

**2009-2010 Shelby County  
Essential Content, Skills, and Sequencing Guide  
8<sup>th</sup> Grade Physical Science  
Textbook – *Physical Science Grade 8* (Prentice Hall)**

Standard	Essential Skills and Content			Projected Timeline & Projects	Textbook Section	Sequence
	Review	Mastery (Mastery Required)	Introduction			
<p><b>1. Identify steps within the scientific process.</b></p> <ul style="list-style-type: none"> <li>Identifying appropriate laboratory glassware, balances, time measuring equipment, and optical instruments used to conduct an investigation</li> <li>Measuring dimension, volume, and mass using <i>Système International d'Unités</i> (SI units)</li> <li>Applying process skills to interpret data from graphs, tables, and charts</li> <li>Identifying examples of hypotheses</li> <li>Identifying controls and variables in a scientific investigation</li> </ul>	<p>Identify the 3 basic SI units – meter, liter, &amp; gram</p> <p>Identify the 3 basic types of graphs – line, bar &amp; pie – as well as data tables &amp; charts.</p>	<p>Identify the steps within the scientific process</p> <p>Identify, name, &amp; show appropriate use of each piece of lab equipment.</p> <p>Measure length, volume, mass, temperature, &amp; time using SI units.</p> <p>Accurately use and convert basic SI units- m, L, g, square &amp; cubic units.</p> <p>Interpret data from graphs, tables, and charts using various data.</p> <p>Collect, organize &amp; interpret data and graphs.</p> <p>Identify the if/then/because components of a hypothesis.</p> <p>Identify controls and variables in a given experiment.</p>	<p>Identifying safe laboratory procedures when handling chemicals and using a Bunsen burner and laboratory glassware (ACOS - Biology)</p> <p>Using appropriate SI units for measuring length, volume, and mass (ACOS - Biology)</p> <p>Describing the steps in the scientific method (ACOS – Biology)</p> <p>Comparing controls, dependent variables, and independent variables (ACOS - Biology)</p>	<p><b>Suggested time - 4 to 5 weeks for Standard #1.</b></p> <p>Design an experiment choosing &amp; using appropriate lab equipment to test an if/then/because hypothesis.</p>	<p>Chapter 1, sections 1, 2 &amp; 3</p> <p>Chapter 6, section 4</p> <p>Appendix A</p> <p>Skills Handbook pg. 780 – 788</p>	<b>First Nine Weeks</b>

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<p><b>2. Describe the structure of the atom, including the location of protons, neutrons, and electrons.</b></p> <ul style="list-style-type: none"> <li>Identifying Democritus and Dalton as contributors to the atomic theory</li> <li>Identifying the charge of each atomic particle</li> </ul>		<p>Describe the structure of the atom</p> <p>Identify the contributions of scientists to the development of the atomic theory</p> <p>Create a timeline showing the development of the atomic theory</p> <p>Identify the name and charge of each subatomic particle – proton, neutron, and electron</p> <p>Identify the location of each subatomic particle</p> <p>Compare and contrast the location and charges of subatomic particles within the atom</p>	<p>Utilizing benchmark discoveries to describe the historical development of atomic structure including photoelectric effect, absorption, and emission spectra of elements (ACOS – Chemistry)</p> <p>Identifying atomic and subatomic particles, including mesons, quarks, tachyons, and baryons (ACOS – Chemistry)</p>	<p><b>Suggested time - 5 to 8 weeks for Standard #2 &amp; 3.</b></p> <p>Build 3-D models of different atoms using various materials.</p>	Chapter 4, section 1	<b>First Nine Weeks</b>

