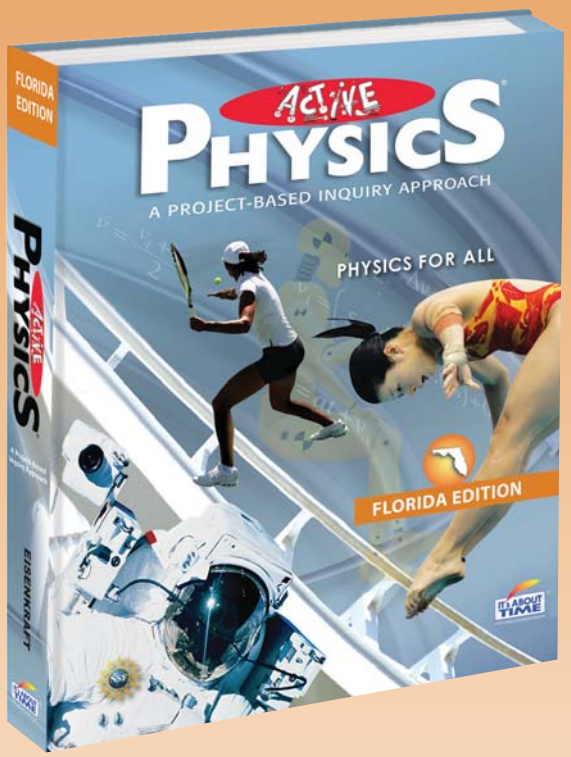
Florida Edition

Active Physics

CORRELATION
FLORIDA DEPARTMENT OF EDUCATION
INSTRUCTIONAL MATERIALS CORRELATION
COURSE STANDARDS



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Correlation of Florida Next Generation Sunshine State Standards to *Active Physics*

Florida Next Generation Sunshine State Standards Scheme and Descriptor	*Active Physics*
Standard 1: The Practice of Science	
A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.	
B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."	
C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.	
D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.	
SC.912.N.1.1 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. pose questions about the natural world, 2. conduct systematic observations, 3. examine books and other sources of information to see what is already known, 4. review what is known in light of empirical evidence, 5. plan investigations, 6. use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), 7. pose answers, explanations, or descriptions of events, 8. generate explanations that explicate or describe natural phenomena (inferences), 9. use appropriate evidence and reasoning to justify these explanations to others, 10. communicate results of scientific investigations, and 11. evaluate the merits of the explanations produced by others.	**1. pose questions about the natural world,** *Questions about the natural world are posed throughout the book. Examples include the following*: Chapter 1, Section 7, pp. 105-109 Chapter 2, Section 7, pp. 210-212 Chapter 3, Section 2, p. 267 Chapter 4, Section 4, pp. 383–384 Chapter 5, Section 5, pp. 530-533; Section 10, pp. 577-578 Chapter 6, Section 1, pp. 599-600 Chapter 7, Section 1, pp. 714-717 Chapter 8, Section 2, pp. 809-810; Section 3, pp. 818-819 **2. conduct systematic observations,** *All Investigates and many* Active Physics Plus *components include instructions for conducting systematic observations. Examples include the following*: Chapter 1, Section 1, pp. 9-11; Section 2, p. 23 Chapter 2, Section 1, pp. 133-141; Section 2, pp. 145-147; Section 4, pp. 174-176 Chapter 3, Section 6, pp. 311-312 Chapter 4, Section 2, pp. 361-363; Section 6, pp. 407-410; Section 8, pp. 437-438 Chapter 5, Section 2, pp. 493-498; Section 6, pp. 538-541; Section 7, pp. 549-551; Section 9, pp. 567-569 Chapter 6, Section 1, pp. 599-600; Section 4, pp. 623-624; Section 7, pp. 665-666 Chapter 7, Section 1, pp. 714-717; Section 2, pp. 726-727 Chapter 8, Section 1, pp. 793-794 **3. examine books and other sources of information to see what is already known,** *Other sources are examined throughout the book. Examples include the following*: Chapter 1, Section 2, p. 33 Chapter 2, Section 6, p. 204 Chapter 3, Section 1, p. 265; Section 3, p. 291; Section 4, p. 301 Chapter 4, Section 1, p. 351; Section 2, p. 371 Chapter 5, Section 4, p. 527; Section 9, p. 576 Chapter 6, Section 1, p. 605 Chapter 7, Section 2, p. 733 Chapter 8, Section 6, p. 861; Section 9, p. 891

