# ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION

Subject: Physical Science	Grade Level: 9-12	<b>Unit Length</b> : Block – 8 days			
Unit #1 – The Atom and Periodic Table		Traditional – 2.5 weeks			
	Unit Overview/Description				
In this unit, students will:					
Know the characteristics of an atom are determined	ned by is structure.				
Identify the parts of an atom and locate the subat	omic particles.				
Know the number of protons determines the elem	nent type. Calculate the number of protons, ne	utrons and electrons.			
Understand how to predict isotopes and calculate	e the neutron number.				
How the periodic table is arranged.					
Identify and predict periodic trends.					
Determine number of valence electrons.					
Investigate the location of metals, nonmetals, and	d metalloids.				
Predict the properties of elements based on their	position on the Periodic Table.				
The characteristics of an atom are determined by its structure.					
Valance electrons determine the chemical proper	Valance electrons determine the chemical properties of atoms.				
Number of protons determines the type of element	nt.				
The elements, arranged by increasing atomic nur	nber, exhibit periodic trends in properties.				
Properties such as valence, ion formation, metall	ic or nonmetallic properties, and phase at room	n temperature, can be predicted for			
representative elements by using the periodic tab					
Classical Physics (Mechanics, Electricity and Ma	agnetism) lead to the discovery of subatomic p	articles and the nucleus.			
Relate the most likely valence state(s) for an eler	nent (excluding transition elements) to its grou	1p.			
CDC1. Studente will investigate our ourrent un de	Unit Standards (Content Standards)				
SPS1. Students will investigate our current under	of				
a. Examine the structure of the atom in terms	01				
proton, electron, and neutron locations.					
atomic mass and atomic number.					
atoms with different numbers of neutrons (isotopes).					
SPS4. Students will investigate the arrangement	of the Periodic Table				
a Determine the trends of the following:					
Number of valence electrons					

Types of ions formed by representative elements

Location of metals, nonmetals, and metalloids

Phases at room temperature

b. Use the Periodic Table to predict the above properties for representative elements.

Year-Long Standards (Characteristics of Science)

Habits of Mind

SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.

a. Exhibit the above traits in their own scientific activities.

b. Recognize that different explanations often can be given for the same evidence.

c. Explain that further understanding of scientific problems relies on the design and execution of new experiments which may reinforce or weaken opposing explanations.

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

a. Follow correct procedures for use of scientific apparatus.

b. Demonstrate appropriate techniques in all laboratory situations.

c. Follow correct protocol for identifying and reporting safety problems and violations.

SCSh3. Students will identify and investigate problems scientifically.

a. Suggest reasonable hypotheses for identified problems. b. Develop procedures for solving scientific problems.

c. Collect, organize and record appropriate data.

d. Graphically compare and analyze data points and/or summary statistics.

e. Develop reasonable conclusions based on data collected.

f. Evaluate whether conclusions are reasonable by reviewing the process and checking against other available information.

SCSh4. Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

a. Develop and use systematic procedures for recording and organizing information.

b. Use technology to produce tables and graphs.

c. Use technology to develop, test, and revise experimental or mathematical models.

SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.

a. Trace the source on any large disparity between estimated and calculated answers to problems.

b. Consider possible effects of measurement errors on calculations.

c. Recognize the relationship between accuracy and precision.

d. Express appropriate numbers of significant figures for calculated data, using scientific notation where appropriate.

# ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION

#### **CURRICULUM GUIDE**

e. Solve scientific problems by substituting quantitative values, using dimensional analysis, and/or simple algebraic formulas as appropriate.

SCSh6. Students will communicate scientific investigations and information clearly.

a. Write clear, coherent laboratory reports related to scientific investigations.

b. Write clear, coherent accounts of current scientific issues, including possible alternative interpretations of the data.

c. Use data as evidence to support scientific arguments and claims in written or oral presentations.

d. Participate in group discussions of scientific investigation and current scientific issues.

The Nature of Science

SCSh7. Students will analyze how scientific knowledge is developed.

Students will recognize that:

a. The universe is a vast single system in which the basic principles are the same everywhere.

b. Universal principles are discovered through observation and experimental verification.

c. From time to time, major shifts occur in the scientific view of how the world works.

More often, however, the changes that take place in the body of scientific knowledge are small modifications of prior knowledge.

Major shifts in scientific views typically occur after the observation of a new phenomenon or an insightful interpretation of existing data by an individual or research group.

d. Hypotheses often cause scientists to develop new experiments that produce additional data.

e. Testing, revising, and occasionally rejecting new and old theories never ends.

SCSh8. Students will understand important features of the process of scientific inquiry.

Students will apply the following to inquiry learning practices:

a. Scientific investigators control the conditions of their experiments in order to produce valuable data.

b. Scientific researchers are expected to critically assess the quality of data including possible sources of bias in their investigations' hypotheses, observations, data analyses, and interpretations.

investigations hypotheses, observations, data analyses, and interpretations.

c. Scientists use practices such as peer review and publication to reinforce the integrity of scientific activity and reporting.

d. The merit of a new theory is judged by how well scientific data are explained by the new theory.

e. The ultimate goal of science is to develop an understanding of the natural universe which is free of biases.

f. Science disciplines and traditions differ from one another in what is studied, techniques used, and outcomes sought.

Content Strand	Prerequisite Objectives/Skills/Concepts	Current Course Level: Mastery Objectives/Skills/Concepts	Next Level Course: Mastery Objectives/Skills/Concepts
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Atom	S8P1. a. Distinguish between atoms and molecules	<ul> <li>SPS1. Students will investigate our current understanding of the atom.</li> <li>a. Examine the structure of the atom in terms of proton, electron, and neutron locations.</li> <li>atomic mass and atomic number.</li> <li>atoms with different numbers of neutrons (isotopes).</li> <li>explain the relationship of the proton number to the element's identity.</li> </ul>	<ul> <li>SC3 Students will use the modern atomic theory to explain the characteristics of atoms.</li> <li>a. Discriminate between the relative size, charge, and position of protons, neutrons, and electrons in the atom.</li> <li>b. Use the orbital configuration of neutral atoms to explain its effect on the atom's chemical properties.</li> <li>c. Explain the relationship of the proton number to the element's identity.</li> <li>d. Explain the relationship of isotopes to the relative abundance of atoms of a particular element.</li> </ul>
Periodic Table	S8P1. f. Recognize that there are more than 100 elements and some have similar properties as shown on the Periodic Table of Elements.	SPS4. Students will investigate the arrangement of the Periodic Table a. Determine the trends of the following: Number of valence electrons Types of ions formed by representative elements Location of metals, nonmetals, and metalloids Phases at room temperature b. Use the Periodic Table to	<ul> <li>SC4. Students will use the organization of the Periodic</li> <li>Table to predict properties of elements.</li> <li>a. Use the Periodic Table to predict periodic trends including atomic radii, ionic radii, ionization energy, and electronegativity of various elements.</li> <li>b. Compare and contrast trends in the chemical and physical</li> </ul>

		predict the above properties for representative elements.	properties of elements and their placement on the Periodic Table
Standards/Elements	Essential Vocabulary	Essential Questions	Assessment
Atom (4 days)	Atom Atomic mass Atomic number Atomic theory Charge Electron Electron cloud Isotope Neutron Nucleus Proton	Know the characteristics of an atom are determined by is structure. Identify the parts of an atom and locate the subatomic particles. Know the number of protons determines the element type. Calculate the number of protons, neutrons and electrons. Understand how to predict isotopes and calculate the neutron number. How do the subatomic particles of an atom affect its characteristics? How does knowing trends on the Periodic Table help scientists predict properties of the representative elements? If an atom loses an electron, why would the resulting particle have a positive charge? What patterns in the properties of the elements contribute to the layout of the periodic table? Can I find the number of subatomic particles in an isotope by looking	<ul> <li>Atomic Structure Test</li> <li>Atoms Test</li> </ul> Please note all files under "Assessment" can be found on Physical Science Curriculum Guide folder on ACORN.

