9th Grade Honors General Science

Curriculum Guide

Scranton School District

Scranton, PA

9th Grade Honors General Science

Prerequisite:

- Completion of 8th grade physical science with teacher recommendation for honors

9th Grade Honors General Science is designed to be a survey course of the main branches of science offered at the high school level. Students will be introduced to basic concepts in Chemistry, Physics, Earth and Space Science, Biology, and Environmental Science. The course meets five class periods per week. The curriculum was developed as a foundation that students will build upon as they progress through high school. The honors curriculum is designed to prepare students with a solid background for future Honors and AP Science courses.

Scranton School District
Curriculum Guide

Year-at-a-glance

Subject: 9th Grade Honors General Science	Grade Level: 9th	Date Completed: 7/16/15

1st Quarter

Topic	Resources	Academic Standards
Scientific Approach: **Measurements** **Scientific Data**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 1: 1.3,1.4** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.3.10.A8** **CC.3.5** **CC.3.6** **3.1.10.A9 Use for all Lessons** • **Compare and contrast scientific theories.** • **Know that both direct and indirect observations are used by scientists to study the natural world and universe.** • **Identify questions and concepts that guide scientific investigations.** • **Formulate and revise explanations and models using logic and evidence.** • **Recognize and analyze alternative explanations and models.** • **Explain the importance of accuracy and precision in making valid measurements.**

Chemistry **Properties of Matter:** **Classifying Matter** **Physical Properties** **Chemical Properties**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 2: 2.1, 2.2** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.2.C.A1** **CC.3.5** **CC.3.6** **3.1.C.C4: Use for all Chemistry Lessons** • **Compare and contrast scientific theories.** • **Know that both direct and indirect observations are used by scientists to study the natural world and universe.** • **Identify questions and concepts that guide scientific investigations.** • **Formulate and revise explanations and models using logic and evidence.** • **Recognize and analyze alternative explanations and models.** • **Explain the importance of accuracy and precision in making valid measurements.** • **Examine the status of existing theories.** • **Evaluate experimental information for relevance and adherence to science processes.** • **Judge that conclusions are consistent and logical with experimental conditions.** • **Interpret results of experimental research to predict new information, propose additional investigable questions, or advance a solution.**
States of Matter: **Solids, Liquids, & Gases** **Phase Changes**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 3: 3.1,3.3** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.2.10.A3** **3.2.C.A3** **CC.3.5** **CC.3.6**

Atomic Structure: **History of Atoms** **Atomic Structure** **Atomic Theory**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 4: 4.1, 4.2, 4.3** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.2.C.A5** **CC.3.5** **CC.3.6**
Periodic Table: **Organization** **Modern Periodic Table** **Groupings**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 5: 5.1, 5.2, 5.3** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.2.C.A1** **3.2.10.A1** **CC.3.5** **CC.3.6**
Chemical Bonding: **Ionic Bond** **Covalent**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 6: 6.1, 6.2** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.2.10.A2** **CC.3.5** **CC.3.6**

Chemical Reactions: **Types of Reactions**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 7: 7.2** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.2.10.A4** **3.2.C.A4** **CC.3.5** **CC.3.6**
Solutions Acids and Bases : **Properties of acids and bases** **Strength of acids and bases**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 8: 8.3, 8.4** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.2.12.A4** **CC.3.5** **CC.3.6**

2nd Quarter

Topic	Resources	Academic Standards
Carbon Chemistry : **Carbon Compounds** **Polymers** **Reactions in Cells**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 9: 9.1, 9.3, 9.4** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.1.B.A7** **CC.3.5** **CC.3.6**

Physics **Motion:** **Distance and Displacement** **Speed and Velocity** **Acceleration**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 11: 11.1, 11.2, 11.3** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.2.P.B1** **CC.3.5** **CC.3.6** **3.1.P.A9: Use for all Lessons in Physics** • **Compare and contrast scientific theories.** • **Know that both direct and indirect observations are used by scientists to study the natural world and universe.** • **Identify questions and concepts that guide scientific investigations.** • **Formulate and revise explanations and models using logic and evidence.** • **Recognize and analyze alternative explanations and models.** • **Explain the importance of accuracy and precision in making valid measurements.** • **Examine the status of existing theories.** • **Evaluate experimental information for relevance and adherence to science processes.** • **Judge that conclusions are consistent and logical with experimental conditions.** • **Interpret results of experimental research to predict new information, propose additional investigable questions, or advance a solution.** • **Communicate and defend a scientific argument.**

