Correlation for
Texas TEKS for Principle of Technology (130.404) with
Physics in Context.

Section a. ***General Requirements***: This course is recommended for students in Grades 10-12. Prerequisites: one credit of high school science and Algebra 1. Students must meet the 40% laboratory and fieldwork requirement. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.

Section b. Introduction

1. Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.	Embedded Throughout the course materials and exercises.
2. The Science, Technology, Engineering, and Mathematics (STEM) Career Cluster focuses on planning, managing, and providing scientific research and professional and technical services, including laboratory and testing services, and research and development services.	Embedded Throughout the course materials and exercises.
3. In Principles of Technology, students will conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Various systems will be described in terms of space, time, energy, and matter. Students will study a variety of topics that include laws of motion, conservation of energy, momentum, electricity, magnetism, thermodynamics, and characteristics and behavior of waves. Students will apply physics concepts and perform laboratory experimentation for at least 40% of instructional time using safe practices.	Embedded Throughout the course materials and exercises.

4. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.	Embedded Throughout the course materials and exercises.
5. Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation are experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.	Embedded Throughout the course materials and exercises.
6. Scientific decision making is a way of answering questions about the natural world. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).	Embedded Throughout the course materials and exercises.
7. A system is a collection of cycles, structures, and processes that interact. All systems have basic properties that can be described in terms of space, time energy, and matter. Change and constancy occur in systems as patterns and can be observed measured, and modeled. These patterns help to make predictions that can be scientifically tested. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.	Embedded Throughout the course materials and exercises.
8. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	Embedded Throughout the course materials and exercises.

9. Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	Embedded Throughout the course materials and exercises.

Section c: Knowledge and Skills:

1. **The Student demonstrates professional standards/employability skills as required by business and industry.** ***The student is expected to:***	
A. Demonstrate knowledge of how to dress appropriately, speak politely and conduct oneself in a manner appropriate for the profession.	
B. Show the ability to cooperate, contribute, and collaborate as a member of a group in an effort to achieve a positive collective outcome.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
C. Present written and oral communications in a clear, concise, and effective manner.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
D. Demonstrate time-management skills in prioritizing tasks, following schedules, and performing goal-relevant activities in a way that produces efficient results.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
E. Demonstrate punctuality, dependability, reliability and responsibility in performing assigned tasks as directed.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
2. **The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate and ethical practices.** ***The student is expected to:***	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com

A. Demonstrate safe practices during laboratory and field investigations.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
B. Demonstrate an understanding of the use and conservation of resources and the proper disposal of recycling of materials.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
3. **The Student uses scientific methods and equipment during laboratory and field investigations.** ***The student is expected to:***	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
A. Know the definition of science and understand that it has limitations, as specified in subsection (b) (4) of this section.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
B. Know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power, which have been tested over a wide variety of conditions, are incorporated into theories.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
C. Know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but may be subjected to change as new areas of science and new technologies are developed.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
D. Distinguish between scientific hypotheses and scientific theories.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site:
E. Design and implement investigative procedures, including making observations, asking well-defined questions, formulating testable hypotheses, identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com

F. Collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as multimeters (current, voltage, resistance), triple beam balances, batteries, clamps, dynamic demonstration equipment, collision apparatus, data acquisition probes, discharge tubes with power supply (H, He, Ne, Ar.), hand-held visual spectroscopes, hot plates, slotted and hooked lab masses, bar magnets, horseshoe magnets, plane mirrors, convex lenses, pendulum support, power supply, ring clamps, ring stands, stopwatches, trajectory apparatus, tuning forks, carbon paper, graph paper, magnetic compasses, polarized film, prisms, protractors, resistors, friction blocks, mini lamps (bulbs) and sockets, electrostatics kits, 90 degree rod clamps, metric rulers, spring scales, knife blade switches, Celsius thermometers, meter sticks, scientific calculators, graphing technology, computers, cathode ray tubes with horseshoe magnetics, ballistic carts or equivalent, resonance tubes, spools of nylon thread or string, containers of iron filings, rolls of white craft paper, copper wire, Periodic Table, electromagnetic spectrum charts, slinky springs, wave motion ropes, and laser pointers.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
G. Use a wide variety of additional course equipment as appropriate such as ripple tank with wave generator, wave motion rope, micrometer, caliper, radiation monitor, computer ballistic pendulum, electroscope, inclined plane, optics bench, optics kit, pulley with table clamp, resonance tube, ring stand screen, four-inch ring, stroboscope, graduated cylinders, and ticker timer.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
H. Make measurements and record data with accuracy and precision using scientific notation and International System (SI) units.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
I. Identify and quantify causes and effects of uncertainties in measured data.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com

