

"Our mission is to prepare each student to be a successful and responsible member of society."

North Smithfield School District

Ninth Grade Science Curriculum

North Smithfield Scope and Sequence SCIENCE Curriculum: K-12

North Smithfield District Science Curriculum Committee
Clare Arnold, District Curriculum Director
Consultants: East Bay Educational Collaborative Science Specialist Team

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North Smithfield High School Course Design- Physical Science

Grade Level – Nine Text: Holt Physical Science, w/ Earth and Space Science 2008.

RI Statements of Enduring Knowledge - (Established Goals):

PS 1 All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another
(*independent of size or amount of substance*)

PS 2 Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.

Related Rhode Island GSE's <i>(Understandings)</i>	RI Assessment Targets Assessment Evidence ***High Priority
<p><i>PS1 (9-11)–1</i> Students demonstrate an understanding of characteristic properties of matter by ...</p> <p>1a utilizing appropriate data (related to chemical and physical properties), to <u>distinguish</u> one substance from another or identify an unknown substance.</p> <p>PS2 (9-11)-5 Students demonstrate an understanding of energy by...</p> <p>5a <u>describing or diagraming the changes in energy (transformation) that occur in different systems (eg. chemical = exo and endo thermic reactions, biological = food webs, physical = phase changes).</u></p> <p><i>PS1 (9-11)– 4</i> Students demonstrate an understanding of the structure of matter by ...</p> <p>4a <u>comparing the three subatomic particles of atoms (protons, electrons, neutrons) and their location within an atom, their relative mass, and their charge.</u></p> <p>4b <u>writing formulae for compounds and developing basic (excluding transition elements) models using electron structure.</u></p> <p>4c <u>explaining or modeling how the electron configuration of atoms governs how atoms interact with one another (e.g. covalent, hydrogen and ionic bonding).</u></p> <p>PS2 (9-11) –6 Students demonstrate an understanding of physical, chemical, and <u>nuclear</u> changes by ...</p> <p>6c <u>explaining and/or modeling how the nuclear make-up of atoms governs alpha and beta emissions creating changes in the nucleus of an atom results in the formation of new elements.</u></p> <p>6d explaining the concept of half-life and using the half-life principal to predict the approximate age of a</p>	<p>ESS1 (9-11) SAE+ POC–3 <i>Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading).</i></p>

material.

6e differentiating between fission and fusion in nuclear reactions and their relation to element changes and energy formation.

ESS1 (9-11)—4

Students demonstrate an understanding of processes and change over time by ...

4a describing various dating methods to determine the age of different rock structures.

PS3 (9-11)- 8

Students demonstrate an understanding of forces and motion by...

8a predicting and/or graphing the path of an object in different reference planes and explain how and why (forces) it occurs.

, **8b** using modeling, illustrating, graphing explain how distance and velocity change over time for a free falling object.

PS2 (9-11) –7

Students demonstrate an understanding of electromagnetism by...

7a explaining through words, diagrams, models, or electrostatic demonstrations the principle that like charges repel and unlike charges attract.

7b explaining through words, charts, diagrams, and models the effects of distance and the amount of charge on the strength of the electrical force present.

7c describing the relationship between moving electric charges and magnetic fields.

PS3 (9-11)—10

Students demonstrate an understanding of waves by ...

10a. investigating examples of wave phenomena (e.g. ripples in water, sound waves, seismic waves).

10b comparing and contrasting electromagnetic waves to mechanical waves.

10c qualifying the relationship between frequency and wavelength of any wave.

ESS1 (9-11)— 1

Students demonstrate an understanding of processes and change over time within earth

systems by ...

1a. plotting the location of mountain ranges and recent earthquakes and volcanic eruptions to identify any existing patterns.

ESS1 (9-11)–2

Students demonstrate an understanding of processes and change over time within earth systems by ...

2a using given data (diagrams, charts, narratives, etc.) and advances in technology to explain how scientific knowledge regarding plate tectonics has changed over time.

ESS1 (9-11)–3

Students demonstrate an understanding of processes and change over time within earth systems by ...

3b explaining how convection circulations of the mantle initiate the movement of the crustal plates which then cause plate movement and seismic activity.

3d explaining how the physical and chemical processes of the Earth alter the crust (e.g. seafloor spreading, hydrologic cycle, weathering, element cycling).