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<p><b>3. Determine the number of protons, neutrons, and electrons, and the mass of an element using the periodic table</b></p> <ul style="list-style-type: none"> <li>Locating metals, nonmetals, metalloids, and noble gases on the periodic table</li> </ul> <p>Using data about the number of electrons in the outer shell of an atom to determine its reactivity</p>		<p>Determine the number of protons, neutrons, electrons, and mass of an element using the periodic table</p> <p>Locate metals, nonmetals, metalloids, and noble gases on a periodic table with and without a key</p> <p>Using the number of valence electrons, determine an element's reactivity</p>	<p>Use the periodic table to identify periodic trends, including atomic radii, ionization energy, electronegativity, and energy levels (ACOS – Chemistry)</p>	<p><b>Suggested time - 5 to 8 weeks for Standard #2 &amp; 3.</b></p> <p>Element trading card</p>	<p>Chapter 4, sections 2 – 4</p> <p>Chapter 5, section 1</p>	<b>First Nine Weeks</b>
<p><b>5. Differentiate between ionic and covalent bonds.</b></p> <ul style="list-style-type: none"> <li>Illustrating transfer or sharing of electrons using electron dot diagrams</li> </ul>		<p>Differentiate between ionic and covalent bonds.</p> <p>Identify the relationship between bond type and the elements involved (ionic bonds occur between metals &amp; nonmetals; covalent bonds occur between nonmetals only)</p> <p>Draw an electron dot diagram for a single, basic element.</p> <p>Illustrate the transfer and sharing of electrons using electron dot diagrams.</p>	<p>Predicting ionic and covalent bond types and products given known reactants (ACOS – Chemistry)</p> <p>Utilizing electron configurations, Lewis dot structures, and orbital notations to write chemical formulas (ACOS – Chemistry)</p>	<p><b>Suggested time - 1 week for Standard #5.</b></p>	<p>Chapter 5, sections 2 – 4</p>	

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<p><b>4. State the law of conservation of matter</b></p> <ul style="list-style-type: none"> <li>Balancing chemical equations by adjusting coefficients</li> </ul>		<p>State the law of conservation of matter</p> <p>Balance chemical equations to represent the law of conservation of matter</p>	<p>Solve stoichiometric problems involving relationships among the number of particles, moles, and masses of reactants and products in a chemical reaction (ACOS – Chemistry)</p>	<p><b>Suggested time - 1 to 2 days for Standard #4.</b></p>	Chapter 6, section 2	<b>Second Nine Weeks</b>
<p><b>6. Define solution in terms of solute and solvent.</b></p> <ul style="list-style-type: none"> <li>Defining diffusion and osmosis</li> <li>Defining isotonic, hypertonic, and hypotonic solutions</li> </ul> <p>Describing acids and bases based on their hydrogen ion concentration</p>		<p>Define solution, solute, &amp; solvent</p> <p>Define diffusion &amp; osmosis</p> <p>Define the prefixes iso-, hypo-, &amp; hyper-</p> <p>Define acids &amp; bases – <u>to be covered in more depth with standard #7</u></p>		<p><b>Suggested time - 2 to 3 weeks for Standard #6 &amp; 7.</b></p>	Chapter 7, section 1 & 2	
<p><b>7. Describe states of matter based on kinetic energy of particles in matter.</b></p> <ul style="list-style-type: none"> <li>Explaining effects of temperature, concentration, surface area, and catalysts on the rate of chemical reactions</li> </ul>	<p>Identify the 3 basic states of matter.</p>	<p><u>Cover states of matter based on KE with standard # 10</u></p> <p>Explaining the effects of temperature, concentration, surface area, and catalysts on the rate of chemical reactions by performing hands-on experiments</p> <p>Identify solutions as either an acid or base based on pH.</p> <p>Relate the pH scale to the hydrogen ion concentrations [H<sup>+</sup>]</p>	<p>Describing factors that affect the rate of solution (ACOS – Chemistry)</p> <p>Describing acids and bases in terms of strength, concentration, pH, and neutralization reactions (ACOS – Chemistry)</p>	<p><b>Suggested time - 2 to 3 weeks for Standard #6 &amp; 7.</b></p>	<p>Chapter 6, section 3</p> <p>Chapter 7, section 3 &amp; 4</p>	

