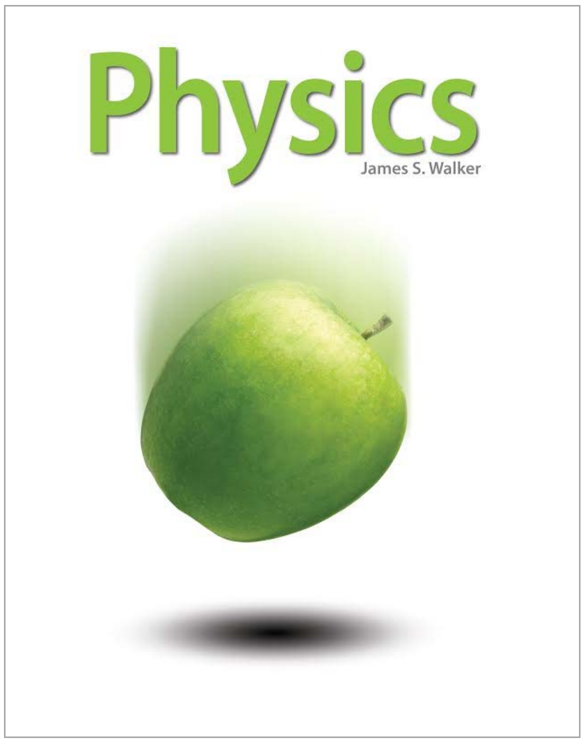
SAVVAS

A Correlation of

Savvas
Physics
©2014



to the

South Carolina Academic Standards and Performance Indicators

Physics 1

Savvas is proud to partner with Pearson to offer the best in AP, honors, and electives products.

Table of Contents

South Carolina Physics 1 Course Standards	Pearson Physics ©2014
SCIENCE AND ENGINEERING PRACTICES	
NOTE: Scientific investigations should always be done in the context of content knowledge expected in this course. The standard describes how students should learn and demonstrate knowledge of the content outlined in the other standards.	
Standard H.P.1: The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.	
H.P.1A. Conceptual Understanding: The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers.	
Performance Indicators: Students who demonstrate this understanding can:	
H.P.1A.1 Ask questions to (1) generate hypotheses for scientific investigations, (2) refine models, explanations, or designs, or (3) extend the results of investigations or challenge scientific arguments or claims.	**SE/TE:** Physics & You: 35, 141, 177, 217 Inquiry Labs: 113, 189, 385, 597, 883 Physics Labs: 142, 178, 218
H.P.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.	**SE/TE:** Inquiry Labs: 43, 229, 267, 529, 745, 883 Physics Labs: 64, 588, 942 **TE Only:** Science & Engineering Practices: 441, 615
H.P.1A.3 Plan and conduct controlled scientific investigations to answer questions, test hypotheses, and develop explanations: (1) formulate scientific questions and testable hypotheses based on credible scientific information, (2) identify materials, procedures, and variables, (3) use appropriate laboratory equipment, technology, and techniques to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.	**SE/TE:** Inquiry Labs: 73, 229, 307, 817 Physics Labs: 36, 64, 103, 142, 178, 218, 258, 298, 334, 376, 408, 444, 484, 521, 555, 588, 627, 666, 696, 736, 773, 808, 842, 874, 904, 942, 969 **TE Only:** Science & Engineering Practices: 354, 441, 679, 752 Differentiated Instruction: 604 **Lab Manual:** The Performance Tasks in the *Pearson Physics* Laboratory Manual are open-ended summative evaluations where the student designs a procedure to experimentally determine an unknown quantity specified in the problem. The student describes measurements and calculations to be made to obtain the unknown quantity, identifies necessary equipment, completes the experiment, and lists possible sources of error in the answer. For examples, please see “Missing Identity”, “Finding the Mass of the Glider”, and “What’s the Speed?”

