kinetic Energy Energy Transfers
- Identifying the relationship between thermal energy and the temperature of a sample of matter	Calorimetry
- Describing the flow of thermal energy between two samples of matter	Conduction and convection
- Explaining how thermal energy is transferred by radiation, conduction, and convection	Radiation Conduction and convection
- Relating simple formulas to the calculation of potential energy, kinetic energy, and work	Gravitational and Potential Energy Kinetic Energy Work
9 Compare methods of energy transfer by mechanical and electromagnetic waves.	Electromagnetic Waves Waves
- Distinguishing between transverse and longitudinal mechanical waves	Waves Transverse Waves Longitudinal Waves
- Relating physical properties of sound and light to wave characteristics Examples: loudness to amplitude, pitch to frequency, color to wavelength and frequency	Sound Reflection Refraction Electromagnetic Waves

10 Explain the relationship between electricity and magnetism. Example: using a moving charge to create a magnetic field and using a moving magnetic field to induce a current in a closed wire loop	Magnetism, Current and Force
- Differentiating between induction and conduction	-
- Identifying mechanical, magnetic, and chemical methods used to create an electrical charge Examples: mechanical—rubbing materials together, magnetic—moving a closed loop of wire across a magnetic field, chemical—using batteries	Static Electricity
- Describing electrical circuits in terms of Ohm's law	Calculating Resistance
11 Describe the nuclear composition of unstable isotopes and the resulting changes to their nuclear composition.	Types of Radiation Radioactivity
- Identifying types of nuclear emissions, including alpha particles, beta particles, and gamma radiation	Types of Radiation Radioactivity Uses of Radiation
- Differentiating between fission and fusion	Nuclear Fission Nuclear Fusion
- Identifying uses and possible negative side effects of nuclear technology Examples: uses—nuclear power generation, medical applications, space travel; negative effects—radioactive contamination, nuclear fuel waste and waste storage	Nuclear Fission Nuclear Fusion
12 Identify metric units for mass, distance, time, temperature, velocity, acceleration, density, force, energy, and power.	Mass and Weight Displacement, Velocity and Acceleration Acceleration Newton's Second Law Power Kinetic Energy Gravitational and Potential Energy