J. Organize, evaluate, and make inferences form data, including the use of tables, charts, and graphs.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
K. Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
L. Express and manipulate relationships among physical variables quantitatively, including the use of graphs, charts, and equations.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com

4. **The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom.** ***The student is expected to:***	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
A. In all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
B. Communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
C. Draw inferences based on data related to promotional materials for products and services.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
D. Explain the impacts of the scientific contributions of a variety of historical and contemporary scientists on scientific thought and society.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com

E. Research and describe the connections between physics and future careers.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
F. Express and interpret relationships symbolically to make predictions and solve problems mathematically, including problems requiring proportional reasoning and graphical vector addition.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com

5. **The student uses scientific process to investigate physical concepts.** ***The student is expected to:***	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
A. Demonstrate an understanding that scientific hypotheses are tentative and testable statements that must be capable of being supported by observational evidence.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
B. Demonstrate an understanding that scientific theories are based on physical phenomena and are capable of being tested by multiple independent researches.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
C. Design and implement investigative procedures.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
D. Demonstrate the appropriate use and care of laboratory equipment.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
E. Demonstrate accurate measurement techniques using precision instruments.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
F. Record data using scientific notation and International Systems (SI) units.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com

G. Identify and quantify causes and effects of uncertainties in measured data.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
H. Organize and evaluate data, including the use of tables, charts, and data.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
I. Communicate conclusions supported through various methods such as laboratory reports, labeled drawings, graphic organizers, journals, summaries, oral reports, or technology based reports.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
J. Record, express, and manipulate data using graphs, charts, and equations.	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com

6. **The student demonstrates appropriate safety techniques in the field and laboratory environment.** ***The student is expected to:***	Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
A. Master relevant safety procedures;	Lab Manual SF-1, section 4 Safety and; Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
B. Comply with safety guidelines as described in various manuals, instructions, and regulations.	Lab Manual SF-1, section 4 Safety, section 5 electrical hazards, section 6 mechanical hazards, section 7 laboratory hazards, and; Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
C. Identify and classify hazardous materials and waste.	Lab Manual SF-1, section 8 Safety Data Sheets and; Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com

D. Make prudent choices in the conservation and use of resources and the appropriate disposal of hazardous materials and waste.	Lab Manual SF-1, section 8 Safety Data Sheet and; Embedded in appropriate sections of student text, teachers guide, Lab Manual, Assessment CD & text web-site: www.learningincontext.com
7. **The student describes and applies the laws governing motion in a variety of situations.** ***The student is expected to:***	Student Text sections 1.1 Force in Mechanical Systems, 4.1 Resistance in Mechanical Systems, 7.1 Momentum Lab Manual Exp. 1-1A Mechanical Forces and Spring Constants, Exp. 4.1 Determining Kinetic Coefficient of Friction in Mechanical Systems and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
A. Generate and interpret relevant equations using graphs and charts for one and two dimensional motion, including: (i). Using and describing, one-dimensional equations for displacement, distance, speed, velocity, average velocity, acceleration and average acceleration; (ii). Using and describing two-dimensional equations for projectile and circular motion; (iii). Using and describing vector forces and resolution;	Student Text sections 1.1 Force in Mechanical Systems, 4.1 Resistance in Mechanical Systems, 7.1 Momentum Lab Manual Exp. 1-1A Mechanical Forces and Spring Constants, Exp. 4.1 Determining Kinetic Coefficient of Friction in Mechanical Systems and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
B. Describe and calculate the effects of forces on objects, including law of inertia and impulse and conservation of momentum:	Student Text sections 1.1 Force in Mechanical Systems, 4.1 Resistance in Mechanical Systems, 7.1 Momentum Lab Manual Exp. 1-1A Mechanical Forces and Spring Constants, Exp. 4.1 Determining Kinetic Coefficient of Friction in Mechanical Systems and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com