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	4. review what is known in light of empirical evidence, *Reviews of empirical evidence gathered in investigations appear throughout the book in* Chapter Challenges *and* Mini-Challenges. *Examples include the following:* Chapter 1, pp. 120-121 Chapter 2, pp. 248-249 Chapter 3, pp. 336-337 Chapter 4, pp. 472-473 Chapter 5, pp. 586-587 Chapter 6, pp. 702-703 Chapter 7, pp. 780-781 Chapter 8, pp. 894-895 **5. plan investigations,** *Student-planned investigations appear throughout the book. Examples include the following*: Chapter 1, Section 5, pp. 75-77 Chapter 2, Section 7, p. 211; Section 8, p. 221 Chapter 4, Section 3, p. 373 Chapter 5, Section 1, p. 491 Chapter 6, Section 4, p. 624; Section 6, p. 661 Chapter 7, Section 2, p. 729; Section 5, pp. 757-758 **6. use tools to gather, analyze, and interpret data,** *Students use equipment to measure data and graphs to analyze it throughout the book. Examples include the following*: Chapter 1, Section 2, pp. 23-24; Section 5, p. 77 Chapter 2, Section 2, pp. 145-148; Section 9, p. 237 Chapter 4, Section 2, p. 363; Section 3, p. 374; Section 5, pp. 394-395; Section 8, p. 438 Chapter 5, Section 7, pp. 550-551 Chapter 6, Section 4, pp. 623-624 Chapter 8, Section 3, pp. 818-819; Section 9, pp. 884-886 **7. pose answers, explanations, or other descriptions of events,** *Students give detailed answers and descriptions of investigation results throughout the book. Examples include the following*: Chapter 1, Section 6, pp. 90-97 Chapter 2, Section 6, pp. 198-200 Chapter 3, Section 3, pp. 276-278 Chapter 4, Section 8, pp. 436-438 Chapter 5, Section 5, pp. 530-533 Chapter 6, Section 5, pp. 631-632 Chapter 7, Section 2, pp. 726-727; Section 4, pp. 747-748 Chapter 8, Section 5, pp. 841-846; Section 6, pp. 853-857 **8. generate explanations that explicate or describe natural** phenomena (inferences), *Examples appear throughout the text. Examples include the following*: Chapter 1, Section 5, p. 77 Chapter 2, Section 5, pp. 186-187; Section 6, pp. 198-200 Chapter 3, Section 4, p. 294 Chapter 4, Section 8, pp. 436-438 Chapter 5, Section 7, pp. 549-553; Section 9, pp. 567-572 Chapter 6, Section 2, pp. 607-609 Chapter 7, Section 3, pp. 735-736