#### **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

		at the atomic mass or the atomic number?	
Periodic Table (4 days)	Alkali metals Alkaline earth metals Group Halogens Ion Metal Metalloid Noble gases Nonmetal Orbital Period Periodic law Periodic table Semi-conductor Semi-metal Transition elements Trends Valence electron	How is the periodic table arranged? Identify and predict periodic trends. Determine number of valence electrons. Investigate the location of metals, nonmetals, and metalloids. Predict the properties of elements based on their position on the Periodic Table. Why is the periodic table arranged as it is?	<ul> <li>Periodic Table Mystery Family Challenge</li> <li>SPS4 Periodic Table Quiz</li> </ul>
Time Frame: Block 8 days T	raditional 2.5 weeks		
Instructional Resources:			
Periodic Table Basics <u>http://sc</u>	ciencespot.net/Pages/classchem.html	#Anchor-ptable	
Group, Period, Valence Electr	ons http://www.cstephenmurray.com	m/Acrobatfiles/IPC/chapter18/chap18	Sno4.pdf
Isotopes <u>http://www.cstephenn</u>	nurray.com/Acrobatfiles/IPC/chapte	er18/chap18no2.pdf	
The Atom <u>http://www.cstephe</u>	nmurray.com/Acrobatfiles/IPC/char	oter18/chap18no1filledin.pdf	
Atom Video <u>http://www.gpb.c</u>	prg/chemistry-physics/chemistry/302	<u>2</u>	
How Small is an Atom? <u>http://ed.ted.com/lessons/just-how-small-is-an-atom</u>			
Organizing the Periodic Table	http://www.gpb.org/chemistry-phys	sics/chemistry/402	

Puzzle of the Periodic Table <u>http://ed.ted.com/lessons/solving-the-puzzle-of-the-periodic-table-eric-rosado</u>

https://www.georgiastandards.org/Frameworks/GSO%20Frameworks/9-12%20Science%20Traditional%20Physical%20Science%20Framework%20Matter.pdf

Subject: Physical Science	Grade Level: 9-12	<b>Unit Length</b> : Block – 9 days
Unit #2 – Bonding and Chemical Equations		Traditional – 3 weeks
	<b>Unit Overview/Description</b>	
In this unit, students will:		
Valance electrons determine the chemical properties	s of atoms.	
Predict formulas for stable binary ionic compounds	based on balanced charges.	
Chemical bonding occurs as a result of attractive for	rces between particles.	
IUPAC conventions provide a standard system for r	naming compounds and writing formu	ılas.
How does atomic structure relate to bonding pattern	ns?	
Counting atoms in a formula and chemical equation	l.	
Demonstrate the Law of Conservation of Matter.		
Recognize all types of chemical equations.		
Chemical reactions are the result of changes in elect	tron configuration.	
Balance all types of chemical equations.		
Relate a compounds chemical formula to the number	er of atoms and ions present in a comp	bound.
Explain why atoms form bonds.		
Be able to differentiate between ionic, covalent and	metallic bonds.	
Name simple ionic and covalent compounds.		
Atoms form bonds to obtain a full valence shell.		
Interactions between electrons result in different typ	pes of bonds.	
In a chemical reaction, atoms are rearranged so that	t new substances are formed.	
In reactions chemical bonds are broken and formed.		
All chemical reactions are accompanied by energy t	transfers.	
Matter is neither created nor destroyed in a chemica	l reaction.	
Relate the number of outer shell electrons to reactiv	rity (i.e., how many electrons would ty	pically be lost, gained, or shared).

Compare the characteristics	of a neutral atom to that of an ion.		
	Unit Standar	ds (Content Standards)	
SPS1. Students will investig	gate our current understanding of the	e atom.	
b. Compare and cont	trast ionic and covalent bonds in terr	ms of electron movement.	
SPS2. Students will explore	the nature of matter, its classification	ons, and its system for naming types	of matter.
b. Predict formulas f	for stable binary ionic compounds ba	ased on balance of charges.	
c. Use IUPAC nome	nclature for transition between chen	nical names and chemical formulas	
of binary ionic com	pounds (containing representative el	lements)	
of binary covalent co	ompounds (i.e. carbon dioxide, carbo	on tetrachloride).	
d. Demonstrate the I	Law of Conservation of Matter in a c	chemical reaction.	
e. Apply the Law of	Conservation of Matter by balancin	g the following types of chemical	
equations:			
Synthesis			
Decomposition			
Single Replacement	t		
Double Replacemen	nt		
Year-Long Standards (Characteristics of Science)			
Habits of Mind			
SCSh1. Students will evaluate	ate the importance of curiosity, hone	esty, openness, and skepticism in scie	ence.
SCSh2. Students will use sta	andard safety practices for all classro	oom laboratory and field investigation	ons.
SCSh3. Students will identif	fy and investigate problems scientifi	cally.	
SCSh4. Students will use to	ols and instruments for observing, n	neasuring, and manipulating scientifi	c equipment and materials.
SCSh5. Students will demor	nstrate the computation and estimation	on skills necessary for analyzing dat	a and developing reasonable
scientific explanations.			
SCSh6. Students will communicate scientific investigations and information clearly.			
The Nature of Science			
SCSh7. Students will analyze how scientific knowledge is developed.			
SCSh8. Students will unders	stand important features of the proce	ess of scientific inquiry.	
Content Strand	Prerequisite	Current Course Level:	Next Level Course:

	Objectives/Skills/Concepts	Mastery Objectives/Skills/Concepts	Mastery Objectives/Skills/Concepts
Bonding, Chemical Reactions, and Balancing	S&P1 Students will examine the scientific view of the nature of matter. g. Identify and demonstrate the Law of Conservation of Matter.	<ul> <li>SPS1. Students will investigate our current understanding of the atom.</li> <li>b. Compare and contrast ionic and covalent bonds in terms of electron movement.</li> <li>SPS2. Students will explore the nature of matter, its classifications, and its system for naming types of matter.</li> <li>b. Predict formulas for stable binary ionic compounds based on balance of charges.</li> <li>c. Use IUPAC nomenclature for transition between chemical names and chemical formulas of binary ionic compounds (containing representative elements) and binary covalent compounds (i.e. carbon dioxide, carbon tetrachloride).</li> <li>d. Demonstrate the Law of Conservation of Matter in a chemical reaction.</li> <li>e. Apply the Law of Conservation of Matter by balancing the following types of chemical equations:</li> </ul>	<ul> <li>SC1 Students will analyze the nature of matter and its classifications.</li> <li>a. Relate the role of nuclear fusion in producing essentially all elements heavier than helium.</li> <li>b. Identify substances based on chemical and physical properties.</li> <li>c. Predict formulas for stable ionic compounds (binary and tertiary) based on balance of charges.</li> <li>d. Use IUPAC nomenclature for both chemical names and formulas:</li> <li>Ionic compounds (Binary and tertiary)</li> <li>Covalent compounds (Binary and tertiary)</li> <li>Acidic compounds (Binary and tertiary)</li> <li>SC2 Students will relate how the Law of Conservation of Matter is used to determine chemical composition in compounds and chemical reactions.</li> <li>a. Identify and balance the following types of chemical equations:</li> <li>Synthesis</li> </ul>

		Synthesis	Decomposition
		Decomposition	Single Replacement
		Single Replacement	Double Replacement
		Double Replacement	Combustion
			b. Experimentally determine
			indicators of a chemical reaction
			specifically precipitation, gas
			evolution, water production, and
			changes in energy to the system.
			c. Apply concepts of the mole and
			Avogadro's number to
			conceptualize and calculate
			• Empirical/molecular formulas.
			• Mass, moles and molecules
			relationships.
			• Molar volumes of gases.
			d. Identify and solve different types
			of stoichiometry problems
			specifically relating mass to moles
			and mass to mass.
			e. Demonstrate the conceptual
			principle of limiting reactants.
			f. Explain the role of equilibrium in
			chemical reactions
Standards/Elements	Essential Vocabulary	Essential Questions	Assessment
	Chemical Bond	Why do some atoms gain	Ionic Bonding Puzzle Lab
	Chemical Structure	electrons while others lose them	Chemical Bonds and
<b>Bonding</b> – Ionic and	Covalent Bond	in chemical reactions?	Nomenclature Test
Covalent (4 days)	Ionic Bond	IUPAC conventions provide a	Compounds Review
	Ionic Charge	standard system for naming	1
	IUPAC Nomenclature	compounds and writing formulas.	

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	Law of Conservation of Matter	How does atomic structure relate	
	Molecular Formula	to bonding patterns?	
	Valence	Counting atoms in a formula and	
	Prefix	chemical equation.	
		Bonds between atoms are created	
		when electrons are transferred or	
		shared.	
		How is the valence of the atom	
		determined?	
		Why do chemists need a system	
		for naming and writing	
		compounds?	
		What factors determine the types	
		of chemical bonds that form	
		between particles?	
		How do subatomic particles	
		contribute to the construction of	
		different forms of matter?	
		How do you determine a	
		chemical formula?	
		Do I know how to write the	
		chemical formula of a compound	
		using the periodic table?	
		Can I identify elements that are	
		likely to form ions and use that	
		information to write chemical	
		formulas?	
Identifying and	Chemical Equation	How do we know if a chemical	Cham Eq Tast
Releasing Chemicel	Decomposition	reaction has occurred?	Chem By Test
Equations (5 days)	Double Replacement	How does atomic structure relate	• Chemi Kx Test

# SCCPSS ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION

Lowof	f Conservation of Mattar	to bonding natterns?	Chamical Departiens Cartage
Law of	Poplacement	Why do we need to belence	Chemical Reactions Cartoon     Chemistery
Single	Replacement	why do we need to balance	Chemistry
Synthe	2818	chemical equations?	• How do you know Chem Rx
		Matter can not be destroyed or	Happened Lab
		created in a chemical reaction.	
		A chemical reaction results in the	
		formation of a new substance.	
		Do I know how to describe how	
		chemical symbols and balanced	
		chemical equations show the Law	
		of Conservation of Mass/Energy?	
		Can I balance a simple chemical	
		equation and identify the	
		reactants, products, and	
		coefficients?	
		Can I describe a synthesis,	
		decomposition, single-	
		replacement, and double-	
		replacement reaction using	
		equations?	
		Counting atoms in a formula and	
		chemical equation	
		What happens to chemical bonds	
		in reactions?	
Time Frame: Block – 9 days Trad	ditional – 3 weeks		

