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correlated to

South Carolina
Course Competencies/Objectives for Grades 9–12

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OBJECTIVES	PAGE REFERENCES
I. Inquiry	
Inquiry is not an isolated unit of instruction and should be embedded throughout the content areas. The nature of science and technology is incorporated within this area.	
A. Identify Questions and Concepts that Guide Scientific Investigations.	
Experimental design should demonstrate logical connections between a knowledge base and conceptual understanding.	
1. Formulate a testable hypothesis based on literary research and previous knowledge.	SE: 13–15, 127, 483, 558 TWE: 13–15, 127, 483, 558
2. Identify and select experimental variables (independent and dependent) and controlled conditions.	SE: 18, 747, 752 TWE: 18, 747, 752
B. Design and Conduct Investigations	
Prior knowledge about major concepts, laboratory apparatus, laboratory techniques, and safety should be used in designing and conducting a scientific investigation.	
1. Design a scientific investigation based on the major concepts in the area being studied.	SE: 13–18, 160–161, 248–249, 306–307, 366–367, 466–467, 530–531, 588–589, 616–617, 648–649, 678–679 TWE: 13–18, 160–161, 248–249, 306–307, 366–367, 466–467, 530–531, 588–589, 616–617, 648–649, 678–679
2. Select and use appropriate instruments to make the observations necessary for the investigation, taking into consideration the limitations of the equipment.	SE: 48, 94, 160, 212, 239, 247, 328, 425, 445, 495, 520, 559, 615, 647, 703 TWE: 48, 94, 160, 212, 239, 247, 328, 425, 445, 495, 520, 559, 615, 647, 703
3. Identify technologies that could enhance the collection of data.	SE: 44–48, 53, 65, 142, 512–513, 527–529, 674, 695, 707–708 TWE: 44–48, 53, 65, 142, 512–513, 527–529, 674, 695, 707–708
4. Select the appropriate safety equipment needed to conduct an investigation (e.g., goggles, aprons, etc.).	SE: 19–20 TWE: 19–20

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5. Suggest safety precautions that need to be implemented for the handling of materials and equipment used in an investigation.	SE: 19–20, 109, 147, 212, 239, 271, 297, 328, 391, 465, 495, 496, 559, 647, 678 TWE: 19–20, 109, 147, 212, 239, 271, 297, 328, 391, 465, 495, 496, 559, 647, 678
6. Describe the proper response to emergency situations in the laboratory.	SE: 19 TWE: 19
7. Conduct a laboratory investigation with repeated trials and systematic manipulation of variables.	SE: 48, 94, 160, 212, 239, 247, 328, 425, 465, 495, 496, 559, 647, 678 TWE: 48, 94, 160, 212, 239, 247, 328, 425, 465, 495, 496, 559, 647, 678
8. Identify possible sources of error inherent in an experimental design.	SE: 28–29, 31, 755 TWE: 28–29, 31, 755
9. Organize and display data in useable and efficient formats, such as tables, graphs, maps, and cross sections.	SE: 50, 63, 179, 262, 270, 277, 305, 429, 529, 531, 635, 640, 750 TWE: 50, 63, 179, 262, 270, 277, 305, 429, 529, 531, 635, 640, 750
10. Draw conclusions based on qualitative and quantitative data.	SE: 19–20, 109, 147, 212, 239, 271, 297, 328, 391, 425, 445, 495, 520, 559, 615, 647, 670, 703, 709 TWE: 19–20, 109, 147, 212, 239, 271, 297, 328, 391, 425, 445, 495, 520, 559, 615, 647, 670, 703, 709
11. Discuss the impact of sources of error on experimental results.	SE: 28–29, 31, 755 TWE: 28–29, 31, 755
12. Communicate and defend the scientific thinking that resulted in conclusions.	SE: 48, 94, 160, 212, 239, 247, 328, 425, 445, 465, 495, 496, 559, 647, 678, 703 TWE: 48, 94, 160, 212, 239, 247, 328, 425, 445, 465, 495, 496, 559, 647, 678, 703

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OBJECTIVES	PAGE REFERENCES
C. Use Technology and Mathematics to Improve Investigations and Communications.	
Scientific investigations can be improved through the use of technology and mathematics. While it is acknowledged that the SI system is the accepted measurement system in science, opportunities to use the English System are encouraged.	
1. Select and use appropriate technologies (e.g., computers, calculators, CBL's) to enhance the precision and accuracy of data collection, analysis, and display.	SE: 20, 56, 79, 121, 179, 211, 238, 262, 277, 296, 390, 449, 494, 529, 553, 586, 635, 695 TWE: 20, 56, 79, 121, 179, 211, 238, 262, 277, 296, 390, 449, 494, 529, 553, 586, 635, 695
2. Discriminate between data that may be valid or anomalous.	SE: 28–29, 31, 755 TWE: 28–29, 31, 755
3. Select and use mathematical formulas and calculations to extend the usefulness of laboratory measurements.	SE: 47, 56, 93, 108, 190, 245, 327, 353, 414, 464, 519, 607, 646, 670, 702, 709 TWE: 47, 56, 93, 108, 190, 245, 327, 353, 414, 464, 519, 607, 646, 670, 702, 709
4. Draw a "best fit" curve through data points.	The opportunity to address this objective is available. See the following: SE: 270, 635, 640, 752 TWE: 270, 635, 640, 752
5. Calculate the slope of the curve and use correct units for the value of the slope for linear relationships.	The opportunity to address this objective is available. See the following: SE: 270, 635, 640, 752 TWE: 270, 635, 640, 752
6. Calculate interpolated and predict extrapolated data points.	The opportunity to address this objective is available. See the following: SE: 270, 635, 640, 752 TWE: 270, 635, 640, 752
7. Perform dimensional analysis calculations.	SE: 760–761 TWE: 760–761

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OBJECTIVES	PAGE REFERENCES
D. Formulate and Revise Scientific Explanations and Models Using Logic and Evidence	
Scientific explanations and models are developed and revised through discussion and debate.	
1. Construct experimental explanations or models through discussion, debate, logic, and experimental evidence.	SE: 13–18, 160–161, 248–249, 306–307, 366–367, 466–467, 530–531, 588–589, 616–617, 648–649, 678–679 TWE: 13–18, 160–161, 248–249, 306–307, 366–367, 466–467, 530–531, 588–589, 616–617, 648–649, 678–679
2. Develop explanations and models that eliminate bias and demonstrate the use of ethical principles. **(P)**	SE: 48, 94, 160, 212, 239, 247, 328, 425, 445, 495, 520, 559, 615, 647, 703 TWE: 48, 94, 160, 212, 239, 247, 328, 425, 445, 495, 520, 559, 615, 647, 703
3. Revise explanations or models after review.	SE: 19–20, 109, 147, 212, 239, 271, 297, 328, 391, 465, 495, 496, 559, 647, 678 TWE: 19–20, 109, 147, 212, 239, 271, 297, 328, 391, 465, 495, 496, 559, 647, 678
E. Recognize and Analyze Alternative Explanations and Models	
Scientific criteria are used to discriminate among plausible explanations.	
1. Compare current scientific models with experimental results.	SE: 22–26, 263, 511–517, 529 TWE: 22–26, 263, 511–517, 529
2. Select and defend, based on scientific criteria, the most plausible explanation or model.	SE: 22–26, 263, 511–517, 529 TWE: 22–26, 263, 511–517, 529