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	9. use appropriate evidence and reasoning to justify these explanations to others, *Evidence and reasoning are used to justify results throughout the book. Examples include the following*: Chapter 1, Section 5, p. 77 Chapter 2, Section 5, pp. 186-187; Section 6, pp. 198-200 Chapter 3, Section 4, p. 294 Chapter 4, Section 8, pp. 436-438 Chapter 5, Section 7, pp. 549-553; Section 9, pp. 567-572 Chapter 6, Section 2, pp. 607-609 Chapter 7, Section 3, pp. 735-736 Chapter 8, Section 5, pp. 841-846; Section 6, pp. 853-857 **10. communicate results of scientific investigations,** *Students are asked to share their work with their groups or class throughout the book, including their* Mini-Challenges, Chapter Challenges*, and answers to* What Do You Think (Now)? *questions. Examples of the last include the following*: Chapter 1, Section 1, p. 11; Section 7, p. 112 Chapter 2, Section 4, p. 181 Chapter 3, Section 3, p. 288 Chapter 4, Section 6, p. 417 Chapter 5, Section 8, p. 563 Chapter 6, Section 4, p. 627 Chapter 7, Section 3, p. 742 Chapter 8, Section 7, p. 870; Section 8, p. 880 **11. evaluate the merits of the explanations produced by others,** *Explanations are presented as part of the learning process throughout the book; evaluating them is an integral part of each chapter's* Mini-Challenge*. Examples include the following*: Chapter 1, pp. 72-74 Chapter 2, pp. 196-197 Chapter 3, pp. 302-303 Chapter 4, pp. 404-405 Chapter 5, pp. 528-529 Chapter 6, pp. 662-663 Chapter 7, pp. 744-745 Chapter 8, pp. 838-839
SC.912.N.1.2 Describe and explain what characterizes science and its methods.	*Scientific methods are elucidated throughout the book, and each section of each chapters contains a highlighting in terms of the* Physics Essential Questions: 1. What does it mean? 2. How do you know? 3. Why do you believe? 4. Why should you care? *Examples include the following*: Nature of Science, pp. NS2, NS3, NS7 Chapter 1, Section 2, p. 31; Section 3, p. 48; Section 7, p. 113 Chapter 2, Section 2, p. 153; Section 5, p. 193 Chapter 3, Section 4, p. 298 Chapter 4, Section 3, p. 379; Section 5, p. 401 Chapter 5, Section 3, p. 516; Section 5, p. 536 Chapter 6, Section 7, p. 675 Chapter 7, Section 3, p. 742; Section 6, p. 774 Chapter 8, Section 1, p. 804; Section 6, p. 860

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SC.912.N.1.3 Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.	*Students are required to apply logic and critical thinking, evaluating the usefulness of argumentation in scientific inquiry throughout the book. Examples include the following*: Nature of Science pp. NS2, NS7 Chapter 1, Section 5, p. 77 Chapter 2, Section 5, pp. 186-187; Section 6, pp. 198-200 Chapter 3, Section 4, p. 294 Chapter 4, Section 8, pp. 436-438 Chapter 5, Section 7, pp. 549-553; Section 9, pp. 567-572 Chapter 6, Section 2, pp. 607-609 Chapter 7, Section 3, pp. 735-736 Chapter 8, Section 5, pp. 841-846; Section 6, pp. 853-857
SC.912.N.1.4 Identify sources of information and assess their reliability according to the strict standards of scientific investigation.	*Throughout the book, students are asked to seek various external information sources, such as online educational sites and government sites, to complete their work, ascertaining their reliability. Examples include the following*: Nature of Science pp. NS2, NS3, NS5, NS7 Chapter 2, Section 3, p. 173 Chapter 3, Section 3, p. 291 Chapter 4, Section 6, p. 419 Chapter 5, Section 9, p. 576 Chapter 7, Section 6, p. 777
SC.912.N.1.5 Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.	Nature of Science p. NS2 Chapter 4, Section 4, p. 383 Chapter 8, Section 4, p. 834; Section 5, pp. 848-849
SC.912.N.1.6 Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.	*Scientific inference is a key component of* Active Physics*, and students are required to observe and report their findings throughout the book. Examples include the following*: Nature of Science pp. NS2, NS3, NS4, NS5, NS7 Chapter 1, Section 1, p. 13; Section 5, p. 77 Chapter 2, Section 5, pp. 186-187; Section 6, pp. 198-200 Chapter 3, Section 4, p. 294 Chapter 4, Section 8, pp. 436-438 Chapter 5, Section 7, pp. 549-553; Section 9, pp. 567-572 Chapter 6, Section 2, pp. 607-609 Chapter 7, Section 3, pp. 735-736 Chapter 8, Section 5, pp. 841-846; Section 6, pp. 853-857
SC.912.N.1.7 Recognize the role of creativity in constructing scientific questions, methods and explanations.	Active Physics *emphasizes the role creativity plays in scientific discovery, and each* Chapter Challenge *contains a creative component as well as a written component to provide students an opportunity to create unique solutions to presented problems. Students must then clearly communicate their results. Examples include the following*: Nature of Science pp. NS1, NS2, NS8 Chapter 1, Section 4, p. 58; *Chapter Challenge* pp.120-121 Chapter 2, *Chapter Challenge* pp. 248-249 Chapter 3, *Chapter Challenge* pp. 336-337 Chapter 4, *Chapter Challenge* pp. 472-473 Chapter 5, *Chapter Challenge* pp. 586-587 Chapter 6, *Chapter Challenge* pp. 702-703 Chapter 7, Section 1, p. 718; Section 4, pp. 750-751; *Chapter Challenge* pp. 780-781 Chapter 8, *Chapter Challenge* pp. 894-895