# SCCPSS ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION

Instructional Resources:		
Covalent Naming http://www.cstephenmurray.com/Acroba	atfiles/IPC/chapter19/chap19	<u>no6.pdf</u>
Ionic Bond http://www.cstephenmurray.com/Acrobatfiles/	<u>TPC/chapter19/chap19no5.pd</u>	<u>f</u>
Naming Flow Chart http://www.cstephenmurray.com/Acro	obatfiles/IPC/chapter19/chap1	<u>19no4.pdf</u>
More Bonding http://www.cstephenmurray.com/Acrobatfi	les/IPC/chapter19/chap19no3	<u>B.pdf</u>
Bonding http://www.cstephenmurray.com/Acrobatfiles/IPC	C/chapter19/chap19no2.pdf	
Ions http://www.cstephenmurray.com/Acrobatfiles/IPC/ch	apter19/chap19no1.pdf	
Bonding Basics http://sciencespot.net/Pages/classchem.htm	nl#Anchor-49575	
Naming Compounds Video http://www.gpb.org/chemistry	r-physics/chemistry/603	
Atoms from A to Easy! Video http://ed.ted.com/featured/Y	<u>(IZZblvz</u>	
Balancing Act http://sciencespot.net/Pages/classchem.html	<u>l#Anchor8</u>	
Chemical Reactions http://sciencespot.net/Pages/classchem	n.html#chemreactions	
Types of Chemical Reactions Flow Chart http://www.cstep	phenmurray.com/Acrobatfiles	s/IPC/chapter20/chap21no1.pdf
Chem Rx Wksht http://www.cstephenmurray.com/Acrobat	tfiles/IPC/chapter20/chap20n	<u>o2.pdf</u>
https://www.georgiastandards.org/Frameworks/GSO%20F 12%20Science%20Traditional%20Physical%20Science%2	Frameworks/9- 20Framework%20Matter.pdf	
Subject: Physical Science	Grade Level: 9-12	<b>Unit Length</b> : Block – 5 days
Unit # 3– Classification of Matter		Traditional – 2 weeks
Uni	t Overview/Description	
In this unit, students will:		
Calculate density.		
Compare and contrast mass, volume, and density.		
Identify appropriate units for physical properties such as m	nass, volume, and density.	
Distinguish between solid, liquid, and gas.		
Compare and contrast the atomic and molecular motion of	the phases of matter.	
For gaseous substances, pressure, volume, and temperature	e are interdependent.	
Understand phase changes and be able to identify the parts	s of a phase diagram.	
Relate temperature, pressure, and volume of gasses to their	r behavior.	

# **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

The phases of matter are states of a	a system that have relatively the	same physical properties.		
Density is a physical property that	Density is a physical property that can be quantitatively measured using mass and volume.			
Perform calculations involving der	nsity.			
Explain the relationship between n	natter, elements, and atoms.			
	Unit Standards	(Content Standards)		
SPS2. Students will explore the na	ature of matter, its classifications	, and its system for naming		
types of matter.	• • • •			
a. Calculate density when	given a means to determine a su	ibstance's mass and volume		
SPS5. Students will compare and o molecular motion.	contrast the phases of matter as t	hey relate to atomic and		
a. Compare and contrast th	e atomic/molecular motion of sc	lids, liquids, gases and plasmas.		
b. Relate temperature, pres	ssure, and volume of gases to the	behavior of gases.		
SPS7. Students will relate transfor	mations and flow of energy with	in a system		
d. Explain the flow of ener	gy in phase changes through the	use of a phase diagram.		
Year-Long Standards (Characteristics of Science)				
Habits of Mind	Habits of Mind			
SCSh1. Students will evaluate the	importance of curiosity, honesty	y, openness, and skepticism in science	ce.	
SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.				
SCSh3. Students will identify and	investigate problems scientifical	lly.		
SCSh4. Students will use tools and	d instruments for observing, mea	suring, and manipulating scientific e	equipment and materials.	
SCSh5. Students will demonstrate	the computation and estimation	skills necessary for analyzing data a	nd developing reasonable	
scientific explanations.				
SCSh6. Students will communicat	te scientific investigations and in	formation clearly.		
The Nature of Science SCSh7. Students will analyze how scientific knowledge is developed. SCSh8. Students will understand important features of the process of scientific inquiry.				
	F Process			
Content Strand	Prerequisite Objectives/Skills/Concepts	Current Course Level: Mastery Objectives/Skills/Concepts	Next Level Course: Mastery Objectives/Skills/Concepts	

### **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

Density	N/A	<ul><li>SPS2. Students will explore the nature of matter, its classifications, and its system for naming types of matter.</li><li>b. Calculate density when given a means to determine a substance's mass and volume</li></ul>	N/A
Matter	<ul> <li>S8P1. Students will examine the scientific view of the nature of matter.</li> <li>a. Distinguish between atoms and molecules.</li> <li>b. Describe the difference between pure substances (elements and compounds) and mixtures.</li> <li>c. Describe the movement of particles in solids, liquids, gases, and plasmas states.</li> <li>d. Distinguish between physical and chemical properties of matter as physical (i.e., density, melting point, boiling point) or chemical (i.e., reactivity, combustibility).</li> <li>e. Distinguish between changes in matter as physical (i.e., physical change) or chemical (development of a gas, formation</li> </ul>	SPS5. Students will compare and contrast the phases of matter as they relate to atomic and molecular motion. a. Compare and contrast the atomic/molecular motion of solids, liquids, gases and plasmas. b. Relate temperature, pressure, and volume of gases to the behavior of gases.	<ul> <li>SC6. Students will understand the effects motion of atoms and molecules in chemical and physical processes.</li> <li>a. Compare and contrast atomic/molecular motion in solids, liquids, gases, and plasmas.</li> <li>c. Analyzing (both conceptually and quantitatively) flow of energy during change of state (phase).</li> <li>SC5. Students will understand that the rate at which a chemical reaction occurs can be affected by changing concentration, temperature, or pressure and the addition of a catalyst.</li> <li>a. Demonstrate the effects of changing concentration, temperature, and pressure on chemical reactions.</li> </ul>

	of precipitate, and change in		
Standards/Elements	Essential Vocabulary	Essential Questions	Assessment
Density(1.5 day)	Density Mass Volume	Calculate density. Compare and contrast mass, volume, and density. How are mass and volume related to density? What floats your boat? How are mass and volume related to density? If I change the size and /or shape of an object, how would density change? How do I make a density column? After I make a density column can I tell which liquid is the most dense and which is the least dense?	• SPS2a Density of Water Lab
	Atom Boiling	Distinguish between solid, liquid, and gas.	SPS5 Gas Laws     Marshmallow Lab
Iviatter	Bouing Point Boyles Law	and molecular motion of the	SPS5 Gas Law Egg Lab     SPS5 Town and Volume
Phase Changes	Charles Law	phases of matter.	Lab
Gas Laws	Chemical Change	Understand phase changes and be	<ul> <li>SPS5 Phases Test</li> </ul>
(4 days)	Chemical Property Compound Condensation Deposition	able to identify the parts of phase diagram. Relate temperature, pressure, and volume of gasses to their	<ul> <li>SPS5 Particles in Motion Lab</li> </ul>

# **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

	Element	behavior.		
	Evaporation	How do the arrangement and		
	Freezing	energy of particles determine the		
	Gas	phases of matter?		
	Guy-Lussac Law	How do changes in pressure,		
	Impure	volume, or temperature of a gas		
	Liquid	relate to each other?		
	Matter	How do specific conditions affect		
	Melting Point	the states of matter?		
	Mixture	Do I know the correct units of		
	Molecule	measurement for a gas, liquid and		
	Molecular Motion	solid?		
	Phase	Can I draw the differences		
	Physical Property	between the states of matter		
	Physical Change	according to their mass, volume,		
	Plasma	density, shape, and particle		
	Pressure	arrangement?		
	Pure			
	Solid			
	Sublimation			
	Temperature			
	Vaporization			
	Volume			
Time Frame: Block 5 days T	raditional 2 weeks			
Instructional Resources:				
Density Wksht http://www.cstephenmurray.com/Acrobatfiles/IPC/Chapter17/chap17no1.pdf				
States of Matter <a href="http://www.cstephenmurray.com/Acrobatfiles/IPC/Chapter16/chap16no3.pdf">http://www.cstephenmurray.com/Acrobatfiles/IPC/Chapter16/chap16no3.pdf</a>				
Classification of Matter http://www.cstephenmurray.com/Acrobatfiles/IPC/Chapter16/chap16no1.pdf				
Physical v Chemical Change http://www.cstephenmurray.com/Acrobatfiles/IPC/chapter20/chap20no1.pdf				
Gas Law Demonstration http://sciencespot.net/Pages/classchem.html#Anchor5				
Classification of Matter video <u>http://www.gpb.org/chemistry-physics/chemistry/202</u>				

