Huntsville City Schools 2017 – 2018 Pacing Guide

Physical Science Grades 10th-12th

1st 9-Weeks

KEY VOCABULARY TERMS

Science
Observation
Hypothesis
Variable
Theory
Law
Model
Scientific notation
Length
Mass
Volume
Density
Conversion factor
Precision
Significant figures
Accuracy
Thermometer
Pure substance
Element
Atom
Compound
Heterogeneous mixture
Homogeneous mixture
Solution
Suspension
Colloid
Physical property
Chemical property
Malleability
Melting point
Boiling point
Physical change
Chemical change
Flammability
Reactivity
Precipitate
Solid
Liquid
Gas
Kinetic energy
Pressure
Absolute zero
Charles's Law
Boyle's Law
Phase change
Endothermic
Exothermic
Vaporization
Heat of vaporization
Evaporation
Condensation
Sublimation
Deposition
Nucleus
Atom
Proton
Neutron
Electron
Atomic number
Mass number
Isotope
Energy levels
Electron cloud
Orbital
Valence electron
Electron configuration
Ground state
Period
Group
Periodic Law
Metals
Transition metals
Nonmetals
Metalloids
Alkali metals
Alkaline earth metals
Halogens
Noble gases
Atomic mass unit

Standard	Resources	Pacing
Quality Core I.A.1.f: Safely use laboratory equipment and techniques when conducting scientific investigations • Introduction to lab safety • Scientific method • Introduction to matter and properties of matter	**Textbook:** Physical Science: Concepts in Action Section 1.1 & 1.2 **Labs:** ASIM Toilet Paper Strength LTF Scientific Method Practice 1 and 2 **Other Activities:** Safety test	**2 DAYS** (w/ additional practice throughout the school year)
Quality Core I.A.2.a-c; II.A.1.b: Use mathematics and measurements in science appropriately • Make and analyze graphs • Make accurate measurements • SI units and conversions	**Textbook:** Physical Science: Concepts in Action Section 1.3, 2.1, 2.2, 2.3 **Labs:** LTF Bar Graphs and Histograms LTF Line Graphs LTF Pie Charts LTF Numbers in Science **Other Activities:** Practice with SI units and SI unit conversions	**3 DAYS** (w/ additional practice throughout the school year)
MATTER & IT'S INTERACTIONS ALCOS 2.) Plan and carry out investigations (e.g., squeezing a balloon, placing a balloon on ice) to identify the relationships that exist among the pressure, volume, density, and temperature of a confined gas. • Phase changes • Endothermic and exothermic processes	**Textbook:** Physical Science: Concepts in Action Section 3.1, 3.2, 3.3 **Labs:** LTF Cool Chemical Reaction LTF Meltdown **Other Activities:** Plan and carry out a confined gas investigation (design inquiry lab) Phase change diagrams	**5 DAYS**

	PhET States of Matter Purdue Visualizations Khan Academy States of Matter	
ALCOS 1.) Use the periodic table as a model to predict the relative properties and trends (e.g., reactivity of metals; types of bonds formed, including ionic, covalent, and polar covalent; numbers of bonds formed; reactions with oxygen) of main group elements based on the patterns of valence electrons in atoms. • Subatomic particles and their locations • Atomic number • Mass number • Isotopes • Mendeleev and the periodic table • Periods and families • Metals, nonmetals, metalloids, and noble gases • Valence electrons • Reactivity of elements	**Textbook:** Physical Science: Concepts in Action Section 4.2 and 4.3 and 5.2 and 5.3 **Labs:** LTF It's in the Cards LTF Making Sense of That Chart on the Wall LTF Flame Tests **Other Activities:** PhET Build an Atom Atomic model project – build an atomic model Atomic Flipbook activity NOVA What Makes an Element Reactive?	**10 DAYS**
		20 DAYS