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Standard 2: The Characteristics of Scientific Knowledge	
A: Scientific knowledge is based on empirical evidence, and is appropriate for understanding the natural world, but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing, such as art, philosophy, or religion.	
B: Scientific knowledge is durable and robust, but open to change.	
C: Because science is based on empirical evidence it strives for objectivity, but as it is a human endeavor the processes, methods, and knowledge of science include subjectivity, as well as creativity and discovery.	
SC.912.N.2.1 Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).	Nature of Science pp. NS2, NS4, NS6 Chapter 2, Extending the Connection, pp. 250A-250B
SC.912.N.2.2 Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.	Nature of Science p. NS6 Chapter 1, Section 6, p. 98 Chapter 5, Physics At Work, p. 589
SC.912.N.2.3 Identify examples of pseudoscience (such as astrology, phrenology) in society.	Nature of Science p. NS6 Chapter 2, Extending the Connection, pp. 250A-250B Chapter 7, Section 1, p. 720
SC.912.N.2.4 Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.	*The durability of scientific knowledge is indicated throughout the book, for example, when detailing historical discoveries and their present-day applications or making comparisons between real-world events and equivalent behavior in models. Examples include the following*: Nature of Science pp. NS2, NS5, NS7 Chapter 1, Section 6, pp. 98-100 Chapter 2, Section 1, pp. 134-138; Section 3, pp. 160-167 Chapter 3, Section 2, pp. 268-271 Chapter 4, Section 3, pp. 374-377; Section 4, pp. 385-389; Section 5, pp. 396-399; Section 6, pp. 415-416 Chapter 5, Section 2, pp. 492-498 Chapter 6, Section 4, pp. 625-626; Section 5, pp. 633-637 Chapter 7, Section 2, pp. 727-729 Chapter 8, Section 5, pp. 846-849
SC.912.N.2.5 Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.	Nature of Science pp. NS2, NS7 Chapter 8, Section 2, p. 810; Section 3, pp. 820-822; Section 6, p. 858