Force and Motion: **Forces** **Newton's Laws** **Momentum** **Universal Forces**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 12: 12.1-12.4** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.2.10.B1** **CC.3.5** **CC.3.6**

3rd Quarter

Topic	Resources	Academic Standards
Forms of Energy: **Energy and it's forms** **Conversion and Conservation** **Energy Resources**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 15: 15.1-15.3** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.3.12.A2** **3.2.P.B2** **CC.3.5** **CC.3.6**

Earth Science **Earth's Structure:** **Plate Tectonics** **Earthquakes** **Volcanoes**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 22: 22.1, 22.4-22.6** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.3.10.A3** **3.3.10.A1** **CC.3.5** **CC.3.6** **3.3.10.A8: Use for all Earth Science** • **Compare and contrast scientific theories.** • **Know that both direct and indirect observations are used by scientists to study the natural world and universe.** • **Identify questions and concepts that guide scientific investigations.** • **Formulate and revise explanations and models using logic and evidence.** • **Recognize and analyze alternative explanations and models.** • **Explain the importance of accuracy and precision in making valid measurements.**

Earth's History : **Weathering and Mass Movement** **Water Shapes the Land** **Glaciers and Wind** **Oceans**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 23: 23.2-23.5** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.3.10.A5** **CC.3.5** **CC.3.6**

4th Quarter

Topic	Resources	Academic Standards
Weather and Climate: **The Atmosphere** **The Sun/Seasons** **Solar Energy** **Water** **Atmosphere** **Weather/Climate**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 24: 24.1-24.6, 24.7** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.3.10.A6** **3.3.12.A6** **3.3.12.A8** **3.3.10.A4** **CC.3.5** **CC.3.6**

The Solar System: **Exploring the solar system** **Earth Moon System** **Planets** **Origin**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 25: 25.1-25.5** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.3.10.B1** **3.3.12.B3** **CC.3.5** **CC.3.6** **3.3.10.B3 Use for Solar System Lessons** • **Compare and contrast scientific theories.** • **Know that both direct and indirect observations are used by scientists to study the natural world and universe.** • **Identify questions and concepts that guide scientific investigations.** • **Formulate and revise explanations and models using logic and evidence.** • **Recognize and analyze alternative explanations and models.** • **Explain the importance of accuracy and precision in making valid measurements.**

Exploring the Universe: **The Sun/Stars** **Life Cycle of Stars** **Groups of Stars** **Expanding Universe**	**Approved textbook** **Physical Science Concepts in Action with Earth and Space: Chapter 26: 26.1-26.5** **Lesson/Unit Plan** **Instructional Content** **Educational Resources** **Assessment** **Videos** **Web-Based Content**	**3.3.12.B1** **3.3.12.B3** **CC.3.5** **CC.3.6** **3.3.12.B3 Use for Universe Lessons** • **Examine the status of existing theories.** • **Evaluate experimental information for relevance and adherence to science processes.** • **Judge that conclusions are consistent and logical with experimental conditions.** • **Interpret results of experimental research to predict new information, propose additional investigable questions, or advance a solution.** • **Communicate and defend a scientific argument.**
Review and Final Examination		

***The suggested timeline and curriculum content should be adjusted and revised as needed in correlation with the PA State Standards.**

General Topic	Academic Standard(s)	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time
Using Science Skills: • Scientific Approach • Measurements • Scientific Data	3.3.10.A8 CC.3.5 CC.3.6	Compare and contrast scientific theories. Know that both direct and indirect observations are used by scientists to study the natural world and universe. Identify questions and concepts that guide scientific investigations. Formulate and revise explanations and models using logic and evidence. Recognize and analyze alternative explanations and models. Explain the importance of accuracy and precision in making valid measurements. Reading Informational Text Writing	Approved textbook Worksheets Activity Assessments Smart Boards Multimedia Presentations Measurement Lab Webquest	Teacher prepared tests, quizzes, etc. Series available assessments online. (Optional)	5 days

Chemistry **Properties of Matter:** • **Classifying Matter** • **Physical Properties** • **Chemical Properties**	**3.2.C.A1** **CC.3.5** **CC.3.6**	**Differentiate between physical properties and chemical properties.** **Differentiate between pure substances and mixtures; differentiate between heterogeneous and homogeneous mixtures.** **Reading Informational Text** **Writing**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentations** **Webquest**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**4 days**