OBJECTIVES	PAGE REFERENCES
F. Communicate and Defend a Scientific Argument	
Experimental processes, data, and conclusions should be communicated in a clear and logical manner.	
1. Develop a set of laboratory instructions that someone else can follow.	SE: 13–18, 160–161, 248–249, 306–307, 366–367, 466–467, 530–531, 588–589, 616–617, 648–649, 678–67 TWE: 13–18, 160–161, 248–249, 306–307, 366–367, 466–467, 530–531, 588–589, 616–617, 648–649, 678–67
2. Develop a presentation to communicate the process and conclusion of a scientific investigation.	SE: 11, 63, 88, 127, 146, 159, 219, 247, 335, 345, 397, 457, 483, 558, 663, 676 TWE: 11, 63, 88, 127, 146, 159, 219, 247, 335, 345, 397, 457, 483, 558, 663, 676
G. Understandings about Scientific and Technological Inquiry	
Historical scientific knowledge, current research, technology, mathematics and logic should be the basis for conducting investigations and drawing conclusions.	
1. Analyze how science and technology explain and predict relationships.	
a. Defend the idea that conceptual principles and knowledge guide scientific and technological inquiry.	The opportunity to address this objective is available. See the following: SE: 48, 94, 160, 212, 239, 247, 328, 425, 445, 466–467, 530–531, 588–589, 616–617, 648–649, 678–679 TWE: 48, 94, 160, 212, 239, 247, 328, 425, 445, 466–467, 530–531, 588–589, 616–617, 648–649, 678–679

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OBJECTIVES	PAGE REFERENCES
b. Explain how historical and current scientific knowledge influences the design, interpretation, and evaluations of investigations.	
1. Discuss the reasons scientists and engineers conduct investigations.	SE: 27–31 TWE: 27–31
2. Defend the use of technology as a method for enhancing data collection, data manipulation, and advancing the fields of science and technology.	The opportunity to address this objective is available. See the following: SE: 44–48, 53, 65, 142, 512–513, 527–529, 674, 695, 707–708 TWE: 44–48, 53, 65, 142, 512–513, 527–529, 674, 695, 707–708
3. Explain how mathematics is important to scientific and technological inquiry.	SE: 50, 114, 177, 303, 333, 383, 455, 525, 604, 632, 638, 642, 667, 689 TWE: 50, 114, 177, 303, 333, 383, 455, 525, 604, 632, 638, 642, 667, 689
4. Explain why scientific models and explanations need to be based on historical and current scientific knowledge.	SE: 22–26, 262, 511–517, 529 TWE: 22–26, 262, 511–517, 529
5. Understand that scientific explanations must be logical, supported by the evidence, and open to revision.	The opportunity to address this objective is available. See the following: SE: 11, 88, 115, 127, 146, 159, 185, 219, 305, 335, 397, 429, 457, 483, 663, 676 TWE: 11, 88, 115, 127, 146, 159, 185, 219, 305, 335, 397, 429, 457, 483, 663, 676

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OBJECTIVES	PAGE REFERENCES
II. Life Science	
A. The Cell	
1. Cells have particular structures that underlie their function. Inside the cell is a concentrated mixture of thousands of different molecules which form a variety of specialized structures that carry out such cell functions as energy production, transport of molecules, waste disposal, synthesis of new molecules, and the storage of genetic material.	
a. Compare prokaryotic and eukaryotic cells.	The opportunity to address this objective is available. See the following: SE: 322, 327 TWE: 322, 327
b. Identify the cellular structures that are responsible for energy production, waste disposal, molecular synthesis, storage of genetic material, and cell movement.	The opportunity to address this objective is available. See the following: SE: 322, 324–327 TWE: 322, 324–327
c. Trace the development of the Cell theory. **(H)**	The opportunity to address this objective is available. See the following: SE: 322, 324–327 TWE: 322, 324–327
d. Discuss uses of technologies that enable in-depth studies of the cell such as microscopes, ultracentrifuge techniques, and radioscopy studies. **(T)**	The opportunity to address this objective is available. See the following: SE: 322, 324–327 TWE: 322, 324–327
2. Most cell functions involve chemical reaction. Food molecules taken into the cell react to provide the chemical constituents needed to synthesize other molecules. Both breakdown and synthesis are made possible by a large set of protein catalysts, called enzymes. The breakdown of some of the food molecules enables the cell to store energy in specific chemicals that are used to carry out the many functions of the cell.	
a. Explain the role of enzymes in chemical reactions within the cell.	SE: 214–216, 218, 614 TWE: 214–216, 218, 614
b. Differentiate the functions of carbohydrates, proteins, lipsids, and nucleic acids in the cell.	SE: 203–205 TWE: 203–205

OBJECTIVES	PAGE REFERENCES
3. Cells store and use information to guide their functions. The genetic information stored in DNA is used to direct the synthesis of the thousands of proteins each cell requires.	
a. Compare DNA and RNA.	The opportunity to address this objective is available. See the following: SE: 320–325 TWE: 320–325
b. Explain the role of the triplet codon in protein synthesis.	The opportunity to address this objective is available. See the following: SE: 320–325 TWE: 320–325
c. Illustrate the steps of protein synthesis.	This objective falls outside the scope of Glencoe, Science Level Blue.
4. Cell functions are regulated. Regulation occurs through changes in the activity of the function performed by proteins and by the selective expression of certain genes. This regulation allows cells to respond to their environment and to control and coordinate cell growth and division	
a. Examine the importance of DNA and proteins in cell regulation.	This objective falls outside the scope of Glencoe, Science Level Blue.
b. Discuss mishaps in cell regulation (e.g., tumors). **(P)**	The opportunity to address this objective is available. See the following: SE: 275 TWE: 275

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5. Cells can differentiate and complex multicellular organisms are formed as a highly organized arrangement of differentiated cells. In the development of these multicellular organisms, the progeny from a single cell form an embryo in which the cells multiply and differentiate to form the many specialized cells, tissues and organs that comprise the final organism. This differentiation is regulated through the expression of different genes.	
a. Illustrate the development of both an animal and a plant multicellular organism (cells, specialized cells, tissues, organs, organ systems, and organisms.)	SE: 174–179, 180–185, 186–190, 213–219, 230–235, 240–245, 246–247, 258–262, 288–289 TWE: 174–179, 180–185, 186–190, 213–219, 230–235, 240–245, 246–247, 258–262, 288–289
b. Describe how organs and systems in both plants and animals function. *[This concept has been taught at a previous grade level]	SE: 186–190, 213–219, 230–235, 246–247, 288–289 TWE: 186–190, 213–219, 230–235, 246–247, 288–289
c. Recognize that a degenerative disease involves the deterioration of the organs or tissues.	SE: 268–269, 275–277 TWE: 268–269, 275–277
B. The Molecular Basis of Heredity	
1. In all organisms, the instructions for specifying the characteristics of the organism are carried in DNA, a large polymer formed from subunits of four kinds (A, T, G, and C). The chemical and structural properties of DNA explain how the genetic information that underlies heredity is both encoded in genes (as a string of molecular "letters") and replicated (by a templating mechanism). Each DNA molecule in a cell forms a single chromosome.	
a. Explain how DNA, genes and chromosomes are related.	SE: 320–325 TWE: 320–325
b. Analyze the chemical structure of DNA.	SE: 321 TWE: 321
c. Explain how DNA replication occurs.	The opportunity to address this objective is available. See the following: SE: 321 TWE: 321

