Alabama Science

Physical Science

Energy	**Energy**
	Systems and System Models
	1 Evaluate sources of information concerning the law of conservation of energy to illustrate energy transformations in practical applications and natural systems. PS.1
	a Plan and carry out investigations to explore how mechanical energy is transformed within a system, including kinetic energy, gravitational potential energy, elastic potential energy, and work. PS.1.A
	Energy
	Energy and Matter
	Energy
	Cause and Effect
Collect, analyze, and use data to explain how thermal energy is transferred by conduction, convection, and radiation. PS.1.B	**b Collect, analyze, and use data to explain how thermal energy is transferred by conduction, convection, and radiation.** PS.1.B
Construct explanations to justify the selection of materials for specific applications based on the materials' specific heat values. PS.1.C	**c Construct explanations to justify the selection of materials for specific applications based on the materials' specific heat values.** PS.1.C
Investigate collisions and other real-world situations to evaluate the effects of impulse on changes in momentum. PS.1.D	**d Investigate collisions and other real-world situations to evaluate the effects of impulse on changes in momentum.** PS.1.D

Waves and Their Applications in Technologies for Information Transfer	**Properties of Waves**
	Energy and Matter 2 Obtain, evaluate, and communicate information to compare and contrast the properties of mechanical and electromagnetic waves as they relate to real-world applications. PS.2 a Analyze and interpret data to identify and describe the relationships among wavelength, frequency, amplitude, and energy in waves. PS.2.A
	Properties of Waves
	Cause and Effect
	Properties of Waves
	Systems and System Models
	Electricity and Magnetism
	Energy and Matter 3 Construct an explanation of the ways in which modern science uses both magnetic and electric concepts to create usable products. PS.3
	Electricity and Magnetism
	Systems and System Models
	Electricity and Magnetism
	Cause and Effect
	Electricity and Magnetism
	Systems and System Models
	Electricity and Magnetism
	Cause and Effect
	Electricity and Magnetism
	Energy and Matter
Develop models to illustrate reflection, refraction, interference, and diffraction. PS.2.B	b **Develop models to illustrate reflection, refraction, interference, and diffraction.** PS.2.B

Analyze the ways in which different media and their characteristics affect the speed of sound and light waves. PS.2.C	**c** **Analyze the ways in which different media and their characteristics affect the speed of sound and light waves.** PS.2.C
Use models to illustrate the Doppler effect and explain the changes in sound perception associated with it. PS.2.D	**d** **Use models to illustrate the Doppler effect and explain the changes in sound perception associated with it.** PS.2.D
Obtain and communicate information from published materials to explain how transmitting and receiving devices use the principles of wave behavior and wave interactions to transmit and capture information and energy. PS.2.E	**e** **Obtain and communicate information from published materials to explain how transmitting and receiving devices use the principles of wave behavior and wave interactions to transmit and capture information and energy.** PS.2.E
Construct an argument using evidence to support the claim that field forces exist between objects and act on the objects even when the objects are not in contact. PS.3.A	**a** **Construct an argument using evidence to support the claim that field forces exist between objects and act on the objects even when the objects are not in contact.** PS.3.A
Plan and carry out investigations to identify the factors that affect the strength of the electric and magnetic forces between objects. PS.3.B	**b** **Plan and carry out investigations to identify the factors that affect the strength of the electric and magnetic forces between objects.** PS.3.B
Use mathematics and computational thinking to represent and determine the quantitative	**c** **Use mathematics and computational thinking to represent and determine the quantitative relationships between voltage, current, and resistance in series and parallel circuits in terms of Ohm's law.** PS.3.C

relationships between voltage, current, and resistance in series and parallel circuits in terms of Ohm's law. PS.3.C	
Develop and use models to determine the relationships among voltage, current, and resistance at specific loads in series and parallel circuits. PS.3.D	**d** **Develop and use models to determine the relationships among voltage, current, and resistance at specific loads in series and parallel circuits.** PS.3.D
Plan and carry out investigations to determine the relationships between magnetism and electrical charge in common devices. PS.3.E	**e** **Plan and carry out investigations to determine the relationships between magnetism and electrical charge in common devices.** PS.3.E
Analyze and interpret data concerning the advantages and disadvantages of the energy sources used to produce electricity. PS.3.F	**f** **Analyze and interpret data concerning the advantages and disadvantages of the energy sources used to produce electricity.** PS.3.F
Matter and Its Interactions	**Structure, Properties, and Nuclear Processes** **Stability and Change** 4 Evaluate the effects of using ions or isotopes of elements as a solution to a complex real-world problem, including cost, safety, trade-offs, and environmental impacts. PS.4 **Structure, Properties, and Nuclear Processes** **Patterns** **Structure and Function** **Structure, Properties, and Nuclear Processes** **Structure, Properties, and Nuclear Processes**