States of Matter: • **Solids, Liquids, & Gases** • **Phase Changes**	**3.2.10.A3** **3.2.C.A3** **CC.3.5** **CC.3.6**	**Describe phases of matter according to the kinetic molecular theory.** **Describe the three normal states of matter in terms of energy, particle motion, and phase transitions.** **Reading Informational Text** **Writing**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentations** **Webquest**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**4 days**

Atomic Structure • History of Atoms • Atomic Structure • Atomic Theory	**3.2.C.A5** **CC.3.5** **CC.3.6**	**Recognize discoveries from Dalton (atomic theory), Thomson (the electron), Rutherford (the nucleus), and Bohr (planetary model of atom), and understand how each discovery leads to modern theory.** **Describe Rutherford's "gold foil" experiment that led to the discovery of the nuclear atom. Identify the major components (protons, neutrons, and electrons) of the nuclear atom and explain how they interact.** **Reading Informational Text** **Writing**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentations** **Webquest** **Construction of Model: Atom**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**5 days**

Periodic Table: • **Organization** • **Modern Periodic Table** • **Groupings**	**3.2.C.A1** **3.2.10.A1** **CC.3.5** **CC.3.6**	**Explain the relationship of an element's position on the periodic table to its atomic number, ionization energy, electro-negativity, atomic size, and classification of elements.** **Predict properties of elements using trends of the periodic table.** **Reading Informational Text** **Writing**	**Approved textbook** **Worksheets** **Activity** **Assessments** **Smart Boards** **Multimedia Presentations** **Webquest**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**6 days**

Chemical Bonding • **Ionic** • **Covalent**	**3.2.10.A2** **CC.3.5** **CC.3.6**	**Compare and contrast different bond types that result in the formation of molecules and compounds.** **Explain why compounds are composed of integer ratios of elements.** **Reading Informational Text** **Writing**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentations** **Webquest**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**6 days**

Chemical Reactions • **Types of Reactions** • **Energy Changes** • **Reaction Rates**	**3.2.10.A4** **3.2.C.A4** **CC.3.5** **CC.3.6**	**Explain the difference between endothermic and exothermic reactions.** **Identify the factors that affect the rates of reactions.** **Classify chemical reactions as synthesis (combination), decomposition, single displacement (replacement), double displacement, and combustion.** **Reading Informational Text** **Writing**	**Approved textbook** **Activity Assessments** **Smart Boards** **Multimedia Presentations** **Webquest** **Measurement Lab**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**5 days**

Solutions • **Acids** • **Bases**	**3.2.12.A4** **CC.3.5** **CC.3.6**	**Apply oxidation/reduction principles to electrochemical reactions.** **Describe the interactions between acids and bases.** **Reading Informational Text** **Writing**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentation**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**5 days**

Carbon Chemistry • **Carbon Compounds** • **Polymers** • **Reactions In Cells**	**3.1.B.A7** **CC.3.5** **CC.3.6**	**Analyze the importance of carbon to the structure of biological macromolecules.** **Compare and contrast the functions and structures of proteins, lipids, carbohydrates, and nucleic acids.** **Explain the consequences of extreme changes in pH and temperature on cell proteins.** **Reading Informational Text** **Writing**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentation**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**5 Days**

Physics **Motion:** • **Distance and Displacement** • **Speed and Velocity** • **Acceleration**	**3.2.P.B1** **CC.3.5** **CC.3.6**	**Differentiate among translational motion, simple harmonic motion, and rotational motion in terms of position, velocity, and acceleration.** **Use force and mass to explain translational motion or simple harmonic motion of objects.** **Reading Informational Text** **Writing**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentation**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**23 Days**

Force and Motion: • Forces • Newton's Laws • Momentum • Universal Forces	**3.2.10.B1** **CC.3.5** **CC.3.6**	**Analyze the relationships among the net forces acting on a body, the mass of the body, and the resulting acceleration using Newton's Second Law of Motion.** **Apply Newton's Law of Universal Gravitation to the forces between two objects.** **Use Newton's Third Law to explain forces as interactions between bodies.** **Describe how interactions between objects conserve momentum.** **Reading Informational Text** **Writing**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentation**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**24 Days**