Unit	Unit Topics – Essential Questions	Instructional Activities / GSE's	Big Ideas (Understandings)
1	<p><u>Matter</u></p> <ul style="list-style-type: none"> • How can matter be classified? • What distinguishes a mixture from a compound? • What are the characteristic properties of a substance? • Why does matter change its state? • What kind of energy do all particles of matter have? <p>Approximate time spent on unit:</p> <ul style="list-style-type: none"> • 15 periods <p>GSE's</p> <ul style="list-style-type: none"> • GSE 1a, 5a 	<ul style="list-style-type: none"> • Text Reference: Holt Science Spectrum: <i>Physical Science with Earth and Space Science</i>. 2008. Chapters 2 and 3 • Chapter Reading Journal • Flame test demonstration • Density of an egg lab • Mystery Mixture Lab Activity (Ref. template <i>Holt Science Spectrum Disk 1 Microsoft Word - sp08_p32_MAT_q1.doc</i>) or equivalent Mixture Separation Lab • Demonstration applet: http://phet.colorado.edu/en/simulation/states-of-matter • Satellite Down! Investigation • COMMON TASK: <i>Busted!</i> Identification of and unknown powder. <p>Suggested Resources/Materials:</p> <ul style="list-style-type: none"> • Holt Science Spectrum <i>Teacher's One Stop Planner</i> Disk 1 	<ul style="list-style-type: none"> • Using appropriate data (related to chemical and physical properties) the student will be able to distinguish one substance from another and identify an unknown substance. • Classifying matter • Characteristic Properties • Properties of matter: Chemical and Physical Properties. • Changes of state • Kinetic Theory
2	<p><u>The Structure of the Atom and the Periodic Table</u></p> <ul style="list-style-type: none"> • Why is it important to understand atomic structure? • How are elements classified? • What is the structure of an atom? 	<p>Chapters 4 and 5</p> <ul style="list-style-type: none"> • Chapter Reading Journal • Atom Modeling Activity • Elements Observation Lab 	<ul style="list-style-type: none"> • Student will be able to compare the three subatomic particles of atoms and their location within the atom, their relative mass and their charge.

	<ul style="list-style-type: none"> • What is the difference between an atom and a molecule? <p>Approximate time spent on unit:</p> <ul style="list-style-type: none"> • 15 periods <p>GSE's</p> <p>GSE PS 1a, 4a, 4b, 4c</p>	<p>Suggested Resources/Materials:</p> <ul style="list-style-type: none"> • Holt Science Spectrum <i>Teacher's One Stop Planner</i> Disk 1 	<ul style="list-style-type: none"> • The Structure of the Atom • Modern Atomic Theory (Bohr Model) • Organizing the Elements • Exploring the Periodic Table • Families of Elements
3	<p><u>Chemical Bonds and Solution Chemistry</u></p> <ul style="list-style-type: none"> • Why and how do atoms form chemical bonds? • How is matter conserved in chemical reactions? • What can a balanced chemical equation tell you? • What factors affect chemical reaction rates? • How can I explain the properties of a solution? <p>Approximate time spent on unit:</p> <ul style="list-style-type: none"> • 15 periods <p>GSE's:</p> <ul style="list-style-type: none"> • . (GSE 1a,4b, 4c) 	<p>Chapters 6, 7,8, and 9</p> <ul style="list-style-type: none"> • Chapter Reading Journal • Is There Iron in Cereal? Lab • Exothermic/Endothermic Lab • Single Replacement $\text{CuCl}_2 + \text{Al}$ foil Lab • Reaction Rates Lab (Chalk + Acetic Acid) • Properties of Water Lab • pH Investigation Lab (Indicators: Litmus, pH paper, red brassica juice) <p>Suggested Resources/Materials:</p> <ul style="list-style-type: none"> • Holt Science Spectrum <i>Teacher's One Stop Planner</i> Disk 1 	<ul style="list-style-type: none"> • The student will explain and predict how the electron configurations of atoms govern how atoms interact with one another. (GSE 4b, 4c) • The student will be able to explain chemical reactions by describing or diagramming the changes in energy that occur in different systems. • The student will be able to explain basic water chemistry including pH in terms of hydrogen ion concentrations. • Conservation of Mass. • Compounds and molecules • Ionic and covalent bonding • Acids, bases, and pH
4	<p><u>Nuclear Changes</u></p> <ul style="list-style-type: none"> • What is radioactivity? • What is nuclear fission? 	<p>Chapter 10</p> <ul style="list-style-type: none"> • Half-Life Investigation: <i>Blockium</i> 	<ul style="list-style-type: none"> • Students will be able to describe the nuclear make-up of atoms and explain the concept of