C. Develop and interpret free-body force diagrams:	Student Text sections 1.1 Force in Mechanical Systems, 4.1 Resistance in Mechanical Systems, 7.1 Momentum Lab Manual Exp. 1-1A Mechanical Forces and Spring Constants, Exp. 4.1 Determining Kinetic Coefficient of Friction in Mechanical Systems and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
D. Identify and describe motion relative to different frames of reference:	Student Text sections 1.1 Force in Mechanical Systems, 4.1 Resistance in Mechanical Systems, 7.1 Momentum Lab Manual Exp. 1-1A Mechanical Forces and Spring Constants, Exp. 4.1 Determining Kinetic Coefficient of Friction in Mechanical Systems and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
8. **The student describes the nature of forces in the physical world.** ***The student is expected to:***	Student Text sections1 1.1 Forces in Mechanical Systems, 1.2 Pressure in Fluid Systems, 1.3 Voltage in Electrical Systems, 1.4 Temperature in Thermal Systems, 5.3 Energy in Electrical Systems Lab Manual Exp. 1-1A Mechanical Forces and Spring Constants, 1.3A Voltage and Measuring Voltage, 5.3A Energy Stored in the Magnetic Field of an Inductor and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com

A. Research and describe the historical development of the concepts of gravitational, Electromagnetic, weak nuclear, and strong nuclear forces.	Student Text sections1 1.1 Forces in Mechanical Systems, 1.2 Pressure in Fluid Systems, 1.3 Voltage in Electrical Systems, 1.4 Temperature in Thermal Systems, 5.3 Energy in Electrical Systems Lab Manual Exp. 1-1A Mechanical Forces and Spring Constants, 1.3A Voltage and Measuring Voltage, 5.3A Energy Stored in the Magnetic Field of an Inductor and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
B. Describe and calculate the magnitude of gravitational forces between two objects.	Student Text Section 1.3 Voltage in Electrical Systems and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
C. Describe and calculate the magnitude of electrical forces.	Student Text Section 1.3 Voltage in Electrical Systems Lab Manual Exp. 1.3A Voltage and Measuring Voltage and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
D. Describe and identify everyday examples of magnetic forces and fields.	Student Text Section 5.3 Energy in Electrical Systems Lab Manual Exp. 5.3A Energy Stored in the Magnetic Field of an Inductor and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
E. Describe the nature and identify everyday examples of electromagnetic forces and fields.	Student Text Section 5.3 Energy in Electrical Systems Lab Manual Exp. 5.3A Energy Stored in the Magnetic Field of an Inductor and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com

F. Characterize materials as conductors or insulators based on their electrical properties.	Student Text Section 4.3 Resistance in Electrical Systems and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
G. Design and construct both series and parallel circuits and calculate current, potential difference, resistance, and power of various circuits.	Student Text Sections 1.3 Voltage in Electrical Systems, 4.3 Resistance in Electrical Systems, 6.3 Power in Electrical Systems Lab Manual Exp. 6.3A Measuring Power in Electric Motors and Generators and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
H. Investigate and describe the relationship between electric and magnetic fields in applications such as generators, motors, and transformers.	Student Text Section 5.3 Energy in Electrical Systems, 6.3 Power in Electrical Systems Lab Manual Exp. 6.3A Measuring Power in Electric Motors and Generators and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
I. Describe technological applications of the strong and weak nuclear forces in nature.	Student Text Section 9.2 Nuclear Radiation Lab Manual Exp. 9.2A Nuclear Radiation and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
9. The student describes and applies the laws of the conservation of energy and momentum. The student is expected to:	Student Text Sections 5 Energy, 5.1 & 5.2 Energy in Mechanical and Fluid Systems, 5.3 Energy in Electrical Systems, 5.4 Energy in Thermal Systems Lab Manual Exp. 5.1A Using Energy in Compressed Air to Operate Air Motors, 5.2A Measuring Energy Stored in a Compressed Spring, 5.3A Energy Stored in the Magnetic Field of an Inductor and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com