## **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

Gas Laws Video http://ed.ted.com/lessons/1207-1-a-bennet	t-brianh264			
Can Crusher Demonstration http://www.education.com/activity/article/Crunch Can middle/				
Can Crusher Lab http://dwb.unl.edu/chemistry/dochem/Do	Chem088.html			
Water Properties Lab http://www.wviz.org/psi/video_stude	nt/bigdeal			
Gas Laws Lab http://www.wviz.org/psi/video_student/bott	led			
Density Lab http://www.wviz.org/psi/video_student/sink				
Density Visual Lab Game https://sites.google.com/site/phy	sicalsciencewithmrmarquez/ho	me/unit-2-1/force-and-density-games/density-		
game	•			
https://www.georgiastandards.org/Frameworks/GSO%20Fr	rameworks/9-			
12%20Science%20Traditional%20Physical%20Science%2	OFramework%20Chemistry%2	20in%20Motion.pdf		
Subject: Physical Science	Grade Level: 9-12	<b>Unit Length</b> : Block – 6 days		
Unit #4 – Solutions		Traditional – 2 weeks		
Unit	: Overview/Description			
In this unit, students will:				
Compare and contrast properties and examples acids and ba	ases.			
Know every day examples of household acids and bases.				
Read and interpret a solubility curve.				
Demonstrate that solubility is related to temperature by con	structing a solubility curve.			
Explore factors that affect the rate a solute dissolves within	a solvent.			
Predict solubility of solutions on a solubility curve.				
Solutions are mixtures in which the relative proportion of s	olute and solvent vary.			
The degree to which a solute dissolves is affected by physical conditions of the system.				
The properties of a solution, such as conductivity and acidity, are related to whether the solute is ionic or covalent.				
Acidic solutions have an excess of hydrogen ions and basic	e solutions contain excess hydro	oxide ions.		
Compare and contrast acids and bases.				
Palate the pU of a substance to its strength				
Kelate the pri of a substance to its strength.		Relate the pH of a substance to its strength.		
Describe the acidic and basic characteristics of household i	tems.			

SPS6. Students will investig	gate the properties of solutions.		
a. Describe solutions in terms of			
solute/solvent			
conductivity			
concentration			
b. Observe factors at	ffecting the rate a solute dissolves in	a specific solvent.	
c. Demonstrate that s	solubility is related to temperature b	y constructing a solubility curve.	
d. Compare and cont	trast the components and properties	of acids and bases.	
e. Determine whethe	er common household substances are	e acidic, basic, or neutral.	
	Year-Long Standar	ds (Characteristics of Science)	
Habits of Mind			
SCSh1. Students will evaluate	ate the importance of curiosity, hone	esty, openness, and skepticism in scie	ence.
SCSh2. Students will use sta	andard safety practices for all classre	oom laboratory and field investigation	ons.
SCSh3. Students will identif	fy and investigate problems scientifi	ically.	
SCSh4. Students will use to	ols and instruments for observing, n	neasuring, and manipulating scientifi	ic equipment and materials.
SCSh5. Students will demon	nstrate the computation and estimati	on skills necessary for analyzing dat	a and developing reasonable
scientific explanations.			
SCSh6. Students will comm	unicate scientific investigations and	information clearly.	
The Nature of Science			
SCSh/. Students will analyz	ze how scientific knowledge is deve	loped.	
SCSh8. Students will understand important features of the process of scientific inquiry.			
Dronogujajta Commant Comma Lanala North Lanal Comman			
Contont Strond	Content Strend Objectives/Skills/Concents Next Level Course:		
Content Stranu	Objectives/Skins/Concepts	Mastery Objectives/Skills/Concents	Mastery Objectives/Skills/Concents
		Objectives/Skins/Concepts	Objectives/Skins/Concepts
	N/A	SPS6. Students will investigate	SC7. Students will characterize the
Solutions		the properties of solutions.	properties that describe solutions
Concentration		a. Describe solutions in terms of	and the nature of acids
Solubility		solute/solvent	and bases.

		conductivity concentration b. Observe factors affecting the rate a solute dissolves in a specific solvent. c. Demonstrate that solubility is related to temperature by constructing a solubility curve.	<ul> <li>a. Explain the process of dissolving in terms of solute/solvent interactions:</li> <li>Observe factors that effect the rate at which a solute dissolves in a specific solvent,</li> <li>Express concentrations as molarities,</li> <li>Prepare and properly label solutions of specified molar concentration,</li> <li>Relate molality to colligative properties.</li> </ul>
Acids/Bases	N/A	<ul> <li>SPS6. Students will investigate the properties of solutions.</li> <li>d. Compare and contrast the components and properties of acids and bases.</li> <li>e. Determine whether common household substances are acidic, basic, or neutral.</li> </ul>	<ul> <li>SC7. Students will characterize the properties that describe solutions and the nature of acids and bases.</li> <li>b. Compare, contrast, and evaluate the nature of acids and bases:</li> <li>Arrhenius, Bronsted-Lowry Acid/Bases</li> <li>Strong vs. weak acids/bases in terms of percent dissociation</li> <li>Hydronium ion concentration</li> <li>pH</li> <li>Acid-Base neutralization</li> </ul>
Standards/Elements	Essential Vocabulary	Essential Questions	Assessment
Solutions	Agitation	How does our understanding of	SPS6 Solutions Test
Concentration	Concentrated	the properties of solutions help us	• SPS6 Egg Lab
Solubility	Concentration	in our everyday lives?	

### **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

(3 days)	Dilute	How are solutions different from	SPS6 Solubility Curve	
(e uu <sub>y</sub> s)	Dissolve	compounds?	Wksht	
	Heterogeneous	How does changing the relative	• SPS6 Rate of Dissolving	
	Homogenous	proportions of a solute and	Lab	
	Ion	solvent affect a solution?		
	Molecule	How is solubility affected by		
	Saturated	physical factors such as pressure,		
	Solubility	temperature, particle size, and		
	Solubility curve	agitation?		
	Solute	How can a solubility curve be		
	Solvent	determined experimentally?		
	Supersaturates			
	Unsaturated			
	Volume			
	Acid	What is pH and what does it	<ul> <li>SPS6 Acid Base Test</li> </ul>	
	Base	measure?	• SPS6 pH Lab	
	Conductivity	What are properties of acids and		
	Electrolyte	bases?		
	Hydronium	How does our understanding of		
	Hydroxide	the properties of acids and bases		
Acids/Bases	Indicator	help us in our everyday lives?		
(3 days)	Neutral	Why do solutions that contain		
	Neutralization	ionic compounds have different		
	рН	characteristics from covalent		
		compounds?		
		why do you add sait to ice to		
		make ice cream?		
Time Frame: Block – 6 days Traditional – 2 weeks				
Instructional Resources:				
Messing With Mixtures http	://sciencespot.net/Pages/classchem.	html#Anchormixtures		
	<u> </u>			

### **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

Acid/Base Wksht http://www.cstephenmurray.c	com/Acrobatfiles/IPC/chapter22to25/chapter2000000000000000000000000000000000000	p25no1.pdf	
Solutions Wksht http://www.cstephenmurray.com/Acrobatfiles/IPC/chapter22to25/chap23no1.pdf			
Solubility Video http://www.gpb.org/chemistry	-physics/chemistry/1002		
Acid/Base Strength Video http://ed.ted.com/less	sons/the-strengths-and-weaknesses-of-ac	ids-and-bases-george-zaidan-and-charles-morton	
https://www.georgiastandards.org/Frameworks/	GSO%20Frameworks/9-		
12%20Science%20Traditional%20Physical%20	OScience%20Framework%20Chemistry%	620in%20Motion.pdf	
Subject: Physical Science	Grade Level: 9-12	<b>Unit Length</b> : Block – 11 days	
Unit #5 – Force, Mass, Motion		Traditional – 3.5 weeks	
	<b>Unit Overview/Description</b>		
In this unit, students will:			
Forces can act upon an object to change the pos	ition, direction, and/or speed of its motio	on.	
Objects change their motion only when a net for	rce is applied.		
Force, mass, and acceleration are interdependen	it. A change in any one of these affects th	ne others.	
Knowledge of the conditions of an object's mot	ion allows us to predict their future.		
Determine the result of unbalanced forces.			
Evaluate forces when the motion is constant			
Friction is an ever present force that opposes me	otion.		
Differentiate between mass and weight			
Whenever one object exerts a force on another of	other, an equal amount of force is exerted	l back on it.	
A system is an ensemble of objects (real or abstract) in which each component relates to at least one other component of the group.			
While the total amount of work remains constar	nt, there is a mechanical advantage to using	ng a simple machine and it can be calculated.	
Work is defined as applied force acting through	a distance.		
A simple machine changes the applied force and	d distance while maintaining the total am	ount of work.	
Mechanical advantage is a comparison of the ap	pplied force required using a simple mach	nine versus using no machine.	
Unit Standards (Content Standards)			
SPS8. Students will determine relationships am	ong force, mass, and motion.		
a. Calculate velocity and acceleration.			
b. Apply Newton's three laws to everyd	ay situations by explaining the following	· ·	
Inertia			
Relationship between force, mass and a	cceleration		

#### **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

### **CURRICULUM GUIDE**

Equal and opposite forces

c. Relate falling objects to gravitational force

d. Explain the difference in mass and weight.

e. Calculate amounts of work and mechanical advantage using simple machines.