	<ul style="list-style-type: none"> • What is nuclear fusion? • How can I date an object using radioactive isotopes? <p>Approximate time spent on unit:</p> <ul style="list-style-type: none"> • 5 periods <p>GSE's:</p> <ul style="list-style-type: none"> • (GSE's 6c, 6d, 6e, ESS1-4a) 	Carbon-14 Dating Investigation	<p>half-life in terms of nuclear decay.</p> <ul style="list-style-type: none"> • Cause of radioactivity. • Nuclear fission and fusion. • Various dating methods using radioactive substances.
5	<p><u>Motion and Forces</u></p> <ul style="list-style-type: none"> • How can understanding physical properties of motion be used to explain everyday occurrences? • What makes an object speed up, slow down, or change directions? <p>Approximate time spent on unit:</p> <p>15 periods</p> <p>GSE's:</p> <p>GSE PS 8a, 8b, 9a, 9b</p>	<p>Chapter 11 and 12</p> <ul style="list-style-type: none"> • Chapter Reading Journal • Bowling Ball constant velocity in 1-D investigation with graphing. • Bowling ball ramp activity: Accelerated motion in 1-D or Acceleration of a Marble Lab if weather is bad. • Horizontal Projectile Motion: Independence of Motion in 2-D <p>Common Task: Mousetrap Catapult Project</p>	<ul style="list-style-type: none"> • Students will be able to calculate speed and acceleration and will interpret and compare both distance-time and speed-time graphs. • Measuring motion • Acceleration • Motion and forces • Students will use Newton's Laws of Motion to explain free-fall and horizontal projectile motion and other uniformly accelerated motion. • Newton's first and second laws • Gravity and the Universal Law of Gravitation • Newton's third law

6	<p><u>Work, Power, and Energy</u></p> <ul style="list-style-type: none"> • What is the relationship between energy, work, and power? • Why is potential energy called the energy of position? • What factors does kinetic energy depend on? • What is the law of Conservation of Energy? <p>Approximate time spent on unit:</p> <p>8 periods</p> <p>GSE's: GSE's PS 5b)</p>	<p>Chapter 13</p> <ul style="list-style-type: none"> • Chapter Reading Journal • Stair Climbing Activity (Work and Power) <p>Energy of a Rolling Ball (page 462 of Textbook)</p>	<ul style="list-style-type: none"> • Students will categorize the different forms of energy and be able to analyze conservation of energy in energy transformations. • Work, Power • Potential energy • Kinetic energy • Work-Energy Theorem • Conservation of Energy
7	<p><u>Electricity and Magnetism</u></p> <ul style="list-style-type: none"> • How do objects acquire an electric charge? • What is the relationship between electricity and magnetism? <p>Approximate time spent on unit:</p> <p>15 periods</p> <p>GSE's:</p> <p>GSE's: 7a, 7b, 7c</p>	<p>Chapters 17 and 18</p> <ul style="list-style-type: none"> • Chapter Reading Journal • Creating Static Electricity (Lab 52 "Take Home Physics" Page 221) • Magnetism Lab • Electromagnetism Lab • Simple Circuits Lab <p>The 10 minute motor activity</p>	<ul style="list-style-type: none"> • Students will explain how pairs of charges attract and repel and students will predict how objects will become charged and students will diagram how charges move within objects. • Students will use models to demonstrate how electric currents produce magnetic fields (and vice versa). • Students will explain what causes magnetism with written and drawn descriptions. • Electric charge and force • Current

