SPRING GROVE AREA SCHOOL DISTRICT

PLANNED COURSE OVERVIEW

Course Title: Science I	**Length of Course:** 30 cycles
Grade Level(s): 9-10	**Periods Per Cycle:** 6
Units of Credit: 1	**Length of Period:** 43 minutes
Classification: Required	**Total Instructional Time:** 129 hours

Course Description

This ninth grade course aims to develop basic scientific skills and concepts in chemistry, physics, and biology. The course emphasis will be on the nature of science, and the application of basic physical science principles to the living world. Lab work and course content will be aligned with guidelines established by the Pennsylvania Department of Education's Standards Aligned System.

Instructional Strategies, Learning Practices, Activities, and Experiences

Teacher Demonstrations	Formal Assessments	Bell Ringers
Laboratory Experiments	Guided Practice	Class Discussion
Textbook Reading	Online Tutorials/Resources	Flexible Groups
Homework	Critical Thinking	Posted Objectives and Agenda

Assessments

Concept Quizzes	End of Marking Period Cumulative Exam	Directed Reading Packets
Unit Examinations	Laboratory Write-ups/Reports	Study Guides

Materials/Resources

Physical Science Textbook	General Science Textbook	Online Resources
Prentice Hall Physical Science-Concepts in Action © 2006	Glencoe Series Science Level Blue © 2005	Laboratory Resources and Equipment
	PowerPoint Lectures	Laboratory Experiments
		Note Packets

Adopted: 5/19/14
Revised:

Science Skills	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Scientific Method Measurements Data Organization and Analysis	3.1.C.A.9 1. Compare and contrast scientific theories. 2. Know that both direct and indirect observations are used by scientists to study the natural world and the universe. 3. Identify questions and concepts that guide scientific investigations. 4. Explain the importance of accuracy and precision in making valid measurements. CC.3.5.9-10.A. 1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CC3.5.9-10.B. 1. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CC.3.5.9-10.D. 1. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. CC.3.5.9-10.E. 1. Analyze the structure of the relationships among concepts in a text, including relationships among key terms. CC.3.5.9-10.G. 1. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

Structure and Properties of Matter	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Classification of Matter Physical and Chemical Properties and Changes The States of Matter The Gas Laws The Structure of the Atom	3.2.C.A1 1. Differentiate between pure substances and mixtures. 2. Differentiate between heterogeneous and homogeneous mixtures. 3.2.C.A1 1. Differentiate between physical properties and chemical properties. 3.2.C.A4 1. Predict how combinations of substances can result in physical and/or chemical changes. 3.2.C.A3 1. Describe the three normal states of matter in terms of energy, particle, motion, and phase transitions. 3.2.C.A1 1. Predict the behavior of gases through application of laws (e.g., Boyle's law, Charles' law) 2. Explain that matter is made of particles called atoms and that atoms are composed of even smaller particles (e.g., protons, neutrons, electrons). 3. Explain the relationship between the physical properties of a substance and its molecular or atomic structure. CC3.5.9-10.A. 1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CC3.5.9-10.B. 1. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CC3.5.9-10.C. 1. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CC.3.5.9-10.D. 1. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. CC.3.5.9-10.E. 1. Analyze the structure of the relationships among concepts in a text, including relationships among key terms.

Structure and Properties of Matter (cont'd)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	CC.3.5.9-10.F. 1. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. CC.3.5.9-10.G. 1. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CC.3.5.9-10.H. 1. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. CC.3.5.9-10.I. 1. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict explanations or accounts.

The Periodic Table	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Origin of the Periodic Table Modern Periodic Table Arrangement	3.2.C.A1 1. Explain the relationship of an element's position on the periodic table to its atomic number and classification of elements. 3.2.C.A2 2. Compare the electron configurations for the first twenty elements of the periodic table. 3. Relate the position of an element on the periodic table to its electrons configuration and compare its reactivity to the reactivity of other elements in the table. CC3.5.9-10.A. 1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CC3.5.9-10.B. 1. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CC3.5.9-10.C. 1. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CC.3.5.9-10.D. 1. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. CC.3.5.9-10.E. 1. Analyze the structure of the relationships among concepts in a text, including relationships among key terms. CC.3.5.9-10.G. 1. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

Chemical Bonding	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Ionic Bonding Covalent Bonding Non-polar vs. Polar Bonds Polar Bonding and Water Properties Metallic Bonding Hydrogen Bonding	3.2.C.A2 1. Explain how atoms combine to form compounds through ionic bonding. 2. Predict chemical formulas based on the number of valence electrons. 3. Draw Lewis dot structures for ionic compounds. 4. Predict the chemical formulas for simple ionic compounds. 3.2.C.A2 1. Explain how atoms combine to form compounds through covalent bonding. 2. Predict chemical formulas based on the number of valence electrons. 3. Draw Lewis dot structures for simple molecules. 4. Predict the chemical formulas for simple molecular compounds. 3.2.C.A1 1. Explain the difference between polar and non-polar covalent bonds. 2. Describe the unique properties of water and how these properties support life on Earth (e.g., freezing point, high specific heat, cohesion). CC3.5.9-10.A. 1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CC3.5.9-10.B. 1. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CC3.5.9-10.C. 1. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CC.3.5.9-10.D. 1. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. CC.3.5.9-10.E. 1. Analyze the structure of the relationships among concepts in a text, including relationships among key terms. CC.3.5.9-10.G. 1. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