South Carolina Physics 1 Course Standards	Pearson Physics ©2014
H.P.1A.4 Analyze and interpret data from informational texts and data collected from investigations using a range of methods (such as tabulation, graphing, or statistical analysis) to (1) reveal patterns and construct meaning, (2) support or refute hypotheses, explanations, claims, or designs, or (3) evaluate the strength of conclusions.	**SE/TE:** Inquiry Labs: 73, 151, 229, 267, 343 Physics Labs: 36, 64, 103, 142, 178, 218, 258, 294, 334, 408, 444, 484, 521, 588, 627, 666, 696, 736, 773, 874, 942, 969 Lesson Check: 57 (#32, 33, 34), 81 (#18), 91 (#41) **TE Only:** Science & Engineering Practices: 55 **Lab Manual:** The Quantitative Labs in the *Pearson Physics* Laboratory Manual require students to make measurements, collect and analyze data, draw conclusions, and communicate results. For representative examples, please see “Graphical Analysis”, “Energy of a Pendulum”, and “Series and Parallel Resistor Circuits”.
H.P.1A.5 Use mathematical and computational thinking to (1) use and manipulate appropriate English and metric units, (2) express relationships between variables for models and investigations, or (3) use grade-level appropriate statistics to analyze data.	**SE/TE:** Lesson Check: 14, 22 Inquiry Labs: 73 Physics Labs: 36, 64, 103, 142, 178, 218, 258, 298, 334, 376, 408, 444, 484, 521, 588, 627, 666, 696, 773, 969 **Lab Manual:** Simple Pendulum Converging Lens
H.P.1A.6 Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.	**SE/TE:** Physics & You: 63 Inquiry Labs: 73, 113, 307, 343, 453, 529, 637, 783, 817, 851, 883, 911, 989 Physics Labs: 36, 103, 142, 218, 258, 298, 334, 376, 408, 444, 484, 521, 555, 588, 627, 666, 696, 736, 773, 808, 874, 904, 942, 969 **TE Only:** Science & Engineering Practices: 651

South Carolina Physics 1 Course Standards	Pearson Physics ©2014
H.P.1A.7 Construct and analyze scientific arguments to support claims, explanations, or designs using evidence and valid reasoning from observations, data, or informational texts.	**SE/TE:** Physics & You: 141, 217, 333, 375, 554, 587, 735, 772, 968 Inquiry Labs: 415 **TE Only:** Scientific Literacy-Writing: 564A **Lab Manual:** Introduction to Physics Exploration Free Fall Exploration
H.P.1A.8 Obtain and evaluate scientific information to (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims, or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations.	**SE/TE:** Physics & You: 63, 102, 333, 520, 665, 807 Assessment: 148 (#100, 101), 186 (#122), 264 (#128), 412 (#90), 490 (#113), 526 (#109), 814 (#100), 974 (#68) **TE Only:** Scientific Literacy-Writing: 73A, 266A, 384A, 492A **Lab Manual:** The Qualitative (inquiry-based) Explorations in the *Pearson Physics* Laboratory Manual introduce concepts through hands-on investigation of scientific phenomena in the context of guided inquiry. Students record their observations and write hypotheses or explanations about what they observe. For representative examples, please see “Exploring Reflection”, “Temperature and Heat Exploration”, and “Exploring Electric Fields and Electric Energy”
H.P.1B. Conceptual Understanding: Technology is any modification to the natural world created to fulfill the wants and needs of humans. The engineering design process involves a series of iterative steps used to solve a problem and often leads to the development of a new or improved technology.	
Performance Indicators: Students who demonstrate this understanding can:	
H.P.1B.1 Construct devices or design solutions using scientific knowledge to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the device or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem and refine the design if needed, and (6) communicate the results.	**SE/TE:** Physics & You: 257 **TE Only:** Science & Engineering Practices: 314, 762 Differentiated Instruction: 175