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Standard 3: The Role of Theories, Laws, Hypotheses, and Models	
The terms that describe examples of scientific knowledge, for example: "theory," "law," "hypothesis" and "model" have very specific meanings and functions within science.	
SC.912.N.3.1 Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.	Nature of Science pp. NS2, NS3, NS4, NS5, NS6, NS7 Chapter 4, Section 4, pp. 388-389 Chapter 7, Section 6, pp. 770-771 Chapter 8, Section 4, p. 833
SC.912.N.3.2 Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.	Nature of Science pp. NS3, NS5 Chapter 8, Section 5, p. 849; Section 6, p. 858
SC.912.N.3.3 Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.	Nature of Science pp. NS3, NS4, NS5 Chapter 2, Section 6, pp. 201-205 Chapter 4, Section 6, pp. 415-416 Chapter 8, Section 1, pp. 799-801; Section 4, p. 835
SC.912.N.3.4 Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.	Nature of Science pp. NS3, NS4, NS5, NS6, NS7 Chapter 2, Extending the Connection, pp. 250A-250B Chapter 8, Section 4, p. 833
SC.912.N.3.5 Describe the function of models in science, and identify the wide range of models used in science.	Nature of Science p. NS5 Chapter 1, Section 6, pp. 90-100 Chapter 2, Section 5, pp. 186-187 Chapter 8, Section 2, pp. 810-812; Section 3, pp. 821–823; Section 4, pp. 831–833; Section 5, pp. 846-849; Section 6, p. 858; Section 7, p. 866
Standard 4: Science and Society	
As tomorrow's citizens, students should be able to identify issues about which society could provide input, formulate scientifically investigable questions about those issues, construct investigations of their questions, collect and evaluate data from their investigations, and develop scientific recommendations based upon their findings.	
SC.912.N.4.1 Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.	Nature of Science pp. NS2, NS7, NS8 Chapter 6, Section 8, pp. 686-690; Section 9, p. 699 Chapter 7, Section 5, pp. 761-762
SC.912.N.4.2 Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.	Nature of Science pp. NS7, NS8 Chapter 6, Section 8, p. 690; Section 9, pp. 691-694, 699 Chapter 7, Section 5, p. 762

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Standard 5: Earth in Space and Time	
The origin and eventual fate of the Universe still remains one of the greatest questions in science. Gravity and energy influence the development and life cycles of galaxies, including our own Milky Way galaxy, stars, the planetary systems, Earth, and residual material left from the formation of the solar system. Humankind's need to explore continues to lead to the development of knowledge and understanding of the nature of the Universe.	
SC.912.E.5.1 Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the Universe.	Chapter 1, Extending the Connection, pp. 122A-122B
SC.912.E.5.6 Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.	Chapter 4, Section 4, pp. 388-389
Standard 8: Properties of Matter	
A: A working definition of matter is that it takes up space, has mass, and has measurable properties. Matter is comprised of atomic, subatomic, and elementary particles.	
B: Electrons are key to defining chemical and some physical properties, reactivity, and molecular structures. Repeating (periodic) patterns of physical and chemical properties occur among elements that define groups of elements with similar properties. The periodic table displays the repeating patterns, which are related to the atom's outermost electrons. Atoms bond with each other to form compounds.	
C: In a chemical reaction, one or more reactants are transformed into one or more new products. Many factors shape the nature of products and the rates of reaction.	
D: Carbon-based compounds are building-blocks of known life forms on earth and numerous useful natural and synthetic products.	
SC.912.P.8.1 Differentiate among the four states of matter.	Chapter 8, Extending the Connection, pp. 896A-896B
SC.912.P.8.3 Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.	Chapter 8, Section 2, pp. 810-812; Section 3, pp. 821–823; Section 4, pp. 831–833; Section 5, p. 845; Section 6, p. 858
SC.912.P.8.4 Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.	Chapter 8, Section 2, pp. 810-812; Section 3, pp. 821–823; Section 4, pp. 831–833; Section 5, p. 845; Section 6, p. 858

