Pine Hill Public Schools Curriculum			
Content Area:	**Science**		
Course Title/ Grade Level:	Honors Chemistry		
Unit 1:	Measurement and problem solving	Duration:	**15 days**
Unit 2:	Development of the Atomic Theory	Duration:	**15 days**
Unit 3:	Using the Periodic Table	Duration:	**15 days**
Unit 4:	Modern Atomic Theory	Duration:	**15 days**
Unit 5:	Ionic and covalent compounds	Duration:	**30 days**
Unit 6:	Chemical formulas and equations	Duration:	**25 days**
Unit 7:	Fundaments of Stoichiometry	Duration:	**20 days**
Unit 8:	Kinetic Theory of matter and Solutions	Duration:	**25 days**
Unit 9:	Gas Laws	Duration:	**20 days**
Date Created or Revised:	2011		
BOE Approval Date:	8/28/12		

Pine Hill Public Schools Science Curriculum		
Unit Title: Measurement and problem solving		**Unit #**
Course or Grade Level: Honors Chemistry	**Length of Time: 15 days (Reinforced Throughout Year)**	
Pacing		
Essential Questions	• How do scientists solve problems?	
Content	• Scientific method	
Skills	• Identify and use laboratory equipment. • Perform labs and be able to draw scientific conclusions.	
Math Skills/ Science Processes	• Create and interpret graphs • Calculating density of solids and liquids	
Assessments	• Lab report on boiling point, Solid density and Liquid density • Quiz on scientific vocabulary related to physical properties of matter • Test on scientific method	
Interventions / differentiated instruction	• Interpretation of graphs to find patterns in science	
Inter-disciplinary Connections	• Problem solving in industry • Use of measurements in cooking	
Lesson resources / Activities	• Labs Boiling point, • Lab density of solids, • Lab density of liquids	
2009 NJCCCS		
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.		
Strand(s): A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world. **D. Participate Productively in Science:** The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.		
Content Statement(s): Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles. Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.	**CPI # / CPI(s):** 5.1.12.A.1 / Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations. 5.1.12.D.3 / Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.	
21st Century Themes		

	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
21st Century Skills							
	Creativity and Innovation		Critical Thinking and Problem Solving		Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy		Life and Career Skills		

Pine Hill Public Schools Science Curriculum		
Unit Title: Development of the Atomic Theory		**Unit #2**
Course or Grade Level: Honors Chemistry	**Length of Time: 15 days (Reinforced Throughout Year)**	
Pacing		
Essential Questions	• How are atoms an integral part of all matter? • How are atoms of each element alike or dissimilar?	
Content	□□History of the atom □□Atomic structure	
Skills	• "Build" atoms with the proper amount of sub atomic particles • Draw the atom according to the different atomic theories from Democratus, Dalton, Thompson, Rutherford and Bohr	
Math Skills/ Science Processes	❖ Find the number of subatomic particles in any element and place them in the correct place within the atom according to the Bohr model.	
Assessments	• Bright line spectra lab report • Test on atomic theory • Quiz on scientific vocabulary related to atomic theory	
Interventions / differentiated instruction	• Videos help to conceptualize the normally invisible subatomic particles	
Inter-disciplinary Connections	• Physics of light • Carbon dating of fossils • Radioactive isotopes used in medicine	
Lesson resources / Activities	• Bright line spectra lab • Video on periodic table • Video on subatomic particles	
2009 NJCCCS		
Standard: 5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science. **5.2 Physical Science:** All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.		
Strand(s): A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world. **C. Reflect on Scientific Knowledge:** Scientific knowledge builds on itself over time. **A. Properties of Matter:** All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.		
Content Statement(s): C 1) Interpretation and manipulation of evidence-based models are used to	**CPI # / CPI(s):** 5.1.12.A.2 / Develop and use mathematical, physical,	

build and critique arguments/explanations. 2) Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges. 3) Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons. In a neutral atom, the positively charged nucleus is surrounded by the same number of negatively charged electrons. Atoms of an element whose nuclei have different numbers of neutrons are called isotopes.	and computational tools to build evidence-based models and to pose theories. 5.1.12.C.3 / Consider alternative theories to interpret and evaluate evidence-based arguments 5.2.12.A.1 / Use atomic models to predict the behaviors of atoms in interactions 5.2.12.A.4 / Explain how the properties of isotopes, including half-lives, decay modes, and nuclear resonances, lead to useful applications of isotopes.