**Year-Long Standards** (*Characteristics of Science*)

Habits of Mind

SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

SCSh3. Students will identify and investigate problems scientifically.

SCSh4. Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.

SCSh6. Students will communicate scientific investigations and information clearly.

The Nature of Science

SCSh7. Students will analyze how scientific knowledge is developed.

SCSh8. Students will understand important features of the process of scientific inquiry.

Content Strand	Prerequisite Objectives/Skills/Concepts	Current Course Level: Mastery Objectives/Skills/Concepts	Next Level Course: Mastery Objectives/Skills/Concepts
Motion and Force	<ul><li>S8P3. Students will investigate relationship between force, mass, and the motion of objects.</li><li>a. Determine the relationship between velocity and acceleration.</li><li>b. Demonstrate the effect of balanced and unbalanced forces</li></ul>	<ul> <li>SPS8. Students will determine relationships among force, mass, and motion.</li> <li>a. Calculate velocity and acceleration.</li> <li>b. Apply Newton's three laws to everyday situations by explaining the following:</li> </ul>	<ul><li>SP1. Students will analyze the relationships between force, mass, gravity, and the motion of objects.</li><li>a. Calculate average velocity, instantaneous velocity, and acceleration in a given frame of reference.</li></ul>

on an object in terms of	Inertia	b. Compare and contrast scalar
gravity, inertia, and friction.	Relationship between	and vector quantities.
	force, mass and	c. Compare graphically and
	acceleration	algebraically the relationships
	Equal and opposite	among position, velocity,
	forces	acceleration, and time.
	c. Relate falling objects to	d. Measure and calculate the
	gravitational force	magnitude of frictional forces
	d. Explain the difference in mass	and Newton's three Laws of
	and weight.	Motion.
		e. Measure and calculate the
		magnitude of gravitational forces.
		f. Measure and calculate two-
		dimensional motion (projectile
		and circular) by using
		component vectors.
		g. Measure and calculate
		centripetal force.
		h. Determine the conditions
		required to maintain a body in a
		state of static equilibrium
		SP3. Students will evaluate the
		forms and transformations of
		energy.
		c. Measure and calculate the
		vector nature of momentum.
		d. Compare and contrast elastic
		and inelastic collisions.
		e. Demonstrate the factors
		required to produce a change in

#### **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

			momentum
Simple Machines	<ul><li>S8P3. Students will investigate relationship between force, mass, and the motion of objects.</li><li>c. Demonstrate the effect of simple machines (lever, inclined plane, pulley, wedge, screw, and wheel and axle) on work.</li></ul>	<ul><li>SPS8. Students will determine relationships among force, mass, and motion.</li><li>e. Calculate amounts of work and mechanical advantage using simple machines.</li></ul>	SP3. Students will evaluate the forms and transformations of energy. g. Analyze and measure power.
Standards/Elements	Essential Vocabulary	Essential Questions	Assessment
Motion and Force (7 days)	Acceleration Balanced forces Distance Force Friction Gravitational force Gravity Inertia Joule Kilogram Law of Conservation of Energy Mass m/s m/s/s or m/s <sup>2</sup> Newton Newton's Laws Position Speed System Time Unbalanced Force Velocity	How is force related to motion? How do unbalanced forces affect motion? Why do objects in motion stay in motion? How does a skateboarder use Newton's three Laws of Motion? How would Newton explain the often heard phrase, "The Force be with you"? Will a specific force produce the same motion on different objects? How are the forces acting on an object related to its motion? Why do objects move? How can you predict an objects motion? How do Newton's Three laws attempt to explain the natural world? What is the effect of gravity on	<ul> <li>SPS8 Acceleration Lab</li> <li>SPS8 Acceleration Post Notes</li> <li>SPS8 Motion PostTest</li> <li>SPS8 Motion, Speed, Accel, Force Review</li> <li>SPS8 Physic Motion Review</li> <li>SPS8 Speed Challenge</li> <li>SPS8 Speed and Velocity Wksht</li> </ul>

#### **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

	Watt	objects?		
	Weight			
Simple Machines (4 days)	Compound Machine Distance Friction Inclined Plane Lever Mechanical advantage Power Pulley Screw Simple machines Wedge Wheel and Axle Work	If I still have to do the same amount of work, why would I want to use a simple machine? How do we make work easier and more efficient? Can I identify, design, demonstrate, and explain simple and compound machines? Can I recognize the combinations of various simple machines found in a compound machine?	<ul> <li>SPS8 IMA all machines</li> <li>SPS8 Machines Power Test</li> <li>SPS8 Measuring Work</li> <li>SPS8 Work Power Problems</li> </ul>	
Time Frame: Block – 11 days Traditional – 3.5 weeks				
Instructional Resources:				
Acceleration and Speed http://	www.cstephenmurray.com/Acrobat	files/IPC/ch1and2/chap2no1.pdf		
Graphing Speed http://www.cstephenmurray.com/Acrobatfiles/IPC/ch1and2/chap1no4.pdf				
Momentum http://www.cstephenmurray.com/Acrobatfiles/IPC/ch3and4/chap3no3.pdf				
Speed/Acel Review http://www.cstephenmurray.com/Acrobatfiles/IPC/ch1and2/chap1and2review.pdf				
Newton's Laws http://www.cstephenmurray.com/Acrobatfiles/IPC/ch3and4/chap3no1.pdf				
Simple Machines http://www.cstephenmurray.com/Acrobatfiles/IPC/ch3and4/chap4no1.pdf				
Weight http://www.cstephenmurray.com/Acrobatfiles/IPC/ch3and4/chap3no2.pdf				
Newton's Laws Video http://ed.ted.com/lessons/joshua-manley-newton-s-3-laws-with-a-bicycle				
Motion Math Video http://www.gpb.org/chemistry-physics/physics/302				
Newton's 1 <sup>st</sup> and 2 <sup>nd</sup> Laws <u>http://www.gpb.org/chemistry-physics/physics/401</u>				
How does Work work? http://ed.ted.com/lessons/how-does-work-work-peter-bohacek				
Cartoon Physics http://www.education.com/activity/article/Cartoon_Physics_high/				
Pendulum Lab http://www.wviz.org/psi/video_student/bowled				
Forces Visuals http://phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html				

https://www.georgiastandards.org/Frameworks/GSO%20Frameworks/9-	
12%20Science%20Traditional%20Physical%20Science%20Framework%20Motion	.pdf

Subject: Physical Science	Grade Level: 9-12	<b>Unit Length</b> : Block – 4 days		
Unit #6 – Energy and Heat		Traditional – 1.5 week		
	Unit Overview/Description			
In this unit, students will:				
Energy can be transferred between objects and/c	or can be converted into different forms			
Transformations of energy usually release some	energy typically in the form of heat.			
Objects at rest have potential energy "stored ene	rgy". Moving objects have kinetic energy.			
Energy is conserved. Energy is transformed from	n one form into another but it cannot be rec	cycled.		
Heat transfer occurs by conduction, convection,	or radiation into cooler places.			
Energy always flows from regions of high energ	y (high temperature) to regions of low ener	rgy (low temperature).		
Different substances absorb different amounts of	f heat before their temperature changes.			
Temperature can change as heat is being transfer	rred.			
If a substance's temperature or pressure is altere	If a substance's temperature or pressure is altered, a phase change may result.			
Temperature is a measure of the internal energy	of the system.			
Heat is a form of energy.				
Unit Standards (Content Standards)				
SPS7. Students will relate transformations and f	low of energy within a system.			
a. Identify energy transformations within	a system (e.g. lighting of a match).			
b. Investigate molecular motion as it rela	tes to thermal energy changes in terms of c	conduction, convection, and radiation.		
c. Determine the heat capacity of a subst	ance using mass, specific heat, and tempera	ature.		
d. Explain the flow of energy in phase ch	anges through the use of a phase diagram.			
Year-J	Long Standards (Characteristics of Scien	ace)		
Habits of Mind				
SCSh1. Students will evaluate the importance of	curiosity, honesty, openness, and skepticis	sm in science.		

# ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION

#### **CURRICULUM GUIDE**

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

SCSh3. Students will identify and investigate problems scientifically.

SCSh4. Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.

SCSh6. Students will communicate scientific investigations and information clearly.

The Nature of Science

SCSh7. Students will analyze how scientific knowledge is developed.

SCSh8. Students will understand important features of the process of scientific inquiry.