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Standard 10: Forms of Energy	
A: Energy is involved in all physical and chemical processes. It is conserved, and can be transformed from one form to another and into work. At the atomic and nuclear levels energy is not continuous but exists in discrete amounts. Energy and mass are related through Einstein's equation $E = mc^2$.	
B: The properties of atomic nuclei are responsible for energy-related phenomena such as radioactivity, fission and fusion.	
C: Changes in entropy and energy that accompany chemical reactions influence reaction paths. Chemical reactions result in the release or absorption of energy.	
D: The theory of electromagnetism explains that electricity and magnetism are closely related. Electric charges are the source of electric fields. Moving charges generate magnetic fields.	
E: Waves are the propagation of a disturbance. They transport energy and momentum but do not transport matter.	
SC.912.P.10.1 Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.	Chapter 2, Section 8, pp. 222-233; Section 9, pp. 234-245; Extending the Connection, pp. 250A-250B Chapter 3, Section 3, pp. 277-287, 289-291; Section 7, pp. 324,328; Extending the Connection, pp. 338A-338B Chapter 4, Section 2, pp. 363-368, 370-371; Section 3, pp. 372-381; Section 8, pp. 439-441, 444, 446-447; Section 9, pp. 448-449, 451-453, 456-457; Section 10, pp. 465-468; Extending the Connection, pp. 474A-474B Chapter 6, Section 1, pp. 600-601; Section 8, pp. 679-684 Chapter 8, Section 2, p. 811; Section 8, pp. 874-882; Section 9, pp. 883-891
SC.912.P.10.2 Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.	Chapter 2, Section 8, pp. 222–224; Section 9, pp. 234-241 Chapter 4, Section 2, pp. 363-368, 370-371; Section 3, pp. 372-381; Section 9, pp. 448-449, 451-453, 456-457; Section 10, pp. 465, 468 Chapter 6, Section 7, pp. 666-674; Section 8, pp. 679-684
SC.912.P.10.3 Compare and contrast work and power qualitatively and quantitatively.	Chapter 4, Section 8, pp. 441-442 Chapter 6, Section 8, pp. 680, 686-689; Section 9, pp. 692-694
SC.912.P.10.4 Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.	Chapter 6, Section 9, pp. 694-695; Extending the Connection, pp. 704A-704B
SC.912.P.10.5 Relate temperature to the average molecular kinetic energy.	Chapter 4, Extending the Connection, pp. 474A-474B Chapter 6, Section 7, p. 669
SC.912.P.10.9 Describe the quantization of energy at the atomic level.	Chapter 8, Section 4, pp. 828-837; Section 5, pp. 843-844, 846-848
SC.912.P.10.10 Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).	Chapter 8, Section 6, pp. 853-861; Section 7, pp. 867-868

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SC.912.P.10.13 Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.	Chapter 7, Section 3, p. 741 Chapter 8, Section 1, pp. 792-807; Section 2, pp. 810-812
SC.912.P.10.14 Differentiate among conductors, semiconductors, and insulators.	Chapter 6, Section 5, p. 635
SC.912.P.10.15 Investigate and explain the relationships among current, voltage, resistance, and power.	Chapter 6, Section 2, pp. 606-613; Section 3, pp. 615-622; Section 4, pp. 623-630; Section 5, pp. 631-643; Section 6, pp. 644-656; Section 8, pp. 681-682 656; Section 8, pp. 681-682
SC.912.P.10.18 Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.	Chapter 7, Section 6, pp. 768-773, 775-776; Extending the Connection, pp. 782A-782B Chapter 8, Section 4, pp. 827-837
SC.912.P.10.20 Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.	Chapter 5, Section 2, pp. 492-507; Section 3, pp. 508-517; Section 4, pp. 518-527; Section 6, p. 543; Section 8, pp. 558-566; Extending the Connection, pp. 588A-588B Chapter 8, Section 5, pp. 840-843, 845-851
SC.912.P.10.21 Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.	Chapter 1, Section 3, pp. 44-46; Extending the Connection, pp. 122A-122B
SC.912.P.10.22 Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.	Chapter 5, Section 5, pp. 530-537; Section 6, pp. 538-547; Section 7, pp. 548-557; Section 8, pp. 558-566; Section 9, pp. 567-576; Section 10, pp. 577-578
Standard 12: Motion of Objects	
A: Motion can be measured and described qualitatively and quantitatively. Net forces create a change in motion. When objects travel at speeds comparable to the speed of light, Einstein's special theory of relativity applies.	
B: Momentum is conserved under well-defined conditions. A change in momentum occurs when a net force is applied to an object over a time interval.	
C: The law of Universal Gravitation states that gravitational forces act on all objects irrespective of their size and position.	
D: Gases consist of great numbers of molecules moving in all directions. The behavior of gases can be modeled by the kinetic molecular theory.	
E: Chemical reaction rates change with conditions under which they occur. Chemical equilibrium is a dynamic state in which forward and reverse processes occur at the same rates.	