A. Describe the transformational process between work, potential energy, and kinetic energy (work-energy theorem).	Student Text Sections 5 Energy, 5.1 & 5.2 Energy in Mechanical and Fluid Systems, 5.3 Energy in Electrical Systems, 5.4 Energy in Thermal Systems Lab Manual Exp. 5.1A Using Energy in Compressed Air to Operate Air Motors, 5.2A Measuring Energy Stored in a Compressed Spring, 5.3A Energy Stored in the Magnetic Field of an Inductor and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
B. Use examples to analyze and calculate the relationships among work, kinetic energy, and potential energy.	Student Text Sections 5 Energy, 5.1 & 5.2 Energy in Mechanical and Fluid Systems, 5.3 Energy in Electrical Systems, 5.4 Energy in Thermal Systems Lab Manual Exp. 5.1A Using Energy in Compressed Air to Operate Air Motors, 5.2A Measuring Energy Stored in a Compressed Spring, 5.3A Energy Stored in the Magnetic Field of an Inductor and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
C. Describe and calculate the mechanical energy of the power generated within, the impulse applied to, and the momentum of a physical system.	Student Text Sections 5 Energy, 5.1 & 5.2 Energy in Mechanical and Fluid Systems, 5.3 Energy in Electrical Systems, 5.4 Energy in Thermal Systems Lab Manual Exp. 5.1A Using Energy in Compressed Air to Operate Air Motors, 5.2A Measuring Energy Stored in a Compressed Spring, 5.3A Energy Stored in the Magnetic Field of an Inductor and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com

D. Describe and apply the laws of conservation of energy and conservation of momentum.	Student Text Sections 5 Energy, 5.1 & 5.2 Energy in Mechanical and Fluid Systems, 5.3 Energy in Electrical Systems, 5.4 Energy in Thermal Systems Lab Manual Exp. 5.1A Using Energy in Compressed Air to Operate Air Motors, 5.2A Measuring Energy Stored in a Compressed Spring, 5.3A Energy Stored in the Magnetic Field of an Inductor and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
10. **The student analyzes the concept of thermal energy.** **The student is expected to:**	Student Text Sections 1.4 Temperature in Thermal Systems, 3.4 Rate in Thermal Systems, 4.4 Resistance in Thermal Systems, 5.4 Energy in Thermal Systems Lab Manual Exp. 1.4A Temperature Difference and the Specific Heat of a Metal, 3.4A Creating Steady-State Heat Flow Conditions, 4.4A Determining the Thermal Resistance of a Material, 5.4A Equilibrium Temperature of a Mixture, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
A. Describe how the macroscopic properties of a thermodynamic system such as temperature, specific heat, and pressure are related to the molecular level of matter, including kinetic or potential energy of atoms.	Student Text Sections 1.4 Temperature in Thermal Systems, 3.4 Rate in Thermal Systems, 4.4 Resistance in Thermal Systems, 5.4 Energy in Thermal Systems Lab Manual Exp. 1.4A Temperature Difference and the Specific Heat of a Metal, 3.4A Creating Steady-State Heat Flow Conditions, 4.4A Determining the Thermal Resistance of a Material, 5.4A Equilibrium Temperature of a Mixture, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com