	Prerequisite	Current Course Level:	Next Level Course:
Contont Strond	<b>Objectives/Skills/Concepts</b>	Mastery	Mastery
Content Stranu		<b>Objectives/Skills/Concepts</b>	<b>Objectives/Skills/Concepts</b>

# **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

	S8P2. Students will be familiar	SPS7. Students will relate	SP3. Students will evaluate the
	with the forms and	transformations and flow of	forms and transformations of
	transformations of energy.	energy within a system.	energy.
	a. Explain energy transformation	a. Identify energy	a. Analyze, evaluate, and apply
	in terms of the Law of	transformations within a system	the principle of conservation of
	Conservation of Energy.	(e.g. lighting of a match).	energy and measure the
	b. Explain the relationship		components of work-energy
	between potential and kinetic		theorem by
	energy.		• describing total energy in a
	c. Compare and contrast the		closed system.
	different forms of energy (heat,		• identifying different types of
	light, electricity, mechanical		potential energy.
Energy	motion, sound) and their		• calculating kinetic energy given
	characteristics.		mass and velocity.
			• relating transformations between
			potential and kinetic energy.
			b. Explain the relationship
			between matter and energy
			SP5. Students will evaluate
			relationships between electrical
			and magnetic forces.
			a. Describe the transformation of
			mechanical energy into electrical
			energy and the transmission of
			electrical energy.
	S8P2. Students will be familiar	b. Investigate molecular motion	SC6. Students will understand the
	with the forms and	as it relates to thermal energy	effects motion of atoms and
Heat	transformations of energy.	changes in terms of conduction,	molecules in chemical and
licat	d. Describe how heat can be	convection, and radiation.	physical processes.
	transferred through matter by the	c. Determine the heat capacity of	b. Collect data and calculate the
	collisions of atoms (conduction)	a substance using mass, specific	amount of heat given off or taken

# **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

	or through space (radiation). In a	heat, and temperature.	in by chemical or physical
	liquid or gas, currents will	d. Explain the flow of energy in	processes.
	facilitate the transfer of heat	phase changes through the use of	c. Analyzing (both conceptually
	(convection).	a phase diagram.	and quantitatively) flow of energy
	(,		during change of state (phase).
Standards/Elements	Essential Vocabulary	Essential Questions	Assessment
	Atomic/Nuclear	How is energy transferred from	SPS7 Energy of Rolling
	Chemical	one place to another?	Ball
	Electrical	How is energy transferred	• SPS7 Energy Test
	Friction	between objects and converted	
	Heat	into different forms?	
Energy	Kinetic Energy	How is the energy of an object	
(2 days)	Mechanical	related to it's mass, velocity, and	
	Potential Energy	height?	
	Radiant/Light	How can we calculate the energy	
	Sound	of an object?	
	Thermal	5	
	Transformation		
	Absolute Zero	What actually happens during a	• SPS7 Thermal Energy
	Conduction	phase change?	Test
	Convection	Why is the temperature of an ice	• SPS7 Specific Heat
	Fusion	water mixture constant?	Practice Problems
	Heat	Why do objects store and transfer	
Uest	Heat capacity	heat differently?	
neat (2 days)	Phase change	Can I identify different types of	
(2 days)	Phase diagram	heat transfer as conduction,	
	Radiation	convection or radiation?	
	Specific heat	Can I solve problems regarding	
	Temperature	heat, mass, specific heat capacity	
	Triple Point	and temperature change	
		$(Q=mCp\Delta T)?$	

Time Frame: Block – 4 days Traditional – 1.5 weeks
Instructional Resources:
Conservation of Energy http://www.cstephenmurray.com/Acrobatfiles/IPC/ch5and10/chap5no3.pdf
Kinetic and Potential Energy http://www.cstephenmurray.com/Acrobatfiles/IPC/ch5and10/chap5no2.pdf
Energy, Work, Power http://www.cstephenmurray.com/Acrobatfiles/IPC/ch5and10/chap5no1.pdf
Heat/Thermodynamics http://www.cstephenmurray.com/Acrobatfiles/IPC/chapter27/chap27no1.pdf
Can Crusher Demonstration <u>http://www.education.com/activity/article/Crunch_Can_middle/</u>
Can Crusher Lab http://dwb.unl.edu/chemistry/dochem/DoChem088.html
Temperature and Reactions Lab <u>http://dwb.unl.edu/chemistry/dochem/DoChem113.html</u>
Basketball Energy <u>http://www.wviz.org/psi/video_student/ball</u>

https://www.georgiastandards.org/Frameworks/GSO%20Frameworks/9-12%20Science%20Traditional%20Physical%20Science%20Framework%20Energy.pdf

Subject: Physical Science	Grade Level: 9-12	<b>Unit Length</b> : Block – 7 days			
Unit #7 – Waves		Traditional – 2.5 weeks			
	Unit Overview/Description				
Waves carry energy that can be transferred or the	Waves carry energy that can be transferred or transformed in interactions with matter or other waves.				
The pitch of a sound is a measure of its frequency.					
Although electromagnetic and mechanical wave transfer energy.	es share some characteristics, they are differ	rent in the way they are generated and			
Recognize the relation of frequency and energy	in electromagnetic and mechanical waves.				
The speed at which sound travels is dependent	apon the material in which it travels.				
As a wave encounters another medium it may b	e reflected and/or refracted.				
As a wave encounters an obstacle or an opening	g it may be reflected, refracted, and/or diffra	acted.			
Two waves that meet will create a pattern of int	erference.				
The energy of a wave can be determined from t	he wave's physical characteristics.				
Waves carry energy from one location to anoth-	er without the transfer of matter.				
Relate properties of sound to aspects of the stud	lent's world (e.g., pitch, Doppler effect)				
	Unit Standards (Content Standards)				
SPS9. Students will investigate the properties o	f waves.				
a. Recognize that all waves transfer ene	ſgy.				
b. Relate frequency and wavelength to t	he energy of different types of electromagne	etic waves and mechanical waves.			
c. Compare and contrast the characterist	ics of electromagnetic and mechanical (sour	nd) waves.			
d. Investigate the phenomena of reflecti	on, refraction, interference, and diffraction.				
e. Relate the speed of sound to different mediums.					
I. Explain the Doppler Effect in terms of everyday interactions.					
Year-Long Standards (Characteristics of Science)					
Habits of Mind					
SCSh1. Students will evaluate the importance of	f curiosity, honesty, openness, and skepticis	sm in science.			
SCSh2. Students will use standard safety practi	ces for all classroom laboratory and field in	vestigations.			
SCSh3. Students will identify and investigate p	roblems scientifically.				
SCSh4. Students will use tools and instruments	for observing, measuring, and manipulating	g scientific equipment and materials.			
SCSh5. Students will demonstrate the computa	ion and estimation skills necessary for analy	yzing data and developing reasonable			

SC	scientific explanations.				
SC	SCSh6. Students will communicate scientific investigations and information clearly.				
Tł SC	ne Nature of Science CSh7. Students will analy SCSh8. Students wi	ze how scientific knowledge is deve ill understand important features of t	loped. he process of scientific inquiry.		
	Content Strand	Prerequisite Objectives/Skills/Concepts	Current Course Level: Mastery Objectives/Skills/Concepts	Next Level Course: Mastery Objectives/Skills/Concepts	
	Waves	<ul> <li>S8P4. Students will explore the wave nature of sound and electromagnetic radiation.</li> <li>a. Identify the characteristics of electromagnetic and mechanical waves.</li> <li>b. Describe how the behavior of light waves is manipulated causing reflection, refraction diffraction, and absorption.</li> <li>c. Explain how the human eye sees objects and colors in terms of wavelengths.</li> <li>d. Describe how the behavior of waves is affected by medium (such as air, water, solids).</li> <li>e. Relate the properties of sound to everyday experiences.</li> <li>f. Diagram the parts of the wave</li> </ul>	<ul> <li>SPS9. Students will investigate the properties of waves.</li> <li>a. Recognize that all waves transfer energy.</li> <li>b. Relate frequency and wavelength to the energy of different types of electromagnetic waves and mechanical waves.</li> <li>c. Compare and contrast the characteristics of electromagnetic and mechanical (sound) waves.</li> <li>d. Investigate the phenomena of reflection, refraction, interference, and diffraction.</li> <li>e. Relate the speed of sound to different mediums.</li> <li>f. Explain the Doppler Effect in terms of everyday interactions.</li> </ul>	<ul> <li>SP4. Students will analyze the properties and applications of waves.</li> <li>a. Explain the processes that results in the production and energy transfer of electromagnetic waves.</li> <li>b. Experimentally determine the behavior of waves in various media in terms of reflection, refraction, and diffraction of waves.</li> <li>c. Explain the relationship between the phenomena of interference and the principle of superposition.</li> <li>d. Demonstrate the transfer of energy through different mediums by mechanical waves.</li> </ul>	

and explain how the parts are	e. Determine the location and
affected by changes in amplitude	nature of images formed by the
and pitch.	reflection or refraction of light.