South Carolina Physics 1 Course Standards	**Pearson Physics ©2014**
INTERACTIONS AND FORCES	
Standard H.P.2: The student will demonstrate an understanding of how the interactions among objects and their subsequent motion can be explained and predicted using the concept of forces.	
H.P.2A. Conceptual Understanding: The linear motion of an object can be described by its displacement, velocity, and acceleration.	
Performance Indicators: Students who demonstrate this understanding can:	
H.P.2A.1 Plan and conduct controlled scientific investigations on the straight-line motion of an object to include an interpretation of the object's displacement, time of motion, constant velocity, average velocity, and constant acceleration.	**SE/TE:** Physics Labs: 64, 103 Inquiry Labs: 43, 73 **Lab Manual:** Skip, Run, Walk, Rest Finding "g"… Three Ways Sprinter
H.P.2A.2 Construct explanations for an object's change in motion using one-dimensional vector addition.	**SE/TE:** 43-45, 52-53, 156-157 Assessment: 47 (#7, 8, 9), 66 (#48-58), 67 (#60-65)
H.P.2A.3 Use mathematical and computational thinking to apply formulas related to an object's displacement, constant velocity, average velocity and constant acceleration. Interpret the meaning of the sign of displacement, velocity, and acceleration.	**SE/TE:** 45-47, 50-53, 58-62, 76-77, 82-83, 84-85, 86-88, 88-90 Lesson Check: 47, 62, 91 Assessment: 66-70, 105-107 Physics Lab: 103
H.P.2A.4 Develop and use models to represent an object's displacement, velocity, and acceleration (including vector diagrams, data tables, motion graphs, dot motion diagrams, and mathematical formulas).	**SE/TE:** 46-47, 50-51, 54-56, 58-62, 74-81, 82-85, 86-88, 88-90 Lesson Check: 57, 62, 81, 91 Assessment: 66-70, 105-107 Physics Labs: 64, 103 Inquiry Labs: 73
H.P.2A.5 Construct explanations for what is meant by "constant" velocity and "constant" acceleration (including writing descriptions of the object's motion and calculating the sign and magnitude of the slope of the line on a position-time and velocity-time graph).	**SE/TE:** 59, 76-77, 97-98 Lesson Check: 62 (#41), 81 (#12), 101 (#56) Assessment: 69 (#88, 89, 90, 91), 107 (#93, 94, 95)

South Carolina Physics 1 Course Standards	Pearson Physics ©2014
H.P.2A.6 Obtain information to communicate the similarities and differences between distance and displacement; speed and velocity; constant velocity and instantaneous velocity; constant velocity and average velocity; and velocity and acceleration.	**SE/TE:** 46-47, 52-53, 55-56, 60, 73-74, 76-77, 88 Lesson Check: 47, 53, 81, 91 Assessment: 66 (#46-50), 67 (#60-65), 105 (#64, 66, 67)
H.P.2B. Conceptual Understanding: The interactions among objects and their subsequent motion can be explained and predicted by analyzing the forces acting on the objects and applying Newton's laws of motion.	
Performance Indicators: Students who demonstrate this understanding can:	
H.P.2B.1 Plan and conduct controlled scientific investigations involving the motion of an object to determine the relationships among the net force on the object, its mass, and its acceleration (Newton's second law of motion, F_{net} = ma) and analyze collected data to construct an explanation of the object's motion using Newton's second law of motion.	**SE/TE:** Physics Labs: 178 **Lab Manual:** Newton's Second Law of Motion Cart Push
H.P.2B.2 Use a free-body diagram to represent the forces on an object.	**SE/TE:** 161-162, 163 (Figures: 5.8, 5.9), 164, 165 (Figure 5.10) Lesson Check: 169 (#23, 29) Assessment: 181 (#65), 182 (#77)
H.P.2B.3 Use Newton's Third Law of Motion to construct explanations of everyday phenomena (such as a hammer hitting a nail, the thrust of a rocket engine, the lift of an airplane wing, or a book at rest on a table) and identify the force pairs in each given situation involving two objects and compare the size and direction of each force.	**SE/TE:** 158-159 Lesson Check: 160 (#11, 12, 13, 15, 18) Assessment: 180 (#49, 50) Inquiry Lab: 151
H.P.2B.4 Use mathematical and computational thinking to derive the relationship between impulse and Newton's Second Law of Motion.	**SE/TE:** 235-240
H.P.2B.5 Plan and conduct controlled scientific investigations to support the Law of Conservation of Momentum in the context of two objects moving linearly (p=mv).	**SE/TE:** Physics Lab: 258 **Lab Manual:** Momentum Conservation