Cause and Effect

e Analyze and interpret data to explain how radioactive decay changes a radioactive isotope over time and explain how the age of an object can be estimated by the ratio of radioactive isotopes contained within the object's atoms. PS.4.E

f Use mathematics and computational thinking to identify types of radioactive decay based on balanced chemical equations, penetrating power, identity of emitted particles, and charge. PS.4.F

Structure, Properties, and Nuclear Processes

Energy and Matter

g Use models to explain how nuclear fission and fusion reactions can be used as energy sources. PS.4.G

Structure, Properties, and Nuclear Processes

Systems and System Models

h Generate and defend a data-based claim regarding the use of radioactive materials as an energy source. PS.4.H

Matter

Cause and Effect

5 Analyze and interpret data to justify the selection of a specific material for a practical application, considering a range of constraints. PS.5

a Carry out investigations and use results to compare and contrast the physical and chemical properties of matter. PS.5.A

Matter

Patterns

Energy and Matter

Matter

Solutions

Energy and Matter

6 Obtain, evaluate, and communicate information to explain how the properties of various types of solutions make them useful in real-world applications. PS.6

Solutions

Cause and Effect

Solutions

	Energy and Matter
	Solutions
	Cause and Effect
Obtain, evaluate, and communicate information from the periodic table concerning the structure of an atom and the arrangement of the atom's protons, neutrons, and electrons. PS.4.A	**a** **Obtain, evaluate, and communicate information from the periodic table concerning the structure of an atom and the arrangement of the atom's protons, neutrons, and electrons.** PS.4.A
Predict the properties of an element based on the element's number of protons and valence electrons. PS.4.B	**b** **Predict the properties of an element based on the element's number of protons and valence electrons.** PS.4.B
Analyze and interpret data to predict properties of ionic and covalent compounds. PS.4.C	**c** **Analyze and interpret data to predict properties of ionic and covalent compounds.** PS.4.C
Use mathematics and computational thinking to determine the charge of an ion and the mass number of an isotope based on the number of subatomic particles. PS.4.D	**d** **Use mathematics and computational thinking to determine the charge of an ion and the mass number of an isotope based on the number of subatomic particles.** PS.4.D
Analyze and interpret data to predict changes in the phase of a material based on changes in particle motion, temperature, pressure, or thermal energy. PS.5.B	**b** **Analyze and interpret data to predict changes in the phase of a material based on changes in particle motion, temperature, pressure, or thermal energy.** PS.5.B

Use mathematical and computational thinking to determine the quantitative relationships among temperature, pressure, and volume of confined gases. PS.5.C	**c** Use mathematical and computational thinking to determine the quantitative relationships among temperature, pressure, and volume of confined gases. PS.5.C
Utilize multiple types of models to support and verify the claim that matter is conserved during a simple chemical reaction. PS.5.D	**d** Utilize multiple types of models to support and verify the claim that matter is conserved during a simple chemical reaction. PS.5.D
Plan and carry out investigations to determine how various factors, including temperature, surface area, and stirring, affect the rate at which a solute dissolves in a solvent. PS.6.A	**a** Plan and carry out investigations to determine how various factors, including temperature, surface area, and stirring, affect the rate at which a solute dissolves in a solvent. PS.6.A
Develop and use particle diagrams to illustrate diluted and concentrated solutions and describe how adjusting amounts of solute and solvent impacts the concentration of a solution. PS.6.B	**b** Develop and use particle diagrams to illustrate diluted and concentrated solutions and describe how adjusting amounts of solute and solvent impacts the concentration of a solution. PS.6.B
Analyze and interpret data from experiments to determine whether solutions are acidic, basic, or neutral to predict properties of the solutions. PS.6.C	**c** Analyze and interpret data from experiments to determine whether solutions are acidic, basic, or neutral to predict properties of the solutions. PS.6.C
Plan and carry out investigations concerning	**d** Plan and carry out investigations concerning neutralization reactions and describe the properties of the reactants and products. PS.6.D

neutralization reactions and describe the properties of the reactants and products. PS.6.D