Standards/Elements	Essential Vocabulary	<b>Essential Questions</b>	Assessment
Waves (7 days)	Amplitude Constructive Interference Crest Compression Destructive Interference Diffraction Doppler Effect Electromagnetic wave Frequency Intensity Interference Longitudinal/Compressional Mechanical wave Medium Period Pitch Rarefaction Reflection Refraction Speed Transverse Trough Wavelength	How do light and sound transfer energy from one place to another? What happens to light as it moves through different media? What happens to sound as it moves through different media? What happens when two waves meet while they travel through the same medium? How do waves transfer energy? How do you know that a wave carries energy? Compare and contrast the four types of wave interactions: reflection, refraction, diffraction and interference.	<ul> <li>SPS9 Good Vibrations (Sound) Lab</li> <li>SPS9 Waves Test</li> <li>SPS9 Waves Worksheet</li> </ul>
The Frame. $DIOCK = 7$ (	lays frautional – 2.5 weeks		

Instructional Resources:			
Sound http://www.cstephenmurray.com/Acrobatfiles/IPC/ch11to13/chap13no1.pdf			
Waves http://www.cstephenmurray.com/Acrob	atfiles/IPC/ch11to13/chap11no2.pdf		
Light http://www.cstephenmurray.com/Acroba	tfiles/IPC/ch14to15/chap14no1.pdf		
Intro to Waves Video http://www.gpb.org/cher	nistry-physics/physics/1101		
Electromagnetic Waves Video http://www.gpb	.org/chemistry-physics/physics/1301		
Refraction Demonstration http://www.educatio	n.com/activity/article/Disappearing_Crys	stals_middle/	
Interactive Website with Reading and Question	is http://www.ndt-ed.org/EducationResou	urces/HighSchool/highschool.htm	
https://www.georgiastandards.org/Frameworks/GSO%20Frameworks/9- 12%20Science%20Traditional%20Physical%20Science%20Framework%20Energy.pdf			
Subject: Physical Science	Grade Level: 9-12	<b>Unit Length</b> : Block – 6 days	
Unit #8 – Nuclear Energy/Radioactivity		Traditional – 2 weeks	
Unit Overview/Description			
In this unit, students will			
Non stable nuclei are radioactive and emit ionizing radiation in the form of alpha, beta, or gamma radiation.			
dentify the three types of nuclear radiation and their individual properties.			
Nuclear reactions convert matter into energy through the process of radioactive decay, fission and fusion.			
The rate of radioactive decay for an isotope is constant and is measured by half-life.			
The rate of radioactive decay for an isotope is con	istant and is measured by half-life.		
The rate of radioactive decay for an isotope is con A change in the nuclear structure and/or electron	nstant and is measured by half-life. configuration results in the emission of ra	adiation.	

Solar energy is produced by a fusion reaction.

Solve half-life problems.

Compare and contrast the types of radioactive decay.

Compare and contrast fission and fusion.

Analyze the process of radioactive decay and calculate radioactive half-life.

Analyze the advantages and disadvantages of nuclear energy.

Predict the penetrating ability of each type (alpha, beta, and gamma) of radiation.

**Unit Standards** (*Content Standards*)

#### **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

#### **CURRICULUM GUIDE**

- SPS3. Students will distinguish the characteristics and components of radioactivity.
  - a. Differentiate among alpha and beta particles and gamma radiation.
  - b. Differentiate between fission and fusion.
  - c. Explain the process half-life as related to radioactive decay.
  - d. Describe nuclear energy, its practical application as an alternative energy source, and its potential problems.

Year-Long Standards (Characteristics of Science)

#### Habits of Mind

SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

SCSh3. Students will identify and investigate problems scientifically.

SCSh4. Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.

SCSh6. Students will communicate scientific investigations and information clearly.

The Nature of Science

SCSh7. Students will analyze how scientific knowledge is developed.

SCSh8. Students will understand important features of the process of scientific inquiry.

Content Strand	Prerequisite Objectives/Skills/Concepts	Current Course Level: Mastery Objectives/Skills/Concepts	Next Level Course: Mastery Objectives/Skills/Concepts
Radioactivity	N/A	<ul><li>SPS3. Students will distinguish the characteristics and components of radioactivity.</li><li>a. Differentiate among alpha and beta particles and gamma</li></ul>	<ul><li>SP2. Students will evaluate the significance of energy in understanding the structure of matter and the universe.</li><li>a. Relate the energy produced</li></ul>

### **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

		<ul> <li>radiation.</li> <li>b. Differentiate between fission and fusion.</li> <li>c. Explain the process half-life as related to radioactive decay.</li> <li>d. Describe nuclear energy, its practical application as an alternative energy source, and its potential problems.</li> </ul>	<ul><li>through fission and fusion by stars as a driving force in the universe.</li><li>b. Explain how the instability of radioactive isotopes results in spontaneous nuclear reactions.</li></ul>
Standards/Elements	Essential Vocabulary	Essential Questions	Assessment
Radioactivity (6 days)	Alpha Particle Alternative Energy Beta Particle Background Radiation Chain Reaction Daughter Nuclei Decay Fission Fusion Gamma Ray Geiger Counter Half-life Isotope Nuclear Power Planet Nuclear Reaction Particle Radioactive Dating Radioactive Decay Radioactive Tracer Radioactivity Reactor Strong Force	Why do all current nuclear power plants use fission reactors? How does the production of electricity in nuclear power plants in Georgia affect our state? How do we use Carbon-14 for radioactive dating? How would the mass of a 10-g sample of carbon-14 change after one half life? In what ways does nuclear radiation affect living things? If there were an ionizing radiation leak in this room, how would you shield yourself? How can nuclear radiation be both dangerous and beneficial to humans? How is nuclear energy stored and released?	<ul> <li>SPS3 Radioactivity Quiz</li> <li>SPS3 Half-Life Wksht</li> <li>SPS3 Radioactivity Wksht</li> <li>SPS3 Half Life of Twizzlers Lab</li> </ul>

 Time Frame: Block – 6 days
 Traditional – 2 weeks

 Instructional Resources:
 Nuclear Power <a href="http://www.cstephenmurray.com/Acrobatfiles/IPC/chapter22to25/chap22no1.pdf">http://www.cstephenmurray.com/Acrobatfiles/IPC/chapter22to25/chap22no1.pdf</a>

 Nuclear Radiation Video
 <a href="http://www.gpb.org/chemistry-physics/physics/1501">http://www.gpb.org/chemistry-physics/physics/1501</a>

 Interactive Website with Reading and Questions
 <a href="http://www.ndt-ed.org/EducationResources/HighSchool/highschool.htm">http://www.georgiastandards.org/Frameworks/GSO%20Frameworks/9-</a>

 12%20Science%20Traditional%20Physical%20Science%20Frameworks/9 <a href="https://www.georgiastandards.org/Frameworks/GSO%20Frameworks/9-12%20Science%20Traditional%20Physical%20Science%20Frameworks/9-12%20Science%20Traditional%20Physical%20Science%20Energy%20Nuclear%20Energy.pdf</a>

**Subject**: Physical Science Unit #9 – Electricity and Magnetism Grade Level: 9-12

Unit Length: Block – 9 days Traditional – 3 weeks

**Unit Overview/Description** 

In this unit, students will:

Distinguish charges and forces in static electricity situations.

Electric current is the result of the motion of charged particles across a conductor.

Friction forces can cause the accumulation of an unbalanced amount of charged particles on the surface of an object.

The voltage created between two objects due to the presence of an unbalanced charged may create an electric spark or shock.

Electrons can be transferred from one charged conductor to another by physical contact.

When a charged object is moved into proximity to a conductor, the conductor is charged by induction.

An electric current requires a complete circuit and a voltage source.

The amount of current that flows in a circuit depends on both the resistance and the voltage of the source.

In a series circuit the same amount of current flows through all the components.

In a parallel circuit the voltage drop across each component is equal and equal to the voltage of the power source.

In a direct current circuit the electrons flow in only one direction.

## **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

In an alternating current the motion of the electrons alternates back and forth due to the changing polarity of the voltage source.
Charges in motion generate magnetic fields.
Variable magnetic fields induce currents in a circuit.
A moving electric charge, or current, in a magnetic field experiences a force.
Current is the flow of electric charge, voltage is the difference of electrical potential between two points of an electric circuit.
A power source (battery) is necessary to supply the energy to move a charge from its low energy, low potential terminal to the high
energy, high potential terminal.
Solve problems involving resistance, current, and voltage (Ohms Law)
Unit Standards (Content Standards)
SPS10. Students will investigate the properties of electricity and magnetism.
a. Investigate static electricity in terms of
friction
induction
conduction
b. Explain the flow of electrons in terms of
alternating and direct current.
the relationship among voltage, resistance and current.
simple series and parallel circuits.
c. Investigate applications of magnetism and/or its relationship to the movement of
electrical charge as it relates to
electromagnets
simple motors
permanent magnets
Year-Long Standards (Characteristics of Science)
Habits of Mind
SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.
SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.
SCSh3. Students will identify and investigate problems scientifically.
SCSh4. Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.
SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable
scientific explanations.

SCSh6. Students will communicate scientific investigations and information clearly.

The Nature of Science

SCSh7. Students will analyze how scientific knowledge is developed.

SCSh8. Students will understand important features of the process of scientific inquiry.