OBJECTIVES	PAGE REFERENCES
d. Evaluate the impact of DNA technology on society (e.g., bioengineering, forensics, genome project, DNA fingerprinting). **(T,P)**	The opportunity to address this objective is available. See the following: SE: 321 TWE: 321
2. Most of the cells in a human contain two copies of each of 22 different chromosomes. In addition, there is a pair of chromosomes that determine sex: a female contains two X-chromosomes and a male contains one X and one Y chromosome. Transmission of genetic information to offspring occurs through egg and sperm cells that contain only one representative from each chromosome pair. An egg and sperm unite to form a new individual. The fact that the human body is formed from cells that contain two copies of each chromosome—and therefore two copies of each new gene—explains many features of human heredity, such as how variations that are hidden in one generation can be expressed in the next.	
a. Explain the process of meiosis.	SE: 325, 332 TWE: 325, 332
b. Make predictions concerning inheritance based on the laws of heredity.	SE: 332 TWE: 332
c. Discuss advancements in the study of heredity since Mendel including the chromosome theory. **(H)**	The opportunity to address this objective is available. See the following: SE: 334–335 TWE: 334–335
3. Changes in DNA (mutations) occur spontaneously at low rates. Some of these changes make no difference to the organism, whereas others can change cells and organisms. Only mutations in germ cells can create the variation that changes an organism's offspring.	
a. Discuss how both chromosomal and gene mutations might occur.	SE: 334–335 TWE: 334–335
b. Infer how mutations contribute to genetic diversity.	SE: 334–335, 351 TWE: 334–335, 351

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OBJECTIVES	PAGE REFERENCES
c. Discuss the characteristics and molecular basis of various genetic disorders, such as sickle cell anemia, Tay-Sachs, cystic fibrosis, and hemophilia. **(P)**	The opportunity to address this objective is available. See the following: SE: 242, 245, 334–335 TWE: 242, 245, 334–335
C. Biological Evolution	
1. Species evolve over time. Evolution is the consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuing selection by the environment of those offspring better able to survive and leave offspring.	
a. Discuss evolution as a consequence of various interactions; such as the number of offspring, genetic variability, finite supply of resources, and environmental factors.	SE: 346–354 TWE: 346–354
b. Discuss the scientific evidence that illustrates change over time.	SE: 355–360 TWE: 355–360
2. Natural selection and its evolutionary consequences provide a scientific explanation for the fossil record of ancient life forms, as well as for the striking molecular similarities observed among the diverse species of living organisms.	
a. Evaluate the process of natural selection and its consequences.	SE: 349 TWE: 349
b. Infer how the fossil record can reveal evolutionary changes over time.	SE: 355–358 TWE: 355–358
c. Describe how carbon dating is utilized in the study of evolution. **(H,T)**	SE: 526 TWE: 526
d. Discuss Charles Darwin's contribution to the study of evolution. **(H)**	SE: 347–350 TWE: 347–350

OBJECTIVES	PAGE REFERENCES
3. Biological classifications are based on how organisms are related.	
a. Investigate the modern kingdom classification system based on fossil record interpretation and similarities in structural and chemical make-up.	The opportunity to address this objective is available. See the following: SE: 359–361, 362–367 TWE: 359–361, 362–367
b. Analyze the complexity of classifying organisms based on structural adaptations, physiology, nutritional strategies, biochemical similarities, genetic similarities, embryological similarities, and methods of reproduction.	The opportunity to address this objective is available. See the following: SE: 359–361, 362–367 TWE: 359–361, 362–367
c. Justify why many scientists group viruses in a category separate from living things	The opportunity to address this objective is available. See the following: SE: 264 TWE: 264
D. Interdependence of Organisms	
1. The atoms and molecules on the earth cycle among the living and nonliving components of the biosphere.	
a. Analyze how organisms interact with the biosphere as part of the geochemical cycles (carbon, nitrogen, phosphorus and water cycles)	SE: 382–390, 448–449 TWE: 382–390, 448–449
b. Evaluate the importance of nutrient cycles in an ecosystem.	The opportunity to address this objective is available. See the following: SE: 382–390 TWE: 382–390

OBJECTIVES	PAGE REFERENCES
2. Energy flows through ecosystems in one direction, from photosynthetic organisms to herbivores to carnivores and decomposers.	
a. Trace the flow of energy through various trophic levels.	The opportunity to address this objective is available. See the following: SE: 382–390 TWE: 382–390
b. Assess the value of the carbon cycle to the flow of energy through the ecosystems.	The opportunity to address this objective is available. See the following: SE: 382–390 TWE: 382–390
3. Organisms both cooperate and compete in ecosystems. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.	
a. Relate the terms of cooperation and competition to organisms within an ecosystem.	The opportunity to address this objective is available. See the following: SE: 348, 384–388 TWE: 348, 384–388
b. Evaluate how interrelationships and interdependencies of living things contribute to the homeostasis of ecosystems.	The opportunity to address this objective is available. See the following: SE: 380–383 TWE: 380–383
4. Living organisms have the capacity to produce populations of infinite size, but environments and resources are finite. This fundamental tension has profound effects on the interactions between organisms.	
a. Describe and give examples of demographic characteristics of populations (e.g., birth and death rates, age structure, and sex ratio).	SE: 366–367 TWE: 366–367
b. Give examples and explain how limiting factors such as water, food, oxygen, and living space play a role in the stability of ecosystems.	SE: 384–388 TWE: 384–388

OBJECTIVES	PAGE REFERENCES
c. Predict how interactions among organisms, such as predation, competition, and parasitism affect population growth.	The opportunity to address this objective is available. See the following: SE: 348, 384–388 TWE: 348, 384–388
d. Discuss the effects of succession on terrestrial ecosystems.	This objective falls outside the scope of Glencoe, Science Level Blue.
e. Evaluate dynamic equilibrium as a result of checks and balances within populations, communities, and ecosystems.	The opportunity to address this objective is available. See the following: SE: 380–383, 384–388 TWE: 380–383, 384–388
5. Human beings live within the world's ecosystems. Increasingly, humans modify ecosystems as a result of population growth, technology, and consumption. Human destruction of habitats through direct harvesting, pollution, atmospheric changes, and other factors is threatening current global stability, and if not addressed, ecosystems will be irreversibly affected.	
a. Identify events that lead to awareness of environmental concerns such as fish kills, destruction of the ozone layer, global warming, and decline of the bald eagle. **(H)**	SE: 383–391 TWE: 383–391
b. Discuss the conflicts that could occur between land developers and conservationists. **(P)**	SE: 392–397 TWE: 392–397
c. Debate the consequences of extinction and introduction of species within ecosystems.	SE: 384–389 TWE: 384–389
d. Assess the consequences of acid rain on ecosystems. **(P)**	SE: 389, 395 TWE: 389, 395
e. Give examples of how technology has advanced the study of environmental science. **(T,P)**	SE: 392–397 TWE: 392–397