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<p><b>8. Identify Newton’s three laws of motion.</b></p> <ul style="list-style-type: none"> <li>Defining terminology such as action and reaction forces, inertia, acceleration, momentum, and friction</li> <li>Interpreting distance-time graphs</li> </ul>		<p>Identify Newton’s three laws of motion.</p> <p>Define motion, action &amp; reaction forces, inertia, acceleration, momentum, &amp; friction.</p> <p>Demonstrate how action &amp; reaction forces, inertia, acceleration, momentum, &amp; friction affect motion, through hands-on labs.</p> <p>Calculate speed, acceleration, &amp; momentum.</p> <p>Interpret data given on a distance-time graph. Create a distance-time graph using data &amp; identify the variables. Identify slope (rise/run) of data.</p>	<p>Describing forces that act on an object (ACOS – Physics)</p> <p>Define the law of conservation of momentum (ACOS – Physics)</p> <p>Describe quantitative relationships for velocity, acceleration, force, work, power, PR, &amp; KE (ACOS – Physics)</p> <p>Explaining the significance of slope and area under a curve when graphing distance-time or velocity-time data (ACOS – Physics).</p>	<p><b>Suggested time - 10 to 12 weeks for Standards #8, 9 (1<sup>st</sup> part – machines), 10, &amp; 11.</b></p> <p><b>Project Idea</b> – Design an experiment that demonstrates several types of energy transformations applying Newton’s three laws &amp; simple machines.</p> <p><b>Example:</b> Design a rollercoaster that incorporates simple machines. Have students label KE &amp; PE, and simple machines.</p>	<p>Chapter 9 (all)</p> <p>Chapter 10, sections 1-4</p>	<b>Third Nine Weeks</b>

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<p><b>10. Differentiate between potential and kinetic energy.</b></p> <p><u>Examples:</u> potential – rock resting at the top of a hill; kinetic – rock rolling down the hill</p>		<p>Differentiate between potential &amp; kinetic energy.</p> <p>Describe states of matter based on kinetic energy of particles in matter. (from #7 above)</p> <p>Define and give examples of KE &amp; PE.</p> <p>Compare and contrast KE &amp; PE.</p> <p>Describe the transfer of PE to KE back to PE throughout a roller coaster ride, etc.</p>	<p>Calculate KE &amp; GPE.</p>	<p><b>Suggested time - 10 to 12 weeks for Standards #8, 9 (1<sup>st</sup> part – machines), 10, &amp; 11.</b></p> <p>(See Project Idea above)</p>	<p>Chapter 13, section 1</p>	<b>Third Nine Weeks</b>
<p><b>11. Explain the law of conservation of energy and its relationship to energy transformation, including chemical to electrical, chemical to heat, electrical to light, electrical to mechanical, and electrical to sound.</b></p>		<p>Define the law of conservation of energy.</p> <p>Identify chemical, electrical, thermal, nuclear, mechanical, electromagnetic (light), and sound energy.</p> <p>Identify how energy can be transformed from one form to another through hands-on and demonstrations.</p>		<p><b>Suggested time - 10 to 12 weeks for Standards #8, 9 (1<sup>st</sup> part – machines), 10, &amp; 11.</b></p> <p>(See Project Idea above)</p>	<p>Chapter 13, section 2-3</p> <p>(see page 451)</p>	