21st Century Themes							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
21st Century Skills							
	Creativity and Innovation		Critical Thinking and Problem Solving		Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy		Life and Career Skills		

Pine Hill Public Schools Science Curriculum		
Unit Title: Using the Periodic Table		**Unit #3**
Course or Grade Level: Honors Chemistry	**Length of Time: 15 days (Reinforced Throughout Year)**	
Pacing		
Essential Questions	• How can we perform labs safely, use the collected data and interpret it correctly?	
Content	• Chemical families • Ionic compounds	
Skills	• Use correct lab safety • Interpret data and draw conclusions about elements in the same chemical family	
Math Skills/ Science Processes	❖ Find the valence (oxidation state) of elements and use that to create organic, molecular and acidic compounds.	
Assessments	• Alkali metal labs lab report • Test on elements and the periodic table • Quiz on scientific vocabulary related to the periodic table	
Interventions / differentiated instruction	• Use of periodic table to show repeating patterns of physical and chemical properties of matter	
Inter-disciplinary Connections	• Use of roman numerals • Use of Latin word in the naming of elements	
Lesson resources / Activities	• Labs Ionic compounds • Alkali metals • Alkali Earth metals	

2009 NJCCCS

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5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.

Strand(s): A. Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.

D. Participate Productively in Science: The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.

A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.

Content Statement(s) A) Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence. **D):** Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work. In the Periodic Table, elements are arranged according to the number of protons (the atomic number). This organization illustrates commonality and patterns of physical and chemical properties among the elements.	**CPI # / CPI(s):** 5.1.12.A.3 / Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence. 5.1.12.D.1 / Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences. 5.2.12.A.3 / Predict the placement of unknown elements on the Periodic Table based on their physical and chemical properties

21st Century Themes							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
21st Century Skills							
	Creativity and Innovation		Critical Thinking and Problem Solving		Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy		Life and Career Skills		

Pine Hill Public Schools Science Curriculum		
Unit Title: Modern Atomic Theory		**Unit #4**
Course or Grade Level: Honors Chemistry	**Length of Time: 15 days (Reinforced Throughout Year)**	
Pacing		
Essential Questions	How are the elements arranged to make compounds? • How can scientists use chemical families to predict chemical reactions results?	
Content	□□Electron configuration □□Periodic table □□Name & Symbols of the elements	
Skills	□□Interpret the period table and be able to use it to identify atomic structure. Recognize the names and symbols of the 50 most common elements used in a chemistry setting. □□Identify chemical families and why elements are grouped into families.	
Math Skills/ Science Processes	• Adding positive and negative integers. • Using the distributive method to calculate chemical formulas	
Assessments	• Lab report on VSEPR Modeling • Lab report on Molecular compounds • Test on the periodic table • Quiz on related chemistry vocabulary	
Interventions / differentiated instruction	• Use of 3d models to help in the understanding of molecular and ionic structure	
Inter-disciplinary Connections	• Genetics with similar traits in chemical families • Art design with 3d modeling • Building design	
Lesson resources / Activities	• Labs: Molecular compounds, properties of carbon dioxide • Lab building VSEPR models	
2009 NJCCCS		
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Strand(s): B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims. **D. Participate Productively in Science:** The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.		
Content Statement(s): B) Logically designed investigations are needed in order to generate the evidence required to build and refine models and	**CPI # / CPI(s):** 5.1.12.B.1 / Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies,	

explanations. D) Science involves using language, both oral and written, as a tool for making thinking public.	causal/co relational relationships, and anomalous data. 5.1.12.D.2 / Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

21st Century Themes							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
21st Century Skills							
	Creativity and Innovation		Critical Thinking and Problem Solving		Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy		Life and Career Skills		

Pine Hill Public Schools Science Curriculum		
Unit Title: Ionic and covalent compounds		**Unit #5**
Course or Grade Level: Honors Chemistry	**Length of Time: 30 days (Reinforced Throughout Year)**	
Pacing		
Essential Questions	• How are molecules different from atoms?	
Content	• Identify the types of chemical compounds. • Identify acids both binary and ternary	
Skills	Write the formula for ionic and molecular compounds as well as Acids	
Math Skills/ Science Processes	• Using the periodic table to identify metals and nonmetals to help create ionic and covalent compounds. • Using flow chart to help in the naming process of molecules and formula units	
Assessments	• Lab Report on Ionic compounds • Lab report on writing chemical names from formula	
Interventions / differentiated instruction	• Modeling to show crystalline lattice structure of ionic compounds	
Inter-disciplinary Connections	• cooking applications • Industrial processes	
Lesson resources / Activities	• Lab on ionic compounds • Test on molecules • Test on ionic compounds	

2009 NJCCCS

Standard:

5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.