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OBJECTIVES	PAGE REFERENCES
E. Matter, Energy and Organization in Living Systems	
1. The energy for life primarily derives from the sum. Plants capture energy by absorbing light and using it to form strong (covalent) chemical bonds between the atoms of carbon-containing (organic) molecules. These molecules can be used to assemble larger molecules with biological activity (including proteins, DNA, sugars, and fats). In addition, the energy stored in bonds between the atoms (chemical energy) can be used as sources of energy for life processes.	
a. Summarize the basic process by which photosynthesis converts solar energy into chemical energy (food molecules).	This objective falls outside the scope of Glencoe, Science Level Blue.
b. Summarize the basic aerobic and anaerobic processes by which cellular respiration breaks down food molecules into energy that can be used by cells	This objective falls outside the scope of Glencoe, Science Level Blue.
2. The chemical bonds of food molecules contain energy. Energy is released when the bonds of food molecules are broken and new compounds with lower energy bonds are formed. Cells usually store this energy temporarily in phosphate bonds of a small high-energy compound called ATP.	
a. Analyze bond energy as it relates to food molecules	The opportunity to address this objective is available. See the following: SE: 202–205 TWE: 202–205
b. Discuss the importance of ATP and how it is recycled.	This objective falls outside the scope of Glencoe, Science Level Blue.
3. The complexity and organization of organisms accommodates the need for obtaining, transforming, transporting, releasing, and eliminating the matter and energy used to sustain the organism	
a. Explain why energy is necessary for the development, growth, and maintenance of organisms.	SE: 202–205 TWE: 202–205
b. Explain homeostasis and predict the consequences of a lack of energy on homeostasis.	SE: 219, 289, 295–296 TWE: 219, 289, 295–296

OBJECTIVES	PAGE REFERENCES
4. As matter and energy flow through different levels of organization of living systems (cells, organs, organisms, communities) and between living systems and the physical environment, chemical elements are recombined in different ways. Each recombination results in storage and dissipation of energy into the environment as heat. Matter and energy are conserved in each change.	
a. Discuss the dynamics of energy and entropy as they apply to biological systems.	The opportunity to address this objective is available. See the following: SE: 202–205 TWE: 202–205
b. Analyze energy in biological systems in terms of transformation, conservation, and efficiency.	The opportunity to address this objective is available. See the following: SE: 202–205 TWE: 202–205
F. Behavior and Regulation	
1. Multicellular animals have nervous systems that generate behavior. Nervous systems are formed from specialized cells that conduct signals rapidly through the long cell extensions that make up nerves. The nerve cells communicate with each other by secreting specific excitatory and inhibitory molecules. In sense organs, specialized cells detect light, sound, and specific chemicals and enable animals to monitor what is going on in the world around them.	
a. Describe how cells of multicellular animals communicate by signals conducted through a nervous system.	SE: 288–296 TWE: 288–296
b. Discuss the adaptive value of the reflexes such as blinking of the eye, opening/closing of the iris, responses to hot and cold, etc.	SE: 298–305 TWE: 298–305
c. Give examples of specialized cells, such as taste buds, touch receptors, and rods and cones, in sense organs that detect stimuli.	SE: 298–305, 306–307 TWE: 298–305, 306–307

OBJECTIVES	PAGE REFERENCES
2. Organisms have behavioral responses to internal change and external stimuli. Responses to external stimuli can result from interactions with the organism's own species and others, as well as environmental changes; these responses can be either innate or learned. The broad patterns of behavior exhibited by animals have evolved to ensure reproductive success. Animals often live in unpredictable environments, and so their behavior must be flexible enough to deal with uncertainty and change. Plants also respond to stimuli.	
a. Investigate how different organisms maintain homeostasis	SE: 219, 289, 295 TWE: 219, 289, 295
b. Give examples of feedback mechanisms.	The opportunity to address this objective is available. See the following: SE: 298–305, 306–307 TWE: 298–305, 306–307
c. Explain how organisms react to pathogens.	SE: 258–261 TWE: 258–261
d. Assess both the positive and negative effects of introducing chemical substances into the body. **(P)**	SE: 296 TWE: 296
e. Give examples that illustrate innate behavior.	This objective falls outside the scope of Glencoe, Science Level Blue.
f. Give examples of learned behavior.	This objective falls outside the scope of Glencoe, Science Level Blue.
g. Discuss tropisms in plants as responses to external stimuli.	This objective falls outside the scope of Glencoe, Science Level Blue.

OBJECTIVES	PAGE REFERENCES
3. Like other aspects of an organism's biology, behaviors have evolved through natural selection. Behaviors often have an adaptive logic when viewed in terms of evolutionary principles.	
a. Give examples of common behavioral responses in organisms such as waggle dancing, courtship, and nesting behaviors that maximize their fitness and success.	This objective falls outside the scope of Glencoe, Science Level Blue.
b. Evaluate how computer technology has been instrumental in collecting and analyzing data in the study of animal behavior. **(T)**	This objective falls outside the scope of Glencoe, Science Level Blue.
4. Behavioral biology has implications for humans, as it provides links to psychology, sociology, and anthropology.	
a. Describe classical studies of learned behavior such as B. F. Skinner, Jane Goodall, and Dian Fossey. **(H)**	This objective falls outside the scope of Glencoe, Science Level Blue.
b. Give examples of how these classical studies relate to human behavior.	This objective falls outside the scope of Glencoe, Science Level Blue.
III. Earth Science	
A. Energy in the Earth System	
1. Earth systems have internal and external sources of energy, both of which create heat. The sun is the major external source of energy. Two primary sources of internal energy are the decay of radioactive isotopes and the gravitational energy from the Earth original formation.	
a. Describe how the decay of radioactive isotopes produces internal heat in the Earth.	The opportunity to address this objective is available. See the following: SE: 522–526 TWE: 522–526
b. Describe how gravitational forces led to the production of heat in the early history of the Earth and to the differentiation of the Earth into a core, mantle, and crust.	This objective falls outside the scope of Glencoe, Science Level Blue.

OBJECTIVES	PAGE REFERENCES
c. Give evidence that some of that heat is still escaping from the Earth's interior.	The opportunity to address this objective is available. See the following: SE: 445, 489 TWE: 445, 489
2. The outward transfer of Earth's internal heat drives convection circulation in the mantle that propels the plates comprising Earth's surface across the face of the globe.	
a. Examine how internal heat produces convection currents that are the driving force for plate tectonics.	This objective falls outside the scope of Glencoe, Science Level Blue.
b. Analyze the pros and cons of living in areas affected by natural hazards such as earthquakes, and volcanic eruptions. **(P)**	This objective falls outside the scope of Glencoe, Science Level Blue.
3. Heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere. Global climate is determined by energy transfer from the sun at and near the Earth's surface. This energy transfer is influenced by dynamic processes such as cloud cover and the Earth's rotation, and static conditions such as the position of mountain ranges and oceans.	
a. Analyze the effects of atmospheric convection, atmospheric dust and cloud cover, rotation of the Earth, revolution of the Earth, and tilt of the Earth's rotational axis on global climates and seasons.	SE: 477–479, 480–483, 484–491 TWE: 477–479, 480–483, 484–491
b. Explain the factors that affect geographic variations in climate including distribution of land and water, physiographic (geologic) features, and latitude effects.	SE: 476–479, 480–481, 486–487, 488–490 TWE: 476–479, 480–481, 486–487, 488–490
c. Relate the transfer of heat energy to the patterns of wind belts.	The opportunity to address this objective is available. See the following: SE: 455 TWE: 455