Chemical Reactions	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Balancing Chemical Equations Types of Reactions Energy Changes in Reactions Reaction Rate Factors	3.2.C.A4 1. Interpret and apply the law of conservation of mass. 2. Balance chemical equations by applying the law of conservation of mass. 3.2.C.A4 1. Classify chemical reactions as synthesis, decomposition, single replacement, double replacement, and combustion. 3.1.C.A2 1. Describe how changes in energy affect the rate of chemical reactions. 3.1.C.A2 1. Describe factors that influence the frequency of collisions during chemical reactions that might affect the reaction rates (e.g., surface area, concentration, catalyst, temperature). 2. Describe the role of an enzyme as a catalyst in regulating a specific biochemical reaction. CC3.5.9-10.A. 2. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CC3.5.9-10.B. 2. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CC3.5.9-10.C. 2. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CC.3.5.9-10.D. 2. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. CC.3.5.9-10.E. 2. Analyze the structure of the relationships among concepts in a text, including relationships among key terms. CC.3.5.9-10.G. 1. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CC.3.5.9-10.H. 1. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. CC.3.5.9-10.I. 2. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict explanations or accounts.

Solutions, Acids, and Bases	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Solubility and Concentration of Solutions Properties of Acids and Bases Strength of Acids	3.1.B.A7 1. Explain the consequences of extreme changes in pH on cell proteins. CC3.5.9-10.A. 3. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CC3.5.9-10.B. 3. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CC3.5.9-10.C. 3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CC.3.5.9-10.D. 3. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. CC.3.5.9-10.E. 3. Analyze the structure of the relationships among concepts in a text, including relationships among key terms. CC.3.5.9-10.F. 1. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. CC.3.5.9-10.G. 2. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CC.3.5.9-10.H. 2. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. CC.3.5.9-10.I. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict explanations or accounts.

The Nonliving Environment	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Abiotic Factors Water Cycle Nitrogen Cycle Carbon Cycle	3.1.B.A2 1. Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, nitrogen cycle). CC3.5.9-10.A. 1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CC3.5.9-10.B. 1. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CC3.5.9-10.C. 1. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CC.3.5.9-10.D. 1. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. CC.3.5.9-10.E. 1. Analyze the structure of the relationships among concepts in a text, including relationships among key terms. CC.3.5.9-10.G. 1. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CC.3.5.9-10.H. 1. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. CC.3.5.9-10.I. 1. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict explanations or accounts.

The Biosphere	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Levels of Organization Interactions and Relationships between the Organisms	3.1.B.A.2 1. Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, and biosphere). 3.1.B.A.2 1. Describe the characteristic biotic and abiotic components of aquatic and terrestrial ecosystems. 2. Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids). 3. Describe biotic interactions in an ecosystem (e.g. competition, predation, symbiosis). 4. Describe the effects of limiting factors on population dynamics and potential species extinction. CC3.5.9-10.A. 1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CC3.5.9-10.B. 1. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CC3.5.9-10.C. 1. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CC.3.5.9-10.D. 1. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. CC.3.5.9-10.E. 1. Analyze the structure of the relationships among concepts in a text, including relationships among key terms. CC.3.5.9-10.G. 1. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CC.3.5.9-10.H. 1. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. CC.3.5.9-10.I. 1. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict explanations or accounts.

Forces and Motion	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Speed and Velocity Acceleration Newton's Laws of Motion	3.2.P.B1 1. Differentiate between translational motion and rotational motion in the terms of position, velocity, and acceleration. CC3.5.9-10.A. 1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CC3.5.9-10.B. 1. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CC3.5.9-10.C. 1. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CC.3.5.9-10.D. 1. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. CC.3.5.9-10.E. 1. Analyze the structure of the relationships among concepts in a text, including relationships among key terms. CC.3.5.9-10.F. 1. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. CC.3.5.9-10.G. 1. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CC.3.5.9-10.H. 1. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. CC.3.5.9-10.I. 1. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict explanations or accounts.

Energy	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Forms of Energy Transfer of Energy	3.2.C.B3 1. Explain the law of conservation of energy. 3.2.P.B3 1. Analyze factors that influence convection, conduction, and radiation between objects or regions that are at different temperatures. CC3.5.9-10.A. 1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. CC3.5.9-10.B. 1. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CC3.5.9-10.C. 1. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CC.3.5.9-10.D. 1. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. CC.3.5.9-10.E. 1. Analyze the structure of the relationships among concepts in a text, including relationships among key terms. CC.3.5.9-10.G. 1. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CC.3.5.9-10.H. 1. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. CC.3.5.9-10.I. 1. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict explanations or accounts.