Forms of Energy • Energy and it's forms • Conversion and Conservation • Energy Resources	**3.2.P.B2** **3.3.12.A2** **CC.3.5** **CC.3.6**	**Explain the translation and simple harmonic motion of objects using conservation of energy and conservation of momentum.** **Explain how gravitational, electrical, and magnetic forces and torques give rise to rotational motion.** **Analyze the availability, location, and extraction of Earth's resources.** **Evaluate the impact of using renewable and nonrenewable energy resources on the Earth's system.** **Reading Informational Text** **Writing**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentation**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**10 Days**

Earth Science **Earth's Interior:** • **Earth's Structure** • **Plate Tectonics** • **Earthquakes** • **Volcanoes**	**3.3.10.A3** **3.3.10.A1** **CC.3.5** **CC.3.6**	**Explain how the evolution of Earth has been driven by interactions between the lithosphere, hydrosphere, atmosphere, and biosphere.** **Relate plate tectonics to both slow and rapid changes in the earth's surface.** **Describe the rock cycle and the processes that are responsible for the formation of igneous, sedimentary, and metamorphic rocks.** **Explain how the Earth is composed of a number of dynamic, interacting systems exchanging energy or matter.** **Reading Informational Text** **Writing**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentation**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**18 Days**

Earth's History • **Weathering and Mass** • **Movement** • **Water Shapes the Land** • **Glaciers and Wind** • **Oceans**	**3.3.10.A5**	**Explain how there is only one ocean.** **Explain the processes of the hydrologic cycle.** **Explain the dynamics of oceanic currents and their relationship to global circulation within the marine environment.**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentation**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**20 days**

Weather and Climate • **The Atmosphere** • **The Sun/Seasons** • **Solar Energy** • **Water Atmosphere** • **Weather/Climate**	**3.3.10.A6** **3.3.12.A6**	**Interpret meteorological data to describe and/or predict weather.** **Explain the phenomena that cause global atmospheric processes such as storms, currents, and wind patterns.** **Explain how the unequal heating of the Earth's surface leads to atmospheric global circulation changes, climate, local short term changes, and weather.** **Examine the status of existing theories.** **Evaluate experimental information for relevance and adherence to science processes.** **Judge that conclusions are consistent and logical with experimental conditions.** **Interpret results of experimental research to predict new information, propose additional investigable questions, or advance a solution.** **Communicate and defend a scientific argument.**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentation**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**15 days**

	3.3.12.A8	**Relate the transfer of energy through radiation, conduction, and convection to global atmospheric processes.** **Relate geochemical cycles to conservation of matter.**			
	3.3.10.A4	**Explain how the Earth's systems and its various cycles are driven by energy.**			
	CC.3.5	**Reading Informational Text**			
	CC.3.6	**Writing**			

Exploring the solar system • **Earth Moon System** • **Planets** • **Origin**	**3.3.10.B1** **3.3.12.B3** **CC.3.5** **CC.3.6**	**Explain how gravity is responsible for planetary orbits.** **Explain what caused the sun, Earth, and most of the other planets to form between 4 and 5 billion years ago.** **Provide evidence to suggest the Big Bang Theory.** **Describe the basic nuclear processes involved in energy production in a star.** **Examine the status of existing theories.** **Evaluate experimental information for relevance and adherence to science processes.** **Judge that conclusions are consistent and logical with experimental conditions.** **Interpret results of experimental research to predict new information, propose additional investigable questions, or advance a solution.** **Communicate and defend a scientific argument.** **Reading Informational Text** **Writing**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentation**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**10 days**

Exploring the Universse: • Life Cycle of Stars • Groups of Stars • Expanding Universe	**3.3.12.B1** **3.3.12.B3** **CC.3.5** **CC.3.6**	**Describe the life cycle of stars based on their mass.** **Analyze the influence of gravity on the formation and life cycles of galaxies, including our own Milky Way galaxy; stars; planetary systems; and residual material left from the creation of the solar system.** **Relate the nuclear processes involved in energy production in stars and supernovas to their life cycles.** **Examine the status of existing theories.** **Evaluate experimental information for relevance and adherence to science processes.** **Judge that conclusions are consistent and logical with experimental conditions.** **Interpret results of experimental research to predict new information, propose additional investigable questions, or advance a solution.** **Communicate and defend a scientific argument.** **Reading Informational Text** **Writing**	**Approved textbook** **Worksheets** **Activity Assessments** **Smart Boards** **Multimedia Presentation**	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**10 days**

Review and Final Examination					**10 days**