OBJECTIVES	PAGE REFERENCES
d. Compare and contrast the formation of high–and low-pressure systems, the formation of fronts, and the movement of weather systems across the surface of the Earth.	SE: 459–460 TWE: 459–460
e. Analyze the pros and cons of living in areas affected by natural hazards such as hurricanes, tornadoes, and other severe weather. **(P)**	The opportunity to address this objective is available. See the following: SE: 463–464 TWE: 463–464
4. The hydrosphere is affected by both internal and external sources of energy. Solar energy drives the hydrologic cycle and produces convection in the hydrosphere. The outward transfer of Earth's internal heat drives hydrothermal processes. (Not an NSES Standard)	
a. Describe how solar energy is transferred to ocean currents and waves.	SE: 478 TWE: 478
b. Investigate and describe the formation of waves and the effects of the transfer of energy as waves interact with the shore.	This objective falls outside the scope of Glencoe, Science Level Blue.
c. Evaluate the effectiveness of human interventions designed to reduce the effects of rising sea level and waves on coastal erosion.	This objective falls outside the scope of Glencoe, Science Level Blue.
d. Examine the influence of heat from the Earth's interior on chemosynthesis in the marine hydrosphere.	This objective falls outside the scope of Glencoe, Science Level Blue.

OBJECTIVES	PAGE REFERENCES
B. Geochemical Cycles	
1. The Earth is a system containing essentially a fixed amount of each stable chemical atom, or element. Each element can exist in several different chemical reservoirs. Each element on Earth moves among reservoirs in the solid earth, oceans, atmosphere, and organisms as part of geochemical cycles.	
a. Illustrate and explain how elements, such as carbon, oxygen, and nitrogen, cycle through the atmosphere, oceans, rocks, and living organisms.	The opportunity to address this objective is available. See the following: SE: 445 TWE: 445
b. Analyze how the use and recovery of fossil fuels impacts the environment. **(T,P)**	SE: 418, 493 TWE: 418, 493
c. Evaluate the importance of limiting consumption of nonrenewable resources. **(T,P)**	SE: 410 TWE: 410
2. Movement of matter between reservoirs is driven by the Earth's internal and external sources of energy. These movements are often accompanied by a change in the physical and chemical properties of the matter. Carbon, for example, occurs in carbonate rocks such as limestone, in the atmosphere as carbon dioxide gas, in water as dissolved carbon dioxide, and in all organisms as complex molecules that control the chemistry of life.	
a. Describe how the Earth's internal and external energy drives the physical and chemical changes carbon undergoes as it moves through its geochemical cycle.	This objective falls outside the scope of Glencoe, Science Level Blue.
b. Discuss how these changes affect the reservoirs.	This objective falls outside the scope of Glencoe, Science Level Blue.

OBJECTIVES	PAGE REFERENCES
C. The Origin and Evolution of the Earth System	
1. Scientists theorize that the sun, the Earth, and the rest of the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago. The early Earth was very different from the planet we live on today.	
a. Describe how scientists theorize that the Solar system formed from a nebular cloud of dust and gas.	SE: 106–107 TWE: 106–107
b. Describe changes in atmospheric conditions over time and infer possible causes including the greenhouse effect and ice age cycles.	SE: 484–490, 491–492 TWE: 484–490, 491–492
2. Geologic time can be estimate by observing rock sequences and using fossils to correlate the sequences at various locations. Current methods include using the known decay rates of radioactive isotopes present in the rock to measure the time since the rock was formed.	
a. Trace the historical development of relative dating using rock sequences and fossils including the contributions of Hutton (uniformitarianism) and Lyell (crosscutting relationships and inclusions). **(H,N)**	The opportunity to address this objective is available. See the following: SE: 356 TWE: 356
b. Describe techniques of relative dating using rock sequences and fossils to establish a sequence of geologic events, including the age of fossils.	SE: 357–359 TWE: 357–359
c. Describe radioactive decay as a means of dating events in the Earth's history.	SE: 526 TWE: 526

OBJECTIVES	PAGE REFERENCES
3. Interactions among the solid Earth, the oceans, and organisms have resulted in the ongoing evolution of the Earth system. We can observe some changes such as earthquakes and volcanic eruptions on a human time scale, but many processes such as mountain building and plate movements take place over hundreds of millions of years.	
a. Explain how scientists conclude that processes take place and change occurs, even when the change is too slow to observe directly.	SE: 352–353, 356 TWE: 352–353, 356
b. Infer from surface features shown on aerial, satellite, and topographic maps the underlying subsurface conditions resulting from past geologic events. **(T)**	This objective falls outside the scope of Glencoe, Science Level Blue.
c. Infer how interactions between the atmosphere, hydrosphere, and solid Earth result in the formation of sedimentary rocks.	The opportunity to address this objective is available. See the following: SE: 356 TWE: 356
d. Predict changes in the Earth's surface based on past and current geologic events (e.g., earthquakes, volcanic activity, mountain building, weathering, erosions, and impact craters). **(N)**	This objective falls outside the scope of Glencoe, Science Level Blue.
e. Trace the historical development of the theory of plate tectonics including the contribution of Wegener **(H,N)**	This objective falls outside the scope of Glencoe, Science Level Blue.
4. Evidence for one-celled forms of life—the bacteria—extends back more than 3.5 billion years. The evolution of life caused dramatic changes in the composition of the Earth's atmosphere, which did not originally contain oxygen.	
a. Relate the dramatic changes in the composition of the Earth's atmosphere (introduction of oxygen) to the evolution of single-celled life forms.	This objective falls outside the scope of Glencoe, Science Level Blue.

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OBJECTIVES	PAGE REFERENCES
D. The Origin and Evolution of the Universe	
1. The origin of the universe remains one of the greatest questions in science. The big bang theory places the origin between 10 and 20 billion years ago, when the universe began in a hot dense state; according to this theory, the universe has been expanding ever since.	
a. Trace the historical development of scientific theories for the formation of and changes in the universe including the contributions of Copernicus, Kepler, and Galileo. **(H,N)**	SE: 105, 108 TWE: 105, 108
b. Discuss the evidence for an expanding universe.	SE: 156–159, TWE: 156–159
c. Give examples of the technology used to provide evidence about the history and origin of the universe. **(H,N,T)**	SE: 157–160 TWE: 157–160
2. Early in the history of the universe, matter primarily the light atoms hydrogen and helium clumped together by gravitational attraction to form countless trillions of stars. Billions of galaxies, each of which is a gravitationally bound cluster of billions of stars, now form most of the visible mass in the universe	
a. Infer how gravity and motion affect the formation of different types of galaxies.	SE: 154–155 TWE: 154–155
b. Identify the location of our Sun in the Milky Way galaxy.	SE: 154–155 TWE: 154–155
3. Stars produce energy from nuclear reactions, primarily the fusion of hydrogen to form helium. These and other processes in stars have led to the formation of all the other elements.	
a. Describe the life cycles of stars.	SE: 151–153 TWE: 151–153
b. Explain the formation of elements by fusion in stars and supernova explosions.	SE: 106 TWE: 106