Content Strand	Prerequisite Objectives/Skills/Concepts	Current Course Level: Mastery Objectives/Skills/Concepts	Next Level Course: Mastery Objectives/Skills/Concepts
Electricity	<ul><li>S8P5. Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in nature.</li><li>b. Demonstrate the advantages and disadvantages of series and parallel circuits and how they transfer energy.</li></ul>	<ul> <li>SPS10. Students will investigate the properties of electricity and magnetism.</li> <li>a. Investigate static electricity in terms of friction induction conduction</li> <li>b. Explain the flow of electrons in terms of - alternating and direct current.</li> <li>the relationship among voltage, resistance and current.</li> <li>simple series and parallel circuits.</li> </ul>	<ul> <li>SP5. Students will evaluate relationships between electrical and magnetic forces.</li> <li>a. Describe the transformation of mechanical energy into electrical energy and the transmission of electrical energy.</li> <li>b. Determine the relationship among potential difference, current, and resistance in a direct current circuit.</li> <li>c. Determine equivalent resistances in series and parallel circuits.</li> </ul>
Magnetism	S8P5. Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in	<ul><li>SPS10. Students will investigate the properties of electricity and magnetism.</li><li>c. Investigate applications of</li></ul>	<ul><li>SP5. Students will evaluate</li><li>relationships between electrical</li><li>and magnetic forces.</li><li>d. Determine the relationship</li></ul>

# **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

	nature	magnetism and/or its relationship	between moving electric charges
	c. Investigate and explain that	to the movement of electrical	and magnetic fields.
	electric currents and magnets can	charge as it relates to	
	exert force on each other.	electromagnets	
		simple motors	
		permanent magnets	
Standards/Elements	<b>Essential Vocabulary</b>	<b>Essential Questions</b>	Assessment
	Alternating current	What does it mean when	• SPS10 Electro/Mag Test
	Amperage/Amps	something is electrically	SPS10 Electrical Circuits
	Battery	charged?	• SPS10 Identify Positive
	Charge	How can object become	and Negative Charge
	Conductor	electrically charged?	• SPS10 Ohms Law
	Conduction	Why can small birds sit on high-	Problems
	Conductivity	voltage power lines?	
	Current	Why is an alternating current	
	Direct current	necessary for a motor to work?	
	Electric Field	What characteristics of the	
	Electricity	material make it a good	
Electricity (5 days)	Force	conductor or insulator?	
Electricity (5 days)	Friction	Why are insulators attracted to	
	Induction	charged objects?	
	Ions	Why is alternating current	
	Insulator	commonly used in household	
	Metalloids	applications?	
	Metals	How do electric generators work?	
	Negative Charge	How are electric generators and	
	Nonmetals	motors different and alike?	
	Ohm	How do transformers work?	
	Ohms Law		
	Parallel circuit		
	Positive Charge		

#### **ACADEMIC AFFAIRS-CURRICULUM & INSTRUCTION**

	Dowor		
	Resistance		
	Series circuit		
	Static Charge		
	Voltage		
	Volts		
	Work		
	Flectromagnet	How is an electromagnet made?	• SPS10 Electro/Mag Test
	Generator	Why is an electromagnet more	• SFS10 Electro/Mag Test
	Motor	nowerful when it possesses an	
	Permanent magnet	iron core?	
Magnetism (4 days)	Poles	Why does striking a magnet with	
Magnetisiii (4 days)	1 0105	something hard weaken its	
		magnetism?	
		How are electricity and	
		magnetism related?	
Time Frame: Block – 9 day	vs Traditional – 3 weeks		
Instructional Resources:			
Magnetism http://www.cste	phenmurray.com/Acrobatfiles/IPC/c	ch5and10/chap10no1.pdf	
Ohm's Law http://www.cste	ephenmurray.com/Acrobatfiles/IPC/	ch6to9/chap7no1.pdf	
Circuits and Symbols http://	www.cstephenmurray.com/Acrobat	files/IPC/ch6to9/chap6no2.pdf	
Electric Charge http://www.	.cstephenmurray.com/Acrobatfiles/I	PC/ch6to9/chap6no1.pdf	
Electric Current Video http:	//www.gpb.org/chemistry-physics/p	<u>hysics/901</u>	
Induction Demonstration htt	tp://www.education.com/activity/art	icle/electric-spoon/	
Make Electricity with Fricti	on Demonstration http://www.educa	ation.com/activity/article/Make_Elec	<u>tricity_fifth/</u>
Magnetism Lab <u>http://www</u>	.stmary.ws/highschool/physics/home	e/lab/lab3/Magnetism_Lab.htm	
Interactive Website with Re	ading and Questions http://www.nd	t-ed.org/EducationResources/HighSc	hool/highschool.htm
https://www.georgiastandar	ds.org/Frameworks/GSO%20Frame	works/9-	
12%20Science%20Tradition	nal%20Physical%20Science%20Fra	mework%20Charge.pdf	

Subject:	Physical Science
Unit #10	– Review

Grade Level: 9-12

**Unit Length**: Block – 10 days Traditional – 3.5 weeks

Unit Overview/Description
In this unit, students will:
Review all content standards.
Taking practice tests found online, utilize usatestprep.com.
Make an EOCT review booklet that is divided by domain or units. Include essential vocabulary, I can statements, visuals, a place to
write quick review, and practice questions.
Play review games.
Predict how they will do on the exam.
Time Frame: Block – 10 days Traditional – 3.5 weeks
Instructional Resources:
GaDOE Student Guide:
http://archives.gadoe.org/DMGetDocument.aspx/EOCT%20Physical%20Science%20Study%20Guide%20August%202008.pdf?p=6C
<u>C6799F8C1371F6FDC54458781AB4584A24B1BB50F0827669920CEB2572F881&amp;Type=D</u>
Condensed questions from GaDOE Student Guide: on Acorn folder
Domain Benchmarks: on Acorn folder
EOCT Questions and Study Guides by Standards: http://mrsbridgessciencepage.wikispaces.com/EOCT
Old QCC Practice test:
http://archives.gadoe.org/DMGetDocument.aspx/Released%20Phys%20Sci.pdf?p=4BE1EECF99CD364EA5554055463F1FBBF5D07
4D5FB1F2CAEB3B63B3ECB220CDD26C2114F3C57D8D262CD4A8A31EEE48A&Type=D
Atomic Theory Questions http://classjump.com/m/msrhyne/documents/EOCTPhysicalScienceAtomicTheory.htm
More Questions Sets by Domain/Element: http://classjump.com/m/msrhyne/?what=classes&class=129901
Review Questions – won't move on until answer is correct:
http://sc.caldwellschools.com/education/components/testbank/default.php?sectiondetailid=28608≻_id=1173882334
EOCT PPT and Questions by Domain: http://www.mcduffie.k12.ga.us/webpages/kneal/homework_help.cfm
Glencoe EOCT Resources: http://www.glencoe.com/sites/common_assets/science/workbooks/georgia/gaeoct2.pdf
Jeopardy Game Part 1 and Part 2: on Acorn folder

Content Descriptors for each Domain, shows student what Proficient, Meets, Does Not Meet : http://www.google.com/url?sa=t&rct=j&q=eoct%20physical%20science%20performane%20level%20descriptors&source=web&cd=1 &ved=0CCIQFjAA&url=http%3A%2F%2Farchives.gadoe.org%2FDMGetDocument.aspx%2FGA%2520Physical%2520Science%25 20PLD%2520Final%252011.8.05.doc%3Fp%3D4BE1EECF99CD364EA5554055463F1FBBF5D074D5FB1F2CAEB3B63B3ECB22 0CDD26C2114F3C57D8D2F3B6C77A126503BB%26Type%3DD&ei=SMKZU9v1A7GgsQSr14GwAg&usg=AFQjCNFp4Jgm6ASB HVpA8O39ma6QQ55cbA&bvm=bv.68911936,d.cWc

#### **GENERAL PHYSICAL SCIENCE RESOURCES**

Curriculum Content Descriptions: <u>https://www.gadoe.org/Curriculum-Instruction-and-</u> Assessment/Assessment/Documents/GA%20EOCT%20PhysSci%20TCD%20August%202012.pdf

Powerpoints and notes <a href="http://gainesville.mo.schoolwebpages.com/education/components/scrapbook/default.php?sectiondetailid=4533">http://gainesville.mo.schoolwebpages.com/education/components/scrapbook/default.php?sectiondetailid=4533</a>

Powerpoint files and notes http://www.sciencepowerpoint.com/

Frameworks, Units, Lessons https://www.georgiastandards.org/Frameworks/Pages/BrowseFrameworks/Science9-12.aspx

Assessments, Videos, Worksheets <u>www.usatestprep.com</u>

Videos http://www.discoveryeducation.com/

Lab Activities <u>http://science.dadeschools.net/Instructional%20Resources%202012-2013/Science%20Hands-</u>on%20Activities/HOT%20Science%20Labs%20-%20Physical%20Science%202012-2013.pdf

Virtual Labs <u>http://www.livebinders.com/play/play?id=304463</u> <u>http://phet.colorado.edu/</u>

Hooks or Labs with sample videos <u>http://www.stevespanglerscience.com/lab/experiments</u> (if link does not work google steve spangler science experiments)