Huntsville City Schools 2017 – 2018 Pacing Guide

Physical Science Grades 10th-12th

2nd 9-Weeks

KEY VOCABULARY TERMS

Electron dot diagram
Ion
Anion
Cation
Chemical bond
Ionic bond
Covalent bond
Chemical formula
Crystals
Molecule
Polar covalent bond
Polyatomic ion
Metallic bond
Alloy
Reactants
Products
Chemical equation
Coefficients
Mole
Molar mass
Synthesis reactions
Decomposition reaction
Single-replacement reaction
Double-replacement reaction
Combustion reaction
Oxidation-reduction reaction
Chemical energy
Exothermic reaction
Endothermic reaction
Reaction rate
Catalyst
Equilibrium
Reversible reaction
Solute
Solvent
Solution
Dissociation
Dispersion
Ionization
Solubility
Saturated solution
Unsaturated solution
Supersaturated solution
Concentration
Molarity
Acid
Base
Indicator
Neutralization
Salt
Buffer
pH
Electrolyte
Radioactivity
Radioisotope
Nuclear radiation
Alpha particle
Beta particle
Gamma ray
Background radiation
Half-life
Strong nuclear force
Fission
Fusion
Chain reaction
Critical mass
Plasma

Standard	Resources	Pacing
ALCOS 3.) Analyze and interpret data from a simple chemical reaction or combustion reaction involving main group elements. • Ionic and covalent bonds • Bonding • Name & determine chemical compounds & formulas • Role of valence electrons in bonding • Interpret chemical equations in terms of reactants, products, and conservation of mass. • Balance chemical equations by manipulating coefficients. • Types of chemical reactions (synthesis, decomposition, etc)	**Textbook:** Physical Science: Concepts in Action Sections 6.1, 6.2, 6.3 and 7.1, 7.2, 7.3, 7.4 **Labs:** LTF Chemical Nomenclature LTF Chemical Bonding using marshmallow models LTF Types of Chemical Reactions LTF: Where's the Heat? **Other Activities:** PhET Molecule Shapes PhET Reactants Products and Leftovers PhET Balancing Chemical Equations	**10 DAYS**
ALCOS 5.) Use mathematical representations to support and verify the claim that atoms, and therefore mass, are conserved during a simple chemical reaction.	**Textbook:** Physical Science: Concepts in Action Section 7.3 **Labs:** **Other Activities:**	**1 DAY**
ALCOS 4.) Analyze and interpret data using acid-base indicators (e.g., color-changing markers, pH paper) to distinguish between acids and bases, including comparisons between strong and weak acids and bases. • Properties of solutions, solutes, and solvents • Discuss the factors that affect solubility • Identify energy changes that occur during the formation of a solution • Define solubility and compare solutions as unsaturated, saturated, or supersaturated. • Relate the pH of acids and bases to the characteristics of electrolytes and nonelectrolytes.	**Textbook:** Physical Science: Concepts in Action Sections 8.1 and 8.2 and 8.3 and 8.4 **Labs:** Acid/Base lab **Other Activities:** Purdue Visualization Solutions	**6 DAYS**

ALCOS 6.) Develop models to illustrate the concept of half-life for radioactive decay. a. Research and communicate information about types of naturally occurring radiation and their properties. b. Develop arguments for and against nuclear power generation compared to other types of power generation. • Nuclear forces and radioactivity • Alpha, beta, and gamma radiation • Fission and fusion • Identify uses and possible negative side effects of nuclear technology	**Textbook:** Physical Science: Concepts in Action Sections 10.1 and 10.4 Physical Science: Concepts in Action and Issues in Science in Ch. 10, Pg. 300 Radioactive Dating **Labs:** LTF Red Hot Half Life M&M Decay Lab **Other Activities:** Nuclear Brochure	**3 DAYS**
		20 DAYS