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<p><b>9. Describe how mechanical advantages of simple machines reduce the amount of force needed for work.</b></p> <p style="color: red;">*Forces in fluids to be covered separately.</p> <p><b>9. Continued...</b></p> <ul style="list-style-type: none"> <li>Describing the effect of force on pressure in fluids <b>Example:</b> increasing force on fluid leading to increase of pressure within a hydraulic cylinder</li> </ul>		<p>Identify the 6 basic machines. Describe the effect of force on pressure in fluids.</p> <p>Define fluid &amp; pressure</p> <p>Compare and contrast air pressure to water pressure and how this relates to density</p> <p>Identify examples of Bernoulli's, Archimedes', &amp; Pascal's principle.</p>		<p><b>Suggested time - 10 to 12 weeks for Standards #8, 9 (1<sup>st</sup> part – machines), 10, &amp; 11.</b> (See Project Idea above)</p> <p><b>Suggested time – 1 weeks or less for Standard #9 (2<sup>nd</sup> part – forces in fluids)</b></p>	<p>Chapter 12, sections 1-3</p> <p>Chapter 11, sections 1-4</p>	<p><b>3<sup>rd</sup>/4<sup>th</sup> Nine Weeks</b></p>
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<p><b>12. Classify waves as mechanical or electromagnetic.</b></p> <p><b>Examples:</b> mechanical – earthquake; electromagnetic – ultraviolet light waves, visible light waves</p> <ul style="list-style-type: none"> <li>• Describing how earthquake waves, sound waves, water waves, and electromagnetic waves can be destructive or beneficial due to the transfer of energy</li> <li>• Describing longitudinal and transverse waves</li> <li>• Describing how waves travel through different media</li> <li>• Relating wavelength, frequency, and amplitude to energy</li> <li>• Describing the electromagnetic spectrum in terms of frequencies</li> </ul> <p><b>Example:</b> - electromagnetic spectrum in increasing frequencies – infrared light, visible light, ultraviolet light, microwaves, x-rays</p>		<p>Classify waves as mechanical or electromagnetic.</p> <p>Describe the differences between mechanical and electromagnetic waves and identify how they can be destructive or beneficial.</p> <p>Describe longitudinal and transverse waves using a rope or slinky. Define and identify crest, trough, wavelength, amplitude, frequency, compression, and rarefaction.</p> <p>Describe how waves travel through different media.</p> <p>Relate changes in energy and how they affect wavelength, frequency, and amplitude.</p> <p>Identify common parts of the EM spectrum and describe it in terms of frequency.</p>	<p>Describe wave behavior in terms of reflection, refraction, diffraction, constructive &amp; destructive wave interference, and the Doppler effect (ACOS – Physics)</p> <p>Describing the change of wave speed in different media (ACOS – Physics)</p> <p>Describe properties of reflection, refraction, and diffraction (ACOS – Physics)</p>	<p><b>Suggested time - 2 to 3 weeks for Standard #12.</b></p> <p>Perform an experiment with sound waves to determine how media type affects transmission (the speed of waves change as they move from one medium to another).</p>	<p>Chapter 15 al</p> <p>Chapter 16, section 1-2</p> <p>Chapter 17, section 1-2</p>	<b>Fourth Nine Weeks</b>

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**Websites: General Physical Science Sites**

[www.nyelabs.com](http://www.nyelabs.com)

[www.chemicalelements.com](http://www.chemicalelements.com)

[www.middleschoolscience.com](http://www.middleschoolscience.com)

<http://alex.state.al.us>

[www.exploratorium.edu](http://www.exploratorium.edu)

<http://school.discovery.com>

[www.webelements.com](http://www.webelements.com)

<http://www.lenntech.com/periodic-chart.htm>

<http://www.eskimo.com/~billb/edu.html>

<http://dir.yahoo.com/Science/>

**Physics**

<http://school.discovery.com/lessonplans/physci.html>

Even though this site encourages that you purchase a video to go with the lesson, it still gives teachers great ideas related to physical science

**Chemistry**

<http://education.jlab.org/indexpages/elementgames.html>

great interactive games that reinforce basic chemistry concepts

<http://education.jlab.org/>

Jefferson Labs homepage, includes teacher and student resources as well as links to lessons and games

[http://www.phschool.com/atschool/science\\_explorer/ChemBB/Student\\_Area/SE\\_K\\_SC3\\_ACT\\_index.html](http://www.phschool.com/atschool/science_explorer/ChemBB/Student_Area/SE_K_SC3_ACT_index.html)

taken from a previous edition of Prentice Hall, this web site includes an excerpt on atom basics as well as including a periodic table scavenger hunt

[http://atozteacherstuff.com/Lesson\\_Plans/Science/Grades\\_6-8/index.shtml](http://atozteacherstuff.com/Lesson_Plans/Science/Grades_6-8/index.shtml)

contains a multitude of lesson plans which include hands-on activities

**Resources**

Lab safety, lab equipment, graphing basics

- Graphing Packet
- *Math Minders Graphing, Grade 6-* Frank Schaffer Publications, ISBN 0768202361

Periodic Table

- Element Caricature

Solutes & Solvent

- Lab: Operation Separation
- Speed & Acceleration
- Lab —How Slow Can You Goll
- Mechanical & Electromagnetic Waves