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OBJECTIVES	PAGE REFERENCES
IV. Physical Science (Chemistry)	
A. The Structure of Atoms	
1. Matter is made of minute particles called atoms, and atoms are composed of even smaller components. These components have measurable properties, such as mass and electrical charge. Each atom has a positively charged nucleus surrounded by negatively charged electrons. The electric force between the nucleus and electrons holds the atom together.	
a. Trace the historical development of the model of the atom including the contributions of John Dalton, J. J. Thomson, Ernest Rutherford, and Neils Bohr. **(H,N)**	SE: 511, 514–516, 518 TWE: 511, 514–516, 518
b. Cite the physical and chemical evidences for the existence and structure of atoms.	SE: 516–519, 521–522 TWE: 516–519, 521–522
c. Compare and contrast the component particles of the atom.	SE: 516–519, 520–521 TWE: 516–519, 520–521
2. The atom's nucleus is composed of protons and neutrons, which are much more massive than electrons. When an element has atoms that differ in the number of neutrons, these atoms are called different isotopes of the element.	
a. Trace the development of nuclear models including the contributions of the Marie and Pierre Curie, Lise Meitner, and Enrico Fermi. **(H,N)**	SE: 511, 514–516, 518 TWE: 511, 514–516, 518
b. Identify the charge, component particles, and relative mass of the nucleus.	SE: 516–518, 521–522 TWE: 516–518, 521–522
c. Explain that elements exist as isotopes, which may be stable or unstable (radioactive).	SE: 521–522, 527–529 TWE: 521–522, 527–529

OBJECTIVES	PAGE REFERENCES
3. The nuclear forces that hold the nucleus of an atom together, at nuclear distances, are usually stronger than the electric forces that would make it fly apart. Nuclear reactions convert a fraction of the mass of interacting particles into energy, and they can release much greater amounts of energy than atomic interactions. Fission is the splitting of a large nucleus into smaller pieces. Fusion is the joining of two nuclei at extremely high temperature and pressure, and is the process responsible for the energy of the sun and other stars.	
a. Explain why like charges are able to remain in close proximity in the nucleus.	SE: 522 TWE: 522
b. Contrast the energy released by nuclear reactions to that release by chemical reactions.	SE: 149–150 TWE: 149–150
c. Compare and contrast fission and fusion reactions showing how they are processes that convert matter to energy.	SE: 149–150 TWE: 149–150
d. Describe fusion as the process that fuels the sun and other stars.	SE: 106–107 TWE: 106–107
e. Debate the consequences of the development of nuclear application such as the atomic bomb, nuclear power plants, and medical technologies. **(P)**	SE: 412, 424 TWE: 412, 424
4. Radioactive isotopes are unstable and undergo spontaneous nuclear reactions, emitting particles, and/or wavelike radiation. The decay of any one nucleus cannot be predicted, but a large group of identical nuclei decay at a predictable rate. This predictability can be used to estimate the age of materials that contain radioactive isotopes.	
a. Explain that unstable isotopes undergo spontaneous nuclear decay, emitting energy or particles and energy.	SE: 521–522, 527–529 TWE: 521–522, 527–529
b. Apply the predictable rate of nuclear decay to estimate the age of materials	SE: 526 TWE: 526

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OBJECTIVES	PAGE REFERENCES
B. Structure and Properties of Matter	
1. Atoms interact with one another by transferring or sharing electrons that are furthest from the nucleus. These outer electrons govern the chemical properties of the element.	
a. Predict the charge a representative element will acquire based on its outer electron arrangement.	SE: 570–573 TWE: 570–573
2. An element is composed of a single type of atom. When elements are listed in order according to the number of protons (called the atomic number), repeating patterns of physical and chemical properties identify families of elements with similar properties. This "Periodic Table" is a consequence of the repeating pattern of outermost electrons and their permitted energies.	
a. Trace the historical development of the periodic table including the contributions of Mendeleev. **(H,N)**	SE: 572–575 TWE: 572–575
b. Explain the arrangement of elements within a group on the periodic table based on similar physical and chemical properties.	SE: 574–575 TWE: 574–575
c. Explain that property trends on the periodic table are a function of the elements' atomic structures.	SE: 572–575 TWE: 572–575
d. Determine atomic number, mass number, # protons, # neutrons, # electrons for given isotopes of elements.	SE: 521–522 TWE: 521–522
3. Bonds between atoms are created when electrons are paired up by being transferred or shared. A substance composed of a single kind of atom is called an element. The atoms may be bonded together into molecules or crystalline solids. A compound is formed when two or more kinds of atoms bind together chemically.	
a. Trace the historical development of the systematic approach to the study of matter by including the contributions Lavoisier (Law of Conservation of Matter) and Dalton (atomic theory). **(H,N)**	SE: 511–512, 602–604 TWE: 511–512, 602–604
b. Compare and contrast elements and compounds.	SE: 578–582 TWE: 578–582

OBJECTIVES	PAGE REFERENCES
c. Classify compounds as being crystalline solids (ionic) or molecules (covalent) based on the transfer or sharing of outer electrons.	SE: 578–582, 587 TWE: 578–582, 587
d. Predict the ratio by which the representative elements combine to form ionic compounds expressing that ratio in a chemical formula.	SE: 585–586 TWE: 585–586
4. The physical properties of compounds reflect the nature of the interactions among its molecules. These interactions are determined by the structure of the molecule, including the constituent atoms and the distances and angles between them.	
a. Relate the physical properties of compounds to their type of bonding.	SE: 582–584 TWE: 583–584
b. Analyze the physical properties of water as they relate to water's bonding and molecular shape.	SE: 583 TWE: 583
c. Investigate how solubility varies among different solutes and for the same solute at different temperatures.	This objective falls outside the scope of Glencoe, Science Level Blue.
d. Analyze the behavior of polar an nonpolar substances in forming solutions.	The opportunity to address this objective is available. See the following: SE: 582–583 TWE: 582–583
e. Identify factors that affect the rates at which substances dissolve.	This objective falls outside the scope of Glencoe, Science Level Blue.
f. Compare the amount of solute and solvent in concentrated and dilute mixtures.	This objective falls outside the scope of Glencoe, Science Level Blue.