Huntsville City Schools 2017 – 2018 Pacing Guide

Physical Science Grades 10th-12th

3rd 9-Weeks

KEY VOCABULARY TERMS

Frame of reference
Relative motion
Distance
Vector
Resultant vector
Speed
Average speed
Instantaneous speed
Velocity
Acceleration
Free fall
Constant acceleration
Force
Newton
Net force
Friction
Static friction
Sliding friction
Rolling friction
Fluid friction
Air resistance
Gravity
Terminal velocity
Projectile motion
Inertia
Mass
Weight
Momentum
Law of conservation of momentum
Electromagnetic force
Strong nuclear force
Weak nuclear force
Gravitational force
Centripetal force
Balance force
Unbalanced force
Work
Joule
Power
Watt
Horsepower
Machine
Input force
Input distance
Work input
Output force
Output distance
Work output
Mechanical advantage
Actual mechanical advantage
Ideal mechanical advantage
Lever
Fulcrum
Input arm
Output arm
Wheel and axle
Inclined plane
Wedge
Screw
Pulley
Compound machine
Energy
Kinetic energy
Potential energy
Gravitational potential energy
Elastic potential energy
Mechanical energy
Thermal energy
Chemical energy
Electrical energy
Electromagnetic energy
Nuclear energy
Energy conversion
Nonrenewable energy resources
Fossil fuels
Renewable energy resources
Solar energy
Biomass energy

Standard	Resources	Pacing
MOTION & STABILITY: FORCES & INTERACTIONS ALCOS 7.) Analyze and interpret data for one- and two-dimensional motion applying basic concepts of distance, displacement, speed, velocity, and acceleration (e.g., velocity versus time graphs, displacement versus time graphs, acceleration versus time graphs). • Motion and forces	**Textbook:** Physical Science: Concepts in Action Sections 11.1, 11.2, and 11.3 **Labs:** LTF Walk the Line LTF Speed LTF Ramped Up LTF Changing Motion LTF Happiness is a Straight Line **Other Activities:** PhET Motion in 2D PhET Maze Game Khan Academy Calculating Velocity or Speed Khan Academy Acceleration	**6 DAYS**
MOTION & STABILITY: FORCES & INTERACTIONS ALCOS 8.) Apply Newton's laws to predict the resulting motion of a system by constructing force diagrams that identify the external forces acting on the system, including friction (e.g., a book on a table, an object being pushed across a floor, an accelerating car). • Balanced and unbalanced forces • Newton's laws • Momentum • Mass and weight	**Textbook:** Physical Science: Concepts in Action Sections 12.1, 12.2, 12.3, and 12.4 **Labs:** LTF Barbie Doll Bungee LTF The Force to Be Reckoned With LTF Vectors LTF Forces on Objects LTF Not So Free Fall **Other Activities:** PhET Moving Man PhET Ramp Forces and Motion PhET Lunar Lander PhET Collision Lab Khan Academy Newton's Laws	**6 DAYS**

MOTION & STABILITY: FORCES & INTERACTIONS ALCOS 9). Use mathematical equations (e.g., $(m_1v_1 + m_2v_2)_{before} = (m_1v_1 + m_2v_2)_{after}$) and diagrams to explain that the total momentum of a system of objects is conserved when there is no net external force on the system. a. Use the laws of conservation of mechanical energy and momentum to predict the result of one-dimensional elastic collisions. • Potential and kinetic energy • Thermal energy	**Textbook:** Physical Science: Concepts in Action Sections 12.3 and 15.1 **Labs:** LTF Hot Dog LTF Roller Coaster! **Other Activities:** PhET Energy Skate Park	**3 DAYS**
ENERGY ALCOS 12.) Design, build, and test the ability of a device (e.g., Rube Goldberg devices, wind turbines, solar cells, solar ovens) to convert one form of energy into another form of energy.* • Work and power • Simple machines • Efficiency and mechanical advantage	**Textbook:** Physical Science: Concepts in Action Sections 14.1, 14.2, 14.3, 14.4 **Labs:** Design lab – build a Rube Goldberg machine LTF Levers R Us LTF Mechanical Advantage LTF Roller Coaster Fun LTF Running the Stairs **Other Activities:** Khan Academy Mechanical Advantage	**5 DAYS**
		20 DAYS