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SC.912.P.12.1 Distinguish between scalar and vector quantities and assess which should be used to describe an event.	Chapter 1, Section 4, p. 59; Section 5, pp. 78-80 Chapter 2, Section 4, pp. 175-183; Section 5, pp. 184-195 Chapter 4, Section 1, p. 355; Section 8, p. 443; Section 9, pp. 450-454
SC.912.P.12.2 Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.	Chapter 1, Section 1, pp. 15, 19-20; Section 2, p. 24; Section 3, pp. 34-43, 47, 49-51; Section 4, pp. 52-66, 68-71; Section 5, pp. 75-89; Section 6, pp. 90-104; Extending the Connection, pp. 122A-122B Chapter 2, Section 2, pp. 145-156; Section 4, pp. 175-183; Section 5, pp. 185-189; Extending the Connection pp. 250A-250B Chapter 4, Section 1, pp. 351-356, 358-359; Section 2, pp. 361-363
SC.912.P.12.3 Interpret and apply Newton's three laws of motion.	Chapter 1, Section 7, pp. 105-115; Extending the Connection, pp. 122A-122B Chapter 2, Section 1, pp. 134-136; Section 3, pp. 157-173; Section 6, pp. 198-209; Section 7, pp. 212-213 Chapter 3, Section 2, pp. 269-270, 274-275; Section 4, pp. 294-297; Section 7, pp. 324-333 Chapter 4, Section 5, pp. 392-400; Section 6, pp. 406-415, 418-419; Section 7, pp. 420-435; Section 10, pp. 459-469
SC.912.P.12.4 Describe how the gravitational force between two objects depends on their masses and the distance between them.	Chapter 4, Section 4, pp. 382-387, 390-391 Chapter 8, Section 1, pp. 799-800
SC.912.P.12.5 Apply the law of conservation of linear momentum to interactions, such as collisions between objects.	Chapter 3, Section 5, pp. 304-309; Section 6, pp. 310-319; Extending the Connection, pp. 338A-338B
SC.912.P.12.7 Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.	Chapter 2, Section 1, p. 138 Chapter 5, Section 8, p. 562 Chapter 7, Sections 6, p. 771
SC.912.P.12.8 Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light.	Chapter 2, Section 1, p. 138 Chapter 4, Section 6, pp. 415-416
SC.912.P.12.9 Recognize that time, length, and energy depend on the frame of reference.	Chapter 2, Section 1, pp. 137-140, 143-144
SC.912.P.12.10 Interpret the behavior of ideal gases in terms of kinetic molecular theory.	Chapter 3, Extending the Connection, pp. 338A-338B
SC.912.P.12.11 Describe phase transitions in terms of kinetic molecular theory.	Chapter 8, Extending the Connection, pp. 896A-896B