South Carolina Physics 1 Course Standards	**Pearson Physics ©2014**
H.P.2B.6 Construct scientific arguments to defend the use of the conservation of linear momentum in the investigation of traffic accidents in which the initial motions of the objects are used to determine the final motions of the objects.	**SE/TE:** 246, 248-255 Lesson Check: 247 (#36), 256 (#49, 53) Assessment: 261 (#88, 89), 262 (#99), 264 (#127, 128) Physics Lab: 258
H.P.2B.7 Apply physics principles to design a device that minimizes the force on an object during a collision and construct an explanation for the design.	For supporting content, please see **SE/TE:** Assessment: 186 (#124-126)
H.P.2B.8 Develop and use models (such as a computer simulation, drawing, or demonstration) and Newton's Second Law of Motion to construct explanations for why an object moving at a constant speed in a circle is accelerating.	**SE/TE:** 320-323, 889 Assessment: 337 (#74) Physics Lab: 334
H.P.2B.9 Construct explanations for the practical applications of torque (such as a see-saw, bolt, wrench, and hinged door).	**SE/TE:** 281-282, 284-285 Practice Problems: 284 (#32) Physics Lab: 298
H.P.2B.10 Obtain information to communicate physical situations in which Newton's Second Law of Motion does not apply.	**SE/TE:** 160, 686, 951
H.P.2C. Conceptual Understanding: The contact interactions among objects and their subsequent motion can be explained and predicted by analyzing the normal, tension, applied, and frictional forces acting on the objects and by applying Newton's Laws of Motion.	
Performance Indicators: Students who demonstrate this understanding can:	
H.P.2C.1 Use a free-body diagram to represent the normal, tension (or elastic), applied, and frictional forces on an object.	**SE/TE:** 158, 161, 162, 167-169, 170-172, 173-174 Lesson Check: 169 (#28) Assessment: 182 (#77) Physics Lab: 178 **TE Only:** Differentiated Instruction: 162
H.P.2C.2 Plan and conduct controlled scientific investigations to determine the variables that could affect the kinetic frictional force on an object.	**SE/TE:** Physics Lab: 178 **Lab Manual:** Kick Disks to the Rescue Finding the Mass of the Block

South Carolina Physics 1 Course Standards	Pearson Physics ©2014
H.P.2C.3 Obtain and evaluate information to compare kinetic and static friction.	**SE/TE:** 170-172, 173-175, 176 Assessment: 183 (#90) Physics Lab: 178
H.P.2C.4 Analyze and interpret data on force and displacement to determine the spring (or elastic) constant of an elastic material (Hooke's Law, $F=-kx$), including constructing an appropriate graph in order to draw a line-of-best-fit whose calculated slope will yield the spring constant, k.	**SE/TE:** 166-167, 440-441 Lesson Check: 169 (#29), 442 (#54, 55, 56, 57) Assessment: 182 (#80, 81, 82, 83), 184 (#110) Physics Lab: 444
H.P.2C.5 Use mathematical and computational thinking to apply $F_{net} = ma$ to analyze problems involving contact interactions and gravity.	**SE/TE:** 152-153, 156-157, 161-162 Lesson Check: 160 (#18) Assessment: 180 (#53, 54), 181 (#57), 184 (#109)
H.P.2D. Conceptual Understanding: The non-contact (at a distance) interactions among objects and their subsequent motion can be explained and predicted by analyzing the gravitational, electric, and magnetic forces acting on the objects and applying Newton's laws of motion. These non-contact forces can be represented as fields.	
Performance Indicators: Students who demonstrate this understanding can:	
H.P.2D.1 Develop and use models (such as computer simulations, demonstrations, diagrams, and drawings) to explain how neutral objects can become charged and how objects mutually repel or attract each other and include the concept of conservation of charge in the explanation.	**SE/TE:** 676, 678-679, 717 Lesson Check: 682 (#6, 7) Assessment: 698 (#36-40, 50-52), 701 (#94) **Lab Manual:** Exploring Electrostatics What's My Charge?
H.P.2D.2 Use mathematical and computational thinking to predict the relationships among the masses of two objects, the attractive gravitational force between them, and the distance between them (Newton's Law of Universal Gravitation, $F=Gm_1m_2/r^2$).	**SE/TE:** 309-311 Lesson Check: 312 (#12-15) Assessment: 336, 337 (#66-73), 338-339 **TE Only:** Differentiated Instruction: 308
H.P.2D.3 Obtain information to communicate how long-term gravitational interactions govern the evolution and maintenance of large-scale structures in the universe (such as the solar system and galaxies) and the patterns of motion within them.	**SE/TE:** 312, 313-319, 325-326, 327-332 Lesson Check: 319 (#21-28), 332 **TE Only:** Science & Engineering Practices: 314, 330