8	<p><u>Waves, Sound, and Light</u></p> <ul style="list-style-type: none"> • How do you know that waves carry energy? • How do the properties of waves determine their uses? • How does relative motion affect wavelength and frequency of waves (Doppler Effect) <p>Approximate time spent on unit:</p> <p>15 periods.</p> <p>GSE's:</p> <p>GSE PS10a, 10b, 10c, ES 1.1a</p>	<p>Chapters 15 and 16</p> <ul style="list-style-type: none"> • Chapter Reading Journal • Snaky Spring Lab • Wave Interactions Lab • Sound Lab with Doppler Effect <p>Diffraction Grating Lab with Spectrum Analysis</p>	<ul style="list-style-type: none"> • Students will distinguish between different types of waves. • Students will use and explain the characteristics of waves. • Students will specify the difference between light waves and sound waves by using the properties of electromagnetic and mechanical waves. • Doppler Effect • Characteristics of waves • Wave interactions • Sound • The nature of light
9	<p><u>Planet Earth</u></p> <ul style="list-style-type: none"> • Earth's Interior and Plate Tectonics • Earthquakes and Volcanoes • Minerals and Rocks • Weathering and Erosion • How do internal and external sources of heat fuel geologic processes? <p>GSE ESS1a, 2a, 3b, 3d</p> <p>Approximate time spent on unit: TBD</p>	<p>Chapter 21</p> <ul style="list-style-type: none"> • Chapter Reading Journal • Inquiry Task: The Eurasian and Indian Plates with Tectonic Plate Boundaries (Resource File Ch 21, page 29) • Finding the Epicenter of an Earthquake (Resource File Ch 21, page 32) <p>The Speed of t</p>	<ul style="list-style-type: none"> • Earth's Interior and Plate Tectonics • Earthquakes and Volcanoes • Review rock cycle \
10	<p><u>The Universe</u></p> <ul style="list-style-type: none"> • How does the analysis of the spectrum of starlight help us understand the formation of the universe (red shift, blue shift, line spectra)? 	<p>Chapter 20</p> <ul style="list-style-type: none"> • Chapter Reading Material • Expanding Universe (Balloon Activity) 	<ul style="list-style-type: none"> • The life cycle of stars • Examining the spectra of stars • Galaxies

	<ul style="list-style-type: none"> • What scientific evidence supports the Big Bang Theory? • What is the relationship between energy produced from nuclear reactions, the origin of elements, and the life cycle of stars? <p>Approximate time spent on unit: TBD</p>	<ul style="list-style-type: none"> • H-R Diagram Activity • Absorption Spectra Lab 	<ul style="list-style-type: none"> • Types of Galaxies • Universe • Big Bang Theory
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North Smithfield High School Course Design- Biology
Grade Level - Ten

Text: Biology, Miller & Levine, Pearson Publisher

RI Statements of Enduring Knowledge - (Established Goals):

LS 2 Matter cycles and energy flows through an ecosystem.

<p align="center">Related Rhode Island GSE's (Understandings)</p>	<p align="center">RI Assessment Targets Assessment Evidence ***High Priority</p>
<p>LS2 (9-11)-4 Students demonstrate an understanding of matter and energy flow in an ecosystem by ...</p> <p>4b explaining how the chemical elements and compounds that make up living things pass through food webs and are combined and recombined in different ways (e.g. nitrogen, carbon cycles, O₂, & H₂O cycles).</p> <p>LS2 (9-11)-3 Students demonstrate an understanding of equilibrium in an ecosystem by ...</p> <p>3a defining and giving an example of equilibrium in an ecosystem.</p> <p>3b describing ways in which humans can modify ecosystems and describe and predict the potential impact (e.g. human population growth; technology; destruction of habitats; agriculture; pollution; and atmospheric changes).</p> <p>3c describing ways in which natural events (e.g. floods and fires) can modify ecosystems and describe and predict the potential effects.</p>	<p>LS2 (9-11) POC+ SAE -4 <i>Trace the cycling of matter (e.g., carbon cycle) and the flow of energy in a living system from its source through its transformation in cellular, biochemical processes (e.g., photosynthesis, cellular respiration, fermentation).</i></p> <p>Text Reference: Prentice Hall Biology Chapter 2 & See Middle School Curriculum for sources of prior student knowledge experiences..</p> <ul style="list-style-type: none"> • Activity: McMush: Keys & Locks <p>Demo: Saliva & Starch</p> <p>Text Reference: Prentice Hall Biology Chapter 8</p> <ul style="list-style-type: none"> • Text references: Prentice Hall Biology 23-1, 23-4 • Lab Activity: Inferring Function from Structure • Lab Activity: Water loss in plants