5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.

Strand(s):

B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.

A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.

B. Changes in Matter: Substances can undergo physical or chemical changes to form new substances. Each change involves energy.

Content Statement(s):	**CPI # / CPI(s):**
Mathematical tools and technology are used to gather, analyze, and communicate results. Acids and bases are important in numerous chemical processes that occur around us, from industrial to biological processes, from the laboratory to the environment. An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.	5.1.12.B.2 / Build, refine, and represent evidence-based models using mathematical, physical, and computational tools. 5.2.12.A.6 / Relate the pH scale to the concentrations of various acids and bases. 5.2.12.B.1 / Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.

21st Century Themes							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
21st Century Skills							
	Creativity and Innovation		Critical Thinking and Problem Solving		Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy		Life and Career Skills		

Pine Hill Public Schools Science Curriculum		
Unit Title: Chemical formulas and equations		**Unit #6**
Course or Grade Level: Honors Chemistry	**Length of Time: 25 days (Reinforced Throughout Year)**	
Pacing		
Essential Questions	How can we identify an unknown substance?	
Content	• Chemical equations • Balancing chemical equations • Types of chemical reactions	
Skills	• Write and balance a chemical equation. • Differentiate between the 4 types of chemical reactions. • Identify the phases of matter by what's happening to there molecular structure.	
Math Skills/ Science Processes	• Distributive property of math • Clearing fractions from equations	
Assessments	• Report on Lab limiting reagent, • Report on lab percent composition, • Report on Hydrates • Test on chemical reactions	
Interventions / differentiated instruction	TBD	
Inter-disciplinary Connections	• algebra skills • commercial arts (mole day) • Music (element song)	
Lesson resources / Activities	• Lab limiting reagent • Lab on percent composition • Lab on hydrates • Test on chemical equations	
2009 NJCCCS		
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Strand(s): B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims. **B. Changes in Matter:** Substances can undergo physical or chemical changes to form new substances. Each change involves energy.		
Content Statement(s):	**CPI # / CPI(s):** 5.1.12.B.3 / Revise predictions and	

Empirical evidence is used to construct and defend arguments. A large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond. The conservation of atoms in chemical reactions leads to the ability to calculate the mass of products and reactants using the mole concept.	explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories. 5.2.12.B.2 / Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel. 5.2.12.B.3 / Balance chemical equations by applying the law of conservation of mass.

21st Century Themes							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
21st Century Skills							
	Creativity and Innovation		Critical Thinking and Problem Solving		Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy		Life and Career Skills		

Pine Hill Public Schools Science Curriculum		
Unit Title: Fundaments of Stoichiometry		**Unit #7**
Course or Grade Level: Honors Chemistry	**Length of Time: 20 days (Reinforced Throughout Year)**	
Pacing		
Essential Questions	▪ How to differentiate molecules by use of formula mass ▪ Analyze how a Mole can relate molecular mass, volume and number of atoms	
Content	• Fundamentals of Stoichiometry	
Skills	• Calculate Moles, grams or Liters of a substance in a chemical reaction.	
Math Skills/ Science Processes	▪ Multi-step algebraic computations. ▪ Logical thinking of how to apply the proper steps to form a solution	
Assessments	• Test on Stoichiometry • Quiz on related chemistry vocabulary	
Interventions / differentiated instruction	• Use of flow charts to help students that have difficulty with dimensional analysis	
Inter-disciplinary Connections	• Algebra skills	
Lesson resources / Activities	• Test on Stoichiometry • Numerous worksheets on conversion skills • Mole diagram	

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Strand(s): B. Generate Scientific Evidence Through Active Investigations : Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.

Content Statement(s): Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	**CPI # / CPI(s):** 5.1.12.B.4 / Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations

21st Century Themes

	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy

21st Century Skills

	Creativity and Innovation		Critical Thinking and Problem Solving		Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy		Life and Career Skills		

Pine Hill Public Schools Science Curriculum		
Unit Title: Kinetic Theory of matter and Solutions		**Unit #8**
Course or Grade Level: Honors Chemistry	**Length of Time: 25 days (Reinforced Throughout Year)**	
Pacing		
Essential Questions	• How are the different phases of matter different? • How can matter change phase?	
Content	• Kinetic theory • Phases of matter	
Skills	• Identify phases of matter according to the kinetic theory	
Math Skills/ Science Processes	Graphing of phase changes and interpreting the changes in kinetic and potential energy	
Assessments	• Report on melting point • Report on heat of Fusion/Heat of vaporization	
Interventions / differentiated instruction	• TBD	
Inter-disciplinary Connections	• TBD	
Lesson resources / Activities	• Lab on heat of fusion/vaporization • Lab on melting point	

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5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.