B. Contrast and give examples of different processes of thermal energy transfer, including conduction, convection, and radiation.	Student Text Sections 1.4 Temperature in Thermal Systems, 3.4 Rate in Thermal Systems, 4.4 Resistance in Thermal Systems, 5.4 Energy in Thermal Systems Lab Manual Exp. 1.4A Temperature Difference and the Specific Heat of a Metal, 3.4A Creating Steady-State Heat Flow Conditions, 4.4A Determining the Thermal Resistance of a Material, 5.4A Equilibrium Temperature of a Mixture, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
C. Analyze and explain Technological examples such as solar and wind energy that illustrate the laws of thermodynamics, including the conservation of energy and the law of entropy.	Student Text Sections 1.4 Temperature in Thermal Systems, 3.4 Rate in Thermal Systems, 4.4 Resistance in Thermal Systems, 5.4 Energy in Thermal Systems Lab Manual Exp. 1.4A Temperature Difference and the Specific Heat of a Metal, 3.4A Creating Steady-State Heat Flow Conditions, 4.4A Determining the Thermal Resistance of a Material, 5.4A Equilibrium Temperature of a Mixture, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
11. **The Student analyzes the properties of wave motion and optics.** **The student is expected to:**	Student Text Sections 8.1 Properties of Waves, 8.2 Wave Interaction, 9.1 Electromagnetic Radiation, 10 Light and Optical Systems Lab Manual Exp.9.1A Natural Frequency of a Vibrating body, 8.2A Resonance of Sound Waves in Hollow Tubes, 9.1A The Electromagnetic Spectrum, 10.1A Reflection of Light, 1.3A Lens Experiments, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com

A. Examine and describe oscillatory motion and wave motion and wave propagation in various types of media.	Student Text Sections 8.1 Properties of Waves, 8.2 Wave Interaction, 9.1 Electromagnetic Radiation, 10 Light and Optical Systems Lab Manual Exp.9.1A Natural Frequency of a Vibrating body, 8.2A Resonance of Sound Waves in Hollow Tubes, 9.1A The Electromagnetic Spectrum, 10.1A Reflection of Light, 1.3A Lens Experiments, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
B. Investigate and analyze characteristics of waves, including period, velocity, frequency, amplitude, and wavelength.	Student Text Sections 8.1 Properties of Waves, 8.2 Wave Interaction, 9.1 Electromagnetic Radiation, 10 Light and Optical Systems Lab Manual Exp.9.1A Natural Frequency of a Vibrating body, 8.2A Resonance of Sound Waves in Hollow Tubes, 9.1A The Electromagnetic Spectrum, 10.1A Reflection of Light, 1.3A Lens Experiments, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
C. Investigate and calculate the relationship between wave speed, frequency, and wavelength.	Student Text Sections 8.1 Properties of Waves, 8.2 Wave Interaction, 9.1 Electromagnetic Radiation, 10 Light and Optical Systems Lab Manual Exp.9.1A Natural Frequency of a Vibrating body, 8.2A Resonance of Sound Waves in Hollow Tubes, 9.1A The Electromagnetic Spectrum, 10.1A Reflection of Light, 1.3A Lens Experiments, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
D. Compare and contrast the characteristics and behaviors of transverse waves, including electromagnetic waves and the electromagnetic spectrum, and longitudinal waves including sound waves.	Student Text Sections 8.1 Properties of Waves, 8.2 Wave Interaction, 9.1 Electromagnetic Radiation, 10 Light and Optical Systems Lab Manual Exp.9.1A Natural Frequency of a Vibrating body, 8.2A Resonance of Sound Waves in Hollow Tubes, 9.1A The Electromagnetic Spectrum, 10.1A Reflection of Light, 1.3A Lens Experiments, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com