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Standard 17: Interdependence	
A: The distribution and abundance of organisms is determined by the interactions between organisms, and between organisms and the non-living environment.	
B: Energy and nutrients move within and between biotic and abiotic components of ecosystems via physical, chemical and biological processes.	
C: Human activities and natural events can have profound effects on populations, biodiversity and ecosystem processes.	
SC.912.L.17.11 Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.	Chapter 6, Section 7 - 9, pp. 664-699
SC.912.L.17.15 Discuss the effects of technology on environmental quality.	Chapter 4, Extending the Connection, pp. 474A-474B
Standard 18: Matter and Energy Transformations	
A: All living things are composed of four basic categories of macromolecules and share the same basic needs for life.	
B: Living organisms acquire the energy they need for life processes through various metabolic pathways (primarily photosynthesis and cellular respiration).	
C: Chemical reactions in living things follow basic rules of chemistry and are usually regulated by enzymes.	
D: The unique chemical properties of carbon and water make life on Earth possible.	
SC.912.L.18.12 Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.	Chapter 6, Extending the Connection, pp. 704A-704B
Standard 2: Nonfiction	
LA.910.2.2.3 The student will organize information to show understanding or relationships among facts, ideas, and events (e.g., representing key points within text through charting, mapping, paraphrasing, summarizing, comparing, contrasting, or outlining);	*Students are required to organize information and give proof of understanding relationships among facts, ideas, and events throughout the book. Examples include the following:* Chapter 1, Section 1, pp. 11, 20; Section 2, pp. 23-24; Section 5, p. 77 Chapter 2, Section 2, pp. 145-148; Section 9, p. 237 Chapter 3, Section 2, p. 267; Section 3, p. 278; Section 4, p. 294 Chapter 4, Section 1, p. 349; Section 2, pp. 362-363; Section 3, p. 374; Section 5, pp. 394-395; Section 8, p. 438; Section 9, pp. 448-449 Chapter 5, Section 3, p. 510; Section 4, p. 519; Section 7, pp. 550-551 Chapter 6, Section 4, pp. 623-624; Section 9, p. 692 Chapter 7, Section 1, pp. 715-716 Chapter 8, Section 3, pp. 818-819; Section 9, pp. 884-886

Florida Next Generation Sunshine State Standards Scheme and Descriptor	*Active Physics*
Standard 2: Informative	
LA.910.4.2.2 The student will record information and ideas from primary and/or secondary sources accurately and coherently, noting the validity and reliability of these sources and attributing sources of information	*Primary and secondary sources are used throughout the book. Examples include the following*: Chapter 1, Section 2, p. 33 Chapter 2, Section 6, p. 204 Chapter 3, Section 1, p. 265; Section 3, p. 291; Section 4, p. 301 Chapter 4, Section 1, p. 351; Section 2, p. 371 Chapter 5, Section 4, p. 527; Section 9, p. 576 Chapter 6, Section 1, p. 605 Chapter 7, Section 2, p. 733 Chapter 8, Section 6, p. 861; Section 9, p. 891
Standard 1: Formulating Questions	
MA.912.S.1.2 Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment.	*Appropriate and consistent measurements of data are collected throughout the book. Examples include the following*: Chapter 1, Section 2, pp. 22–27 Chapter 2, Section 2, pp. 145–147, 151 Chapter 3, Section 3, pp. 278, 285-286 Chapter 4, Section 6, pp. 407-409; Section 8, pp. 437-438 Chapter 5, Section 1, pp. 485-486; Section 3, pp. 509-510; Section 6, pp. 539-541 Chapter 6, Section 8, p. 679 Chapter 7, Section 2, pp. 726-727 Chapter 8, Section 2, p. 809; Section 3, pp. 818-819; Section 8, pp. 876-877
Standard 3: Summarizing Data	
MA.912.S.3.2 Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries from the following: • bar graphs • line graphs • stem and leaf plots • circle graphs • histograms • box and whisker plots • scatter plots • cumulative frequency (ogive) graphs	*Examples of visual summaries of data sets appear throughout the book. Examples include the following*: Chapter 1, Section 2, pp. 23-24; Section 5, p. 77 Chapter 2, Section 2, pp. 145-148; Section 9, p. 237 Chapter 4, Section 2, p. 363; Section 3, p. 374; Section 5, pp. 394-395; Section 8, p. 438 Chapter 5, Section 7, pp. 550-551 Chapter 6, Section 4, pp. 623-624 Chapter 8, Section 3, pp. 818-819; Section 9, pp. 884-886

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