South Carolina Physics 1 Course Standards	Pearson Physics ©2014
H.P.2D.4 Use mathematical and computational thinking to predict the relationships among the charges of two particles, the attractive or repulsive electrical force between them, and the distance between them (Coulomb's Law, $F=kq_1q_2/r^2$).	**SE/TE:** 683-688 Lesson Check: 689 Assessment: 699 (#56-66) Physics Lab: 696
H.P.2D.5 Construct explanations for how the non-contact forces of gravity, electricity, and magnetism can be modeled as fields by sketching field diagrams for two given charges, two massive objects, or a bar magnet and use these diagrams to qualitatively interpret the direction and magnitude of the force at a particular location in the field.	**SE/TE:** 312, 705-706, 714-716, 783-786, 788, 792-793 Lesson Check: 717 (#17), 795 (#18) Assessment: 738 (#65-67) Inquiry Labs: 705, 783 Physics Labs: 736, 808 **TE Only:** Using Prior Knowledge: 784
H.P.2D.6 Use a free-body diagram to represent the gravitational force on an object.	**SE/TE:** 158, 163, 164, 165 Lesson Check: 169 (#28) Assessment: 182 (#77a)
H.P.2D.7 Use a free-body diagram to represent the electrical force on a charge.	**SE/TE:** 684 (Figure 19.11), 690, 692, 706 (Figure 20.2), 708 (#Figure 20.3) Lesson Check: 689 (#16), 717 (#12)
H.P.2D.8 Develop and use models (such as computer simulations, drawings, or demonstrations) to explain the relationship between moving charged particles (current) and magnetic forces and fields.	**SE/TE:** 785-795, 799-801, 803-804 Lesson Check: 806 (#37) Assessment: 811 (#71, 74, 75) **Lab Manual:** Exploring Magnetism and Magnetic Fields
H.P.2D.9 Use Newton's Law of Universal Gravitation and Newton's second law of motion to explain why all objects near Earth's surface have the same acceleration.	**SE/TE:** 97-99, 163, 313-315 Lesson Check: 101 (#57) Assessment: 107 (#105), 110 (#133-134) **TE Only:** Science and Engineering Practices: 314
H.P.2D.10 Use mathematical and computational thinking to apply $F_{net} = ma$ to analyze problems involving non-contact interactions, including objects in free fall.	**SE/TE:** 152, 315, 317, 685, 687, 800-802 Assessment: 181 (#74), 184 (#105,106), 319 (#23-28), 699 (#64), 811 (#76), 812 (#81, 83, 84, 86, 87, 88) Lesson Check: 806 (#40, 42)

South Carolina Physics 1 Course Standards	**Pearson Physics ©2014**
INTERACTIONS AND ENERGY	
Standard H.P.3: The student will demonstrate an understanding of how the interactions among objects can be explained and predicted using the concept of the conservation of energy.	
H.P.3A. Conceptual Understanding: Work and energy are equivalent to each other. Work is defined as the product of displacement and the force causing that displacement; this results in the transfer of mechanical energy. Therefore, in the case of mechanical energy, energy is seen as the ability to do work. This is called the work-energy principle. The rate at which work is done (or energy is transformed) is called power. For machines that do useful work for humans, the ratio of useful power output is the efficiency of the machine. For all energies and in all instances, energy in a closed system remains constant.	
Performance Indicators: Students who demonstrate this understanding can:	
H.P.3A.1 Use mathematical and computational thinking to determine the work done by a constant force (W=Fd).	**SE/TE:** 189-191 Lesson Check: 191 (#2, 3) Assessment: 220 (#67-73)
H.P.3A.2 Use mathematical and computational thinking to analyze problems dealing with the work done on or by an object and its change in energy.	**SE/TE:** 199-201, 202-204, 205 Lesson Check: 206 (#28, 29, 34, 36) Assessment: 221 (#77, 78, 81, 92, 93), 222 (#94, 95), 224 (#132), 225 (#135)
H.P.3A.3 Obtain information to communicate how energy is conserved in elastic and inelastic collisions.	**SE/TE:** 248-249, 250-252, 254-255 Physics & You: 257 Lesson Check: 256 (#50, 51) Assessment: 262 (#98)
H.P.3A.4 Plan and conduct controlled scientific investigations to determine the power output of the human body.	**TE Only:** Science & Engineering Practices: 212 **Lab Manual:** Human Horsepower
H.P.3A.5 Obtain and communicate information to describe the efficiency of everyday machines (such as automobiles, hair dryers, refrigerators, and washing machines).	**SE/TE:** 390-392 Physics & You: 217