Strand(s):

C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.

A. Properties of Matter: All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.

Gas particles move independently and are far apart relative to each other. The behavior of gases can be explained by the kinetic molecular theory. The kinetic molecular theory can be used to explain the relationship between pressure and volume, volume and temperature, pressure and temperature, and the number of particles in a gas sample. There is a natural tendency for a system to move in the direction of disorder or entropy.

Content Statement(s):	**CPI # / CPI(s):**
Refinement of understandings, explanations, and models occurs as new evidence is incorporated. Differences in the physical properties of solids, liquids, and gases are explained by the ways in which the atoms, ions, or molecules of the substances are arranged, and by the strength of the forces of attraction between the atoms, ions, or molecules. Solids, liquids, and gases may dissolve to form solutions. When combining a solute and solvent to prepare a solution, exceeding a particular concentration of solute will lead to precipitation of the solute from the solution. Dynamic equilibrium occurs in saturated solutions. Concentration of solutions can be calculated in terms of molarity, molality, and percent by mass.	5.1.12.C.1 / Reflect on and revise understandings as new evidence emerges. 5.2.12.A.2 / Account for the differences in the physical properties of solids, liquids, and gases.

21st Century Themes							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
21st Century Skills							
	Creativity and Innovation		Critical Thinking and Problem Solving		Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy		Life and Career Skills		

Pine Hill Public Schools Science Curriculum		
Unit Title: Gas Laws		**Unit #9**
Course or Grade Level: Honors Chemistry	**Length of Time: 20 days (Reinforced Throughout Year)**	
Pacing		
Essential Questions	How are temperature and kinetic energy related?	
Content	• Temperature scales	
Skills	Convert between the Fahrenheit, Celsius and Kelvin Temperature scales.	
Math Skills/ Science Processes	Basic algebra skills in conversion between temperature scales	
Assessments	• Lab report on absolute zero • Test on kinetic theory	
Interventions / differentiated instruction	• TBD	
Inter-disciplinary Connections	• Travel to countries with metric system • New super-conductor technology	
Lesson resources / Activities	• TBD	

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5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.

Strand(s): C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself over time.

D. Energy Transfer and Conservation: The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.

C. Forms of Energy: Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.

D. Forms of Energy: Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.

Content Statement(s): Data and refined models are used to revise predictions and explanations. Chemical equilibrium is a dynamic process that is significant in many systems, including biological, ecological, environmental, and geological systems. Chemical reactions occur at different rates. Factors such as temperature, mixing, concentration, particle size, and surface area affect the rates of chemical reactions. Heating increases the energy of the atoms composing elements and the molecules or ions composing compounds. As the kinetic energy of the atoms, molecules, or ions increases, the temperature of the matter increases. Heating a pure solid increases the vibration energy of its atoms, molecules, or ions. When the vibration energy of the molecules of a pure substance becomes great enough, the solid melts. Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically. Gas particles move independently and are far apart relative to each other. The behavior of gases can be explained by the kinetic molecular theory. The kinetic molecular theory can be used to explain the relationship between pressure and volume, volume and temperature, pressure and temperature, and the number of particles in a gas sample. There is a natural tendency for a system to move in the direction of disorder or entropy.	**CPI # / CPI(s):** 5.1.12.C.2 / Use data representations and new models to revise predictions and explanations. 5.2.12.D.5 / Model the change in rate of a reaction by changing a factor. 5.2.12.C.2 / Account for any trends in the melting points and boiling points of various compounds. 5.1.12.D.3 / Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare. 5.2.12.A.5 / Describe the process by which solutes dissolves in solvents. 5.2.12.C.1 / Use the kinetic molecular theory to describe and explain the properties of solids, liquids, and gases.

21st Century Themes							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
21st Century Skills							
	Creativity and Innovation		Critical Thinking and Problem Solving		Communication and Collaboration		Information Literacy
	Media Literacy		ICT Literacy		Life and Career Skills		