Huntsville City Schools 2017 – 2018 Pacing Guide

Physical Science Grades 10th-12th

4th 9-Weeks

KEY VOCABULARY TERMS

Heat
Temperature
Thermal expansion
Absolute zero
Specific heat
Calorimeter
Conduction
Thermal conductor
Thermal insulator
Convection
Convection current
Radiation
Thermodynamics
Heat engine
Waste heat
Mechanical wave
Medium
Crest
Trough
Transverse wave
Compression
Rarefaction
Longitudinal wave
Surface wave
Periodic motion
Period
Frequency
Hertz
Wavelength
Amplitude
Reflection
Refraction
Diffraction
Interference
Constructive interference
Destructive interference
Standing wave
Node
Antinode
Sound waves
Intensity
Decibel
Loudness
Pitch
Sonar
Doppler Effect
Resonance
Electromagnetic waves
Electric field
Magnetic field
Electromagnetic radiation
Photons
Intensity
Electromagnetic spectrum
Electric charge
Electric force
Electric field
Static electricity
Law of conservation of change
Induction
Electric current
Direct current
Alternating current
Electrical conductor
Electrical insulator
Resistance
Superconductor
Potential difference
Voltage
Battery
Ohm's law
Electric circuit
Series circuit
Parallel circuit
Electric power
Fuse
Circuit breaker
Grounding
Electromagnetic force
Solenoid
Electromagnet

Standard	Resources	Pacing
ENERGY ALCOS 11.) Design and conduct investigations to verify the law of conservation of energy, including transformations of potential energy, kinetic energy, thermal energy, and the effect of any work performed on or by the system. • Radiation, conduction, convection	**Textbook:** Physical Science: Concepts in Action Sections 16.1, 16.2 **Labs:** LTF Molecular Motion **Other Activities:** PhET Energy Forms and Changes Wisc-Online Heat Transfer	**3 DAYS**
ALCOS 10.) Construct simple series and parallel circuits containing resistors and batteries and apply Ohm's law to solve typical problems demonstrating the effect of changing values of resistors and voltages. • Induction and conduction • Circuits • Ohm's Law • Magnets	**Textbook:** Physical Science: Concepts in Action Sections 20.1, 20.2, 20.3, 20.4 (if time), and 21.1 **Labs:** LTF Electrostatics LTF What in the World? LTF Short Circuits **Other Activities:** PhET Balloons and Static Electricity PhET Magnets and Electromagnets PhET Circuit Construction Kit PhET Electric Field Hockey PhET Generator PhET Ohms Law	**6 DAYS**
WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFOMATION TRANSFER ALCOS 13.) Use mathematical representations to demonstrate the relationships among wavelength, frequency, and speed of waves (e.g., the relation v = λ f)	**Textbook:** Physical Science: Concepts in Action Sections 17.1, 17.2, 17.3, 17.4 **Labs:** LTF Catch the Wave	**5 DAYS**

traveling in various media (e.g., electromagnetic radiation traveling in a vacuum and glass, sound waves traveling through air and water, seismic waves traveling through Earth) • transverse and longitudinal mechanical waves • sound • light • characteristics of mechanical and electromagnetic waves	LTF Waves in a String LTF Waves in a Spring **Other Activities:** PhET Wave on a String PhET Sound Exploratorium Palm Pipes	
WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFOMATION TRANSFER ALCOS 14.) Propose and defend a hypothesis based on information gathered from published materials (e.g., trade books, magazines, Internet resources, videos) for and against various claims for the safety of electromagnetic radiation.	**Textbook:** Physical Science: Concepts in Action Sections 18.1 and 18.2 **Labs:** LTF Electromagnetism **Other Activities:** Propose and defend a hypothesis for and against claims for the safety of electromagnetic radiation	**3 DAYS**
WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFOMATION TRANSFER ALCOS 15.) Obtain and communicate information from published materials to explain how transmitting and receiving devices (e.g., cellular telephones, medical-imaging technology, solar cells, wireless Internet, scanners, **So**und **N**avigation **a**nd **R**anging [SONAR]) use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.	**Textbook:** Physical Science: Concepts in Action Sections 18.2 and 21.2 **Labs:** **Other Activities:** Mini research project on transmitting and receiving devices	**3 DAYS**
		20 DAYS