SE = Student Edition **TE = Teacher's Edition**

South Carolina Physics 1 Course Standards	**Pearson Physics ©2014**
H.P.3B. Conceptual Understanding: Mechanical energy refers to a combination of motion (kinetic energy) and stored energy (potential energy). When only conservative forces act on an object and when no mass is converted to energy, mechanical energy is conserved. Gravitational and electrical potential energy can be modeled as energy stored in the fields created by massive objects or charged particles.	
Performance Indicators: Students who demonstrate this understanding can:	
H.P.3B.1 Develop and use models (such as computer simulations, drawings, bar graphs, and diagrams) to exemplify the transformation of mechanical energy in simple systems and those with periodic motion and on which only conservative forces act.	**SE/TE:** 207-210, 453, 456-457, 462-463 Lesson Check: 211 (#41) **MasteringPhysics:** ActivPhysics: 5.4 Inverse Bungee Jumper, 5.5 Spring-Launched Bowler PhET Simulation: Energy Skate Park
H.P.3B.2 Use mathematical and computational thinking to argue the validity of the conservation of mechanical energy in simple systems and those with periodic motion and on which only conservative forces act ($KE = ½ mv^2$, $PE_g = mgh$, $PE_e = ½ kx^2$).	**SE/TE:** 197-201, 202-205, 206-211, 723-724 Assessment: 222 (#97-100) **Lab Manual:** Energy of a Pendulum
H.P.3B.3 Use drawings or diagrams to identify positions of relative high and low potential energy in a gravitational and electrical field (with the source of the field being positive as well as negative and the charge experiencing the field being positive as well as negative).	**SE/TE:** 202, 204, 207, 208-210, 718-719, 721-723, 725-727 Assessment: 221 (#83), 739 (#77), 740 (#86)
H.P.3C. Conceptual Understanding: When there is a temperature difference between two objects, an interaction occurs in the form of a transfer of thermal energy (heat) from the hotter object to the cooler object. Thermal energy is the total internal kinetic energy of the molecules and/or atoms of a system and is related to temperature, which is the average kinetic energy of the particles of a system. Energy always flows from hot to cold through the processes of conduction, convection, or radiation.	
Performance Indicators: Students who demonstrate this understanding can:	
H.P.3C.1 Plan and conduct controlled scientific investigations to determine the variables that affect the rate of heat transfer between two objects.	**SE/TE:** Physics Lab: 376 **TE Only:** Science & Engineering Practices: 354
H.P.3C.2 Analyze and interpret data to describe the thermal conductivity of different materials.	For supporting content, see **SE/TE:** 354-355, 357

South Carolina Physics 1 Course Standards	Pearson Physics ©2014
H.P.3C.3 Develop and use models (such as a drawing or a small-scale greenhouse) to exemplify the energy balance of the Earth (including conduction, convection, and radiation).	For supporting content, see **SE/TE:** 354-356
H.P.3D. Conceptual Understanding: Sound is a mechanical, longitudinal wave that is the result of vibrations (kinetic energy) that transfer energy through a medium.	
Performance Indicators: Students who demonstrate this understanding can:	
H.P.3D.1 Develop and use models (such as drawings) to exemplify the interaction of mechanical waves with different boundaries (sound wave interference) including the formation of standing waves and two-source interference patterns.	**SE/TE:** 474, 477-479, 498, 501-506 Lesson Check: 482 (#50, 51), 506 (#28) Physics Lab: 484 **TE Only:** Differentiated Instruction: 505 **Lab Manual:** Exploring Waves on a Coiled Spring
H.P.3D.2 Use the principle of superposition to explain everyday examples of resonance (including musical instruments and the human voice).	**SE/TE:** 468-469, 476, 518-519 Physics Lab: 521 **Lab Manual:** Exploring Sound and Sound Sources
H.P.3D.3 Develop and use models to explain what happens to the observed frequency of a sound wave when the relative positions of an observer and wave source changes (Doppler effect).	**SE/TE:** 507-509, 510-512 Assessment: 524 (#83-86) **Lab Manual:** Exploring Sound and Sound Sources
H.P.3D.4 Use mathematical and computational thinking to analyze problems that relate the frequency, period, amplitude, wavelength, velocity, and energy of sound waves.	**SE/TE:** 454-455, 473-474, 479-480, 494-496, 500, 503-504, 505-506, 513-516 Lesson Check: 475 (#42, 43, 44), 482 (#53), 501 (#13, 14, 17), 519 (#57-60) Physics Lab: 521 **TE Only:** Science & Engineering Practices: 515