OBJECTIVES	PAGE REFERENCES
5. Solids, liquids, and gases differ in the distances and angles between molecules or atoms and therefore the energy that binds them together. In solids the structure is nearly rigid; in liquids molecules or atoms move around each other but do not move apart; and in gases molecules or atoms move almost independently of each other and are mostly far apart.	
a. Compare and contrast solids, liquids, and gases in terms of particle arrangement and the energy that binds them together.	This objective falls outside the scope of Glencoe, Science Level Blue.
6. Carbon atoms can bond to one another in chains, rings, and branching networks to form a variety of structures, including synthetic polymers, oils, and the large molecules essential to life.	
a. Analyze how carbon atoms bond to one another in a variety of structures.	The opportunity to address this objective is available. See the following: SE: 521–522 TWE: 521–522
b. Describe polymers as molecules bonded together.	This objective falls outside the scope of Glencoe, Science Level Blue.
c. Determine uses of aromatic compounds and polymers in everyday life. **(P)**	This objective falls outside the scope of Glencoe, Science Level Blue.
d. Explore, investigate, and list some common uses of petroleum products, including manufacturing and medical application.	This objective falls outside the scope of Glencoe, Science Level Blue.
C. Chemical Reactions	
1. Chemical reactions occur all around us, for example in health care, cooking, cosmetics, and automobiles. Complex chemical reactions involving carbon-based molecules take place constantly in every cell in our bodies.	
a. Explain the process of rusting in terms of electron transfer and debate the economic impact of rusting.	This objective falls outside the scope of Glencoe, Science Level Blue.
b. Describe how metabolism is an inter-related collection of chemical reactions.	The opportunity to address this objective is available. See the following: SE: 202–211, 213–219 TWE: 202–211, 213–219

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OBJECTIVES	PAGE REFERENCES
1. Explain that food is composed partially of large complex molecules that are broken down into simpler molecules. **(P)**	SE: 213–219 TWE: 213–219
2. Analyze how these simpler molecules are rearranged into new molecules within living things. **(N)**	The opportunity to address this objective is available. See the following: SE: 202–211, 213–219 TWE: 202–211, 213–219
c. Explain the sources and environmental effects of some inorganic and organic toxic substances, such as heavy metals and PCB's. **(P)**	SE: 274, 389, 421–422 TWE: 274, 389, 421–422
2. Chemical reactions may release or consume energy. Some reactions such as the burning of fossil fuels release large amounts of energy by losing heat and by emitting light. Light can initiate many chemical reactions such as photosynthesis and the evolution of urban smog.	
a. Investigate and provide evidences of a chemical change by recording systematic observations, such as change in color, odor, and temperature for various chemical reactions. **(N)**	SE: 597–599, 604–607 TWE: 597–599, 604–607
b. Recognize balanced chemical equations.	SE: 603 TWE: 603
c. Classify reactions as energy-absorbing (endothermic) or energy-releasing (exothermic) based on temperature measurements.	SE: 604–607 TWE: 604–607
d. Conclude from experimental evidence that mass is neither created nor destroyed based on mass measurements. **(N)**	SE: 602 TWE: 602

OBJECTIVES	PAGE REFERENCES
3. A large number of important reactions involve the transfer of either electrons (oxidation/reduction) or hydrogen ions (acid/base reactions) between reaction ions, molecules, or atoms. In other reactions, chemical bonds are broken by heat or light to form very reactive radicals with electrons ready to form new bonds. Radical reactions control many processes such as the presence of ozone and greenhouse gases in the atmosphere, burning and processing of fossil fuels, the formation of polymers, and explosions.	
a. Differentiate between acids and bases.	
1. Identify the physical characteristics of acids and bases.	This objective falls outside the scope of Glencoe, Science Level Blue.
2. Identify acids and bases in terms of their pH.	This objective falls outside the scope of Glencoe, Science Level Blue.
3. Describe neutralization reactions.	This objective falls outside the scope of Glencoe, Science Level Blue.
4. Explain how acid rain is formed and discuss its effects on the environment. **(P)**	SE: 389 TWE: 389
5. Evaluate the role pH plays in the development of consumer products. **(N,P)**	This objective falls outside the scope of Glencoe, Science Level Blue.
6. Analyze the color changes of some common indicators to distinguish among the ranges of acidic, basic, and neutral solutions.	This objective falls outside the scope of Glencoe, Science Level Blue.
b. Examine the role of free radicals in atmospheric changes, cellular changes, and processes such as organic synthesis and burning **(N,P)**	This objective falls outside the scope of Glencoe, Science Level Blue.

OBJECTIVES	PAGE REFERENCES
4. Chemical reactions can take place in time periods ranging form the few femtoseconds (10^{-15} seconds) required for an atom to move a fraction of a chemical bond distance to geologic time scales of billions of years. Reaction rates depend on how often the reacting atoms and molecules encounter one another, on the temperature, and on the properties – including shape – of the reacting species. Catalysts, such as metal surfaces, accelerate chemical reactions. Chemical reactions in living systems are catalyzed by protein molecules called enzymes.	
a. Describe how reaction rates are a function of the collisions among particles.	SE: 608–612 TWE: 608–612
b. Analyze the effects of temperature, particle size, stirring, concentration, and catalysts on reaction rates.	SE: 610–614 TWE: 610–614
c. Apply reaction rate concepts to real life applications such as food spoilage, storage of film and batteries, digestive aids, and catalytic converters. **(P,T)**	SE: 612–614 TWE: 612–614
IV. Physical Science (Physics)	
A. Motions and Forces	
1. Objects change their motion only when a net force is applied. Laws of motion are used to calculate precisely the effects of forces on the motion of objects. The magnitude of the change in motion can be calculated using the relationship F=ma, which is independent of the nature of the force. Whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted on the first object.	
a. Trace the historical development of the understanding of forces including the contributions of Galileo, Isaac Newton, Benjamin Franklin, and Charles-Augustin de Coulomb. **(H,N)**	SE: 656, 660–663, 664–670, 671–676 TWE: 656, 660–663, 664–670, 671–676
b. Predict the motion of an object in terms of Newton's three laws of motion.	SE: 660–663, 6654–670, 671–676 TWE: 660–663, 6654–670, 671–676
c. Solve uniformly accelerated, linear motion problems quantitatively and graphically.	SE: 632–635, 636–640, 664–667 TWE: 632–635, 636–640, 664–667
d. Generate and interpret graphs of linear motion.	SE: 632–635, 636–640 TWE: 632–635, 636–640

OBJECTIVES	PAGE REFERENCES
e. Cite evidence to justify the use of auto safety devices, including seat belts, air bags, bumpers and head rests, in terms of Newton's laws. **(P,T)**	SE: 680–681 TWE: 680–681
2. Gravitation is a universal force that each mass exerts on any other mass. The strength of the gravitational attractive force between two masses is proportional to the masses and inversely proportional to the square of the distance between them.	
a. Describe quantitative changes in gravitational attraction in terms of changes in distances between masses.	SE: 665–666 TWE: 665–666
b. Describe quantitative changes in gravitational attraction in terms of changes in the masses	SE: 665–666 TWE: 665–666
3. The electric force is a universal force that exists between any two charged objects. Opposite charges attract while like charges repel. The strength of the force is proportional to the charges, and, as with gravitation, inversely proportional to the square of the distance between them. Between any two charged particles, electric force is vastly greater than the gravitational force. Most observable forces such as those exerted by a coiled spring or friction may be traced to electric forces acting between atoms and molecules.	
a. Demonstrate the interactions of like and unlike charges.	This objective falls outside the scope of Glencoe, Science Level Blue.
b. Examine changes in electrostatic attraction in terms of changes in distances between two point charges.	This objective falls outside the scope of Glencoe, Science Level Blue.
c. Examine changes in electrostatic attraction in terms of changes in the quantities of the charges.	This objective falls outside the scope of Glencoe, Science Level Blue.
d. Compare the magnitudes of electrical and gravitational forces.	This objective falls outside the scope of Glencoe, Science Level Blue.
e. Discuss the role of static electricity in disruptions and damage to electrical devices. **(N,P,T)**	This objective falls outside the scope of Glencoe, Science Level Blue.