E. Investigate behaviors of waves, including reflection, refraction, diffraction, interference, resonance, polarization, and the Doppler effect.	Student Text Sections 8.1 Properties of Waves, 8.2 Wave Interaction, 9.1 Electromagnetic Radiation, 10 Light and Optical Systems Lab Manual Exp.9.1A Natural Frequency of a Vibrating body, 8.2A Resonance of Sound Waves in Hollow Tubes, 9.1A The Electromagnetic Spectrum, 10.1A Reflection of Light, 1.3A Lens Experiments, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
F. Describe and predict image formation as a consequence of reflection from a plane mirror and refraction through a thin convex lens.	Student Text Sections 8.1 Properties of Waves, 8.2 Wave Interaction, 9.1 Electromagnetic Radiation, 10 Light and Optical Systems Lab Manual Exp.9.1A Natural Frequency of a Vibrating body, 8.2A Resonance of Sound Waves in Hollow Tubes, 9.1A The Electromagnetic Spectrum, 10.1A Reflection of Light, 1.3A Lens Experiments, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
G. Describe the role of wave characteristics and behaviors in medical and industrial technology applications.	Student Text Sections 8.1 Properties of Waves, 8.2 Wave Interaction, 9.1 Electromagnetic Radiation, 10 Light and Optical Systems Lab Manual Exp.9.1A Natural Frequency of a Vibrating body, 8.2A Resonance of Sound Waves in Hollow Tubes, 9.1A The Electromagnetic Spectrum, 10.1A Reflection of Light, 1.3A Lens Experiments, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
12. **The student analyzes the concepts of atomic, nuclear, and quantum phenomena.** **The student is expected to:**	Student Text Sections 9.1 Electromagnetic Radiation, 9.2 Nuclear Radiation, 10.3 Laser Light Lab Manual Exp. 9.1A The Electromagnetic Spectrum, 9.2A Nuclear Radiation, 10.3A Laser Radiation, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com

A. Describe the Photoelectric effect and the dual nature of light.	Student Text Sections 9.1 Electromagnetic Radiation, 9.2 Nuclear Radiation, 10.3 Laser Light Lab Manual Exp. 9.1A The Electromagnetic Spectrum, 9.2A Nuclear Radiation, 10.3A Laser Radiation, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
B. Compare and explain emission spectra produced by various atoms.	Student Text Sections 9.1 Electromagnetic Radiation, 9.2 Nuclear Radiation, 10.3 Laser Light Lab Manual Exp. 9.1A The Electromagnetic Spectrum, 9.2A Nuclear Radiation, 10.3A Laser Radiation, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
C. Describe the significance of mass-energy equivalence and apply it in explanations of phenomena such as nuclear stability, fission, and fusion.	Student Text Sections 9.1 Electromagnetic Radiation, 9.2 Nuclear Radiation, 10.3 Laser Light Lab Manual Exp. 9.1A The Electromagnetic Spectrum, 9.2A Nuclear Radiation, 10.3A Laser Radiation, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
D. Describe the process of radioactive decay given an isotope and half-life.	Student Text Sections 9.1 Electromagnetic Radiation, 9.2 Nuclear Radiation, 10.3 Laser Light Lab Manual Exp. 9.1A The Electromagnetic Spectrum, 9.2A Nuclear Radiation, 10.3A Laser Radiation, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com

E. Describe the role of mass-energy equivalence for areas such as nuclear stability, fission, and fusion.	Student Text Sections 9.1 Electromagnetic Radiation, 9.2 Nuclear Radiation, 10.3 Laser Light Lab Manual Exp. 9.1A The Electromagnetic Spectrum, 9.2A Nuclear Radiation, 10.3A Laser Radiation, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com
F. Explore technology applications of atomic, nuclear, and quantum phenomena such as nanotechnology, radiation therapy, diagnostic imagining, and nuclear power.	Student Text Sections 9.1 Electromagnetic Radiation, 9.2 Nuclear Radiation, 10.3 Laser Light Lab Manual Exp. 9.1A The Electromagnetic Spectrum, 9.2A Nuclear Radiation, 10.3A Laser Radiation, and; Embedded in appropriate sections of Teachers Guide, Assessment CD & text web-site: www.learningincontext.com