South Carolina Physics 1 Course Standards	Pearson Physics ©2014
H.P.3E. Conceptual Understanding: During electric circuit interactions, electrical energy (energy stored in a battery or energy transmitted by a current) is transformed into other forms of energy and transferred to circuit devices and the surroundings. Charged particles and magnets create fields that store energy. Magnetic fields exert forces on moving charged particles. Changing magnetic fields cause electrons in wires to move, creating current.	
Performance Indicators: Students who demonstrate this understanding can:	
H.P.3E.1 Plan and conduct controlled scientific investigations to determine the relationship between the current and potential drop (voltage) across an Ohmic resistor. Analyze and interpret data to verify Ohm's law, including constructing an appropriate graph in order to draw a line-of-best-fit whose calculated slope will yield *R*, the resistance of the resistor.	**SE/TE:** 751 Physics Lab: 773 **TE Only:** Science & Engineering Practices: 752
H.P.3E.2 Develop and use models (such as circuit drawings and mathematical representations) to explain how an electric circuit works by tracing the path of the electrons and including concepts of energy transformation, transfer, and the conservation of energy and electric charge.	**SE/TE:** 757-764 **TE Only:** Science & Engineering Practices: 762
H.P.3E.3 Use mathematical and computational thinking to analyze problems dealing with current, electric potential, resistance, and electric charge.	**SE/TE:** 675-679, 718-723, 723-727, 745-747, 748-751 Lesson Check: 727 (#33-36) Assessment: 739 (#78-83), 740 (#84-89)
H.P.3E.4 Use mathematical and computational thinking to analyze problems dealing with the power output of electric devices.	**SE/TE:** 765-769 Lesson Check: 771 (#45, 46) Assessment: 777 (#96-105), 740 (#84-89)
H.P.3E.5 Plan and conduct controlled scientific investigations to determine how connecting resistors in series and in parallel affects the power (brightness) of light bulbs.	**SE/TE:** Conceptual: 769 **TE Only:** Science & Engineering Practices: 762 **Lab Manual:** Exploring Simple Electric Circuits

South Carolina Physics 1 Course Standards	Pearson Physics ©2014
H.P.3E.6 Obtain and communicate information about the relationship between magnetism and electric currents to explain the role of magnets and coils of wire in microphones, speakers, generators, and motors.	**SE/TE:** 789, 817-818, 823, 828-831 Lesson Check: 831 (#21) Physics & You: 841 **TE Only:** Science & Engineering Practices: 830 **Lab Manual:** Exploring Electromagnetic Induction
H.P.3E.7 Design a simple motor and construct an explanation of how this motor transforms electrical energy into mechanical energy and work.	**SE/TE:** Inquiry Lab: 817 Physics Lab: 842
H.P.3F. Conceptual Understanding: During radiant energy interactions, energy can be transferred over long distances without a medium. Radiation can be modeled as an electromagnetic wave or as a stream of discrete packets of energy (photons); all radiation travels at the same speed in a vacuum (speed of light). This electromagnetic radiation is a major source of energy for life on Earth.	
Performance Indicators: Students who demonstrate this understanding can:	
H.P.3F.1 Construct scientific arguments that support the wave model of light and the particle model of light.	**SE/TE:** 533, 534, 537, 857, 859-861, 866 Assessment: 557 (#43) Lesson Check: 863 (#19)
H.P.3F.2 Plan and conduct controlled scientific investigations to determine the interaction between the visible light portion of the electromagnetic spectrum and various objects (including mirrors, lenses, barriers with two slits, and diffraction gratings) and to construct explanations of the behavior of light (reflection, refraction, transmission, interference) in these instances using models (including ray diagrams).	**SE/TE:** Inquiry Labs: 565, 597, 637 Physics Labs: 588, 627, 666 **TE Only:** Science & Engineering Practices: 568, 604, 615, 651 Real World: 624, 662 **Lab Manual:** Reflection by Multiple Mirrors Exploring Refraction Converging Lens Measuring the Wavelength of Light with a Diffraction Grating
H.P.3F.3 Use drawings to exemplify the behavior of light passing from one transparent medium to another and construct explanations for this behavior.	**SE/TE:** 597-605 Lesson Check: 605 Assessment: 629 (#52)