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OBJECTIVES	PAGE REFERENCES
4. Electricity and magnetism are two aspects of a single electromagnetic force. Moving electric charges produce magnetic forces, and moving magnets produce electric forces. These effects help students to understand electric motors and generators.	
a. Describe how moving electrical charges produce magnetic fields.	This objective falls outside the scope of Glencoe, Science Level Blue.
b. Describe how moving magnets produce electrical fields.	This objective falls outside the scope of Glencoe, Science Level Blue.
c. Compare and contrast electrical motors and electrical generators in terms of energy transfers. **(N,T)**	This objective falls outside the scope of Glencoe, Science Level Blue.
d. Examine the effects of the advent of electricity on individuals and society. **(H,N,P,T)**	This objective falls outside the scope of Glencoe, Science Level Blue.
5. Analyze electrical circuits that obey Ohm's Law. (Not an NSES standard)	
a. Construct and schematically diagram simple series circuits and parallel circuits.	This objective falls outside the scope of Glencoe, Science Level Blue.
b. Use an electric meter to measure the voltage and resistance. **(T)**	This objective falls outside the scope of Glencoe, Science Level Blue.
c. Compare and contrast series and parallel circuits.	This objective falls outside the scope of Glencoe, Science Level Blue.
d. Perform calculations using Ohm's Law.	This objective falls outside the scope of Glencoe, Science Level Blue.
e. Explain how fuses, surge protectors, and breakers function. **(T)**	This objective falls outside the scope of Glencoe, Science Level Blue.

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OBJECTIVES	PAGE REFERENCES
B. Conservation of Energy and the Increase in Disorder	
1. The total energy of the universe is constant. Energy can be transferred by collisions in chemical and nuclear reactions, by light waves and other radiations, and in many other ways. However, it can never be destroyed. As these transfers occur, the matter involved becomes steadily less ordered.	
a. Evaluate transformations between potential and kinetic energies and other forms of energy.	SE: 411 TWE: 411
b. State and apply quantitative relationships between energy, work, power, and efficiency.	The opportunity to address this objective is available. See the following: SE: 411 TWE: 411
c. Cite or identify examples of how the disorder of matter changes with energy changes. **(N)**	This objective falls outside the scope of Glencoe, Science Level Blue.
2. All energy can be considered to be either kinetic energy, which is the energy of motion; potential energy, which depends on relative position; or energy contained by a field, such as electromagnetic waves.	
a. Classify energy types as potential, kinetic, or electromagnetic.	The opportunity to address this objective is available. See the following: SE: 411 TWE: 411
3. Heat consists of random motion and the vibrations of atoms, molecules, and ions. The higher the temperature, the greater the atomic or molecular motion.	
a. Predict and measure the effects of varying the temperature, pressure, and volume of gases. **(N)**	This objective falls outside the scope of Glencoe, Science Level Blue.
b. Asses particle motion and distance as they relate to temperature and phase changes.	This objective falls outside the scope of Glencoe, Science Level Blue.
c. Assess the hazards of handling and storing pressurized gases. **(P,T)**	This objective falls outside the scope of Glencoe, Science Level Blue.

OBJECTIVES	PAGE REFERENCES
4. Everything tends to become less organized and less orderly over time. Thus, in all energy transfers, the overall effect is that the energy is spread out uniformly. Examples are the transfer of energy from hotter to cooler objects by conduction, radiation, or convection and the warming of our surroundings when we burn fuels.	
a. Compare and contrast the environmental impact of power plants that use fossil fuels, water, or nuclear energy to produce electricity. **(P,T)**	SE: 412, 418, 424, 493 TWE: 412, 418, 424, 493
C. Interactions of Energy and Matter	
1. Waves, including sound and seismic waves, waves on water, and light waves, have energy and can transfer energy when they interact with matter.	
a. Identify and show relationships among wave characteristics such as velocity, period, frequency, amplitude, phase, and wavelength.	The opportunity to address this objective is available. See the following: SE: 42–43 TWE: 42–43
b. Compare and contrast models of longitudinal and transverse waves.	This objective falls outside the scope of Glencoe, Science Level Blue.
c. Give examples of the wave behaviors of reflection, refraction, diffraction, interference, polarization, and Doppler effect.	SE: 44, 156–157 TWE: 44, 156–157
d. Compare light and sound in terms of wave models	The opportunity to address this objective is available. See the following: SE: 301 TE: 301
e. Distinguish between the electromagnetic spectrum, seismic waves, water waves and sound waves based on their properties and behaviors.	This objective falls outside the scope of Glencoe, Science Level Blue.
f. Describe the energy of a wave in terms of amplitude and frequency.	This objective falls outside the scope of Glencoe, Science Level Blue.

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g. Relate wave behavior to health issues such as skin cancer, cataracts, medical diagnostics, and treatment. **(P,T)**	This objective falls outside the scope of Glencoe, Science Level Blue.
h. Relate wave behavior to communication issues such as cellular phones, satellites, and animal communication. **(P,T)**	This objective falls outside the scope of Glencoe, Science Level Blue.
i. Relate wave behavior to optical and sonic devices such as optic fibers and motion detectors. **(P,T)**	This objective falls outside the scope of Glencoe, Science Level Blue.
2. Electromagnetic waves result when a charged object is accelerated or decelerated. Electromagnetic waves include radio waves (the longest wavelength), microwaves, infrared radiation (radiant heat), visible light, ultraviolet radiation, x-rays, and gamma rays. The energy of electromagnetic waves is carried in packets whose magnitude is inversely proportional to the wavelength.	
a. Compare and contrast the parts of the electromagnetic spectrum in terms of energy.	SE: 42–43 TWE: 42–43
3. Each kind of atom or molecule can gain or lose energy only in particular discrete amounts and thus can absorb and emit light only at wavelengths corresponding to these amounts. These wavelengths can be used to identify the substance.	
a. Describe how the absorbing and releasing of energy by electrons produces light.	This objective falls outside the scope of Glencoe, Science Level Blue.
b. Explain that each element has its own configuration of electrons and has a unique line spectrum that can be used to identify that element.	The opportunity to address this objective is available. See the following: SE: 142 TWE: 142
c. Discuss the application of emitted colors by certain substances in such areas as fireworks and light sources. **(P,T)**	The opportunity to address this objective is available. See the following: SE: 142 TWE: 142

OBJECTIVES	PAGE REFERENCES
4. In some materials, such as metals, electrons flow easily, whereas in insulating materials such as glass they can hardly flow at all. Semiconducting materials have intermediate behavior. At low temperatures some materials become superconductors and offer no resistance to the flow of electrons.	
a. Compare insulators, conductors, and semiconductors.	The opportunity to address this objective is available. See the following: SE: 411–415 TWE: 411–415
b. Describe the conditions under which superconductivity exists.	The opportunity to address this objective is available. See the following: SE: 411–415 TWE: 411–415
c. Evaluate the impact of miniaturization of electric circuits upon individuals and society **(H,P,T)**	The opportunity to address this objective is available. See the following: SE: 411–415 TWE: 411–415

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