South Carolina Physics 1 Course Standards	Pearson Physics ©2014
H.P.3F.4 Use mathematical and computational thinking to analyze problems that relate the frequency, period, amplitude, wavelength, velocity, and energy of light.	**SE/TE:** 536-538, 598, 651-652, 655-656, 662-663, 855-859 Lesson Check: 544 (#24, 25, 26), 661 (#42)
H.P.3F.5 Obtain information to communicate the similarities and differences among the different bands of the electromagnetic spectrum (including radio waves, microwaves, infrared, visible light, ultraviolet, and gamma rays) and give examples of devices or phenomena from each band.	**SE/TE:** 539-541 Lesson Check: 544 (#23) Assessment: 558-559 **Lab Manual:** Color and the Electromagnetic Spectrum
H.P.3F.6 Obtain information to construct explanations on how waves are used to produce, transmit, and capture signals and store and interpret information (including ultrasound imaging, telescopes, cell phones, and bar code scanners).	**SE/TE:** 498, 537, 539-541, 862-863 Physics & You: 587
H.P.3G. Conceptual Understanding: Nuclear energy is energy stored in an atom's nucleus; this energy holds the atom together and is called binding energy. Binding energy is a reflection of the equivalence of mass and energy; the mass of any nucleus is always less than the sum of the masses of the individual constituent nucleons that comprise it. Binding energy is also a measure of the strong nuclear force that exists in the nucleus and is responsible for overcoming the repulsive forces among protons. The strong and weak nuclear forces, gravity, and the electromagnetic force are the fundamental forces in nature. Strong and weak nuclear forces determine nuclear sizes, stability, and rates of radioactive decay. At the subatomic scale, the conservation of energy becomes the conservation of mass-energy.	
Performance Indicators: Students who demonstrate this understanding can:	
H.P.3G.1 Develop and use models to represent the basic structure of an atom (including protons, neutrons, electrons, and the nucleus).	**SE/TE:** 676-677, 883-887, 888 **TE Only:** Science & Engineering Practices: 885
H.P.3G.2 Develop and use models (such as drawings, diagrams, computer simulations, and demonstrations) to communicate the similarities and differences between fusion and fission. Give examples of fusion and fission reactions and include the concept of conservation of mass-energy.	**SE/TE:** 920, 925-930 **MasteringPhysics:** ActivPhysics: 19.2 Nuclear Binding Energy PhET Simulation: Nuclear Fission

South Carolina Physics 1 Course Standards	Pearson Physics ©2014
H.P.3G.3 Construct scientific arguments to support claims for or against the viability of fusion and fission as sources of usable energy.	For supporting content, please see **SE/TE:** 925-928, 929-930
H.P.3G.4 Use mathematical and computational thinking to predict the products of radioactive decay (including alpha, beta, and gamma decay).	**SE/TE:** 923-924, 930-934 Lesson Check: 935 (#36, 37, 38) Assessment: 944 (#65, 66), 945 (#67-72) Physics Lab: 942 **TE Only:** Differentiated Instruction: 931 Cross Cutting Concepts: 924 **MasteringPhysics:** ActivPhysics: 19.4 Radioactivity
H.P.3G.5 Obtain information to communicate how radioactive decay processes have practical applications (such as food preservation, cancer treatments, fossil and rock dating, and as radioisotopic medical tracers).	**SE/TE:** 932, 934-935 Assessment: 946 (#94-97)