

GLENCOE CORRELATION
PHYSICAL SCIENCE
MARYLAND
 Science Content Standards
 Grade Twelve

CONTENT STANDARDS	PAGE REFERENCES
1.0 Skills and Processes - Students will demonstrate the thinking and acting inherent in the practice of science.	
Scientific Inquiry	
By the end of grade 12 , students know and are able to do everything required at earlier grades and:	
1.12.1 access and process information from readings, investigations, and/or oral communications. (SFS 3.2) (SFS 4.1)	
The student will read a technical selection and interpret it appropriately. (CLG 1.5.6)	SE: 8, 798 <i>Science and History</i> 118-119, 350-351, 566-567 <i>Science and Society</i> 150-151, 314-315, 412-413, 476-477, 788-789
<i>The student will learn the use of new instruments and equipment by following instructions in a manual or from oral direction. (CLG 1.3.4)</i>	SE: 471, 805-806 <i>Activity</i> 116-117, 148-149, 216-217, 442-443, 692-693 <i>Explore Activity</i> 193, 225 <i>MiniLab</i> 19
The student will use relationships discovered in the lab to explain phenomena observed outside the laboratory. (CLG 1.2.7)	SE: <i>Activity</i> 27, 148-149, 312-313, 380-381, 563 <i>Problem Solving Strategies</i> 230, 303, 680 <i>Science and Society</i> 314-315, 788-789
The student will create and/or interpret graphics (scale drawings, photographs, digital images, etc.). (CLG 1.5.4)	SE: 22-26, 43, 291, 492, 505-507, 808 <i>Activity</i> 58-59, 180-181, 496, 692-693
1.12.2 formulate questions that lead to a testable hypothesis , which demonstrates the logical connections between the scientific concepts and the design of an investigation .	
The student will identify meaningful, answerable scientific questions. (CLG 1.2.1)	SE: 8, 802 <i>Activity</i> 58-59, 148-149, 312-313, 692-693 <i>Problem Solving Activity</i> 230, 303, 680, 781
<i>The student will pose meaningful, answerable, scientific questions. (CLG 1.2.2)</i>	SE: 8, 802 <i>Activity</i> 58-59, 148-149, 312-313, 692-693 <i>Problem Solving Activity</i> 230, 303, 680, 781
1.12.3 use observations, research, and select appropriate scientific information to form predictions and hypotheses .	
The student will formulate a working hypothesis. (CLG 1.2.3)	SE: 8, 802 <i>Activity</i> 58-59, 116-117, 216-217, 248-249, 312-313, 380-381, 442-443, 630-631
1.12.4 design experimental approaches, which answer scientific questions.	
The student will select appropriate instruments and materials to conduct an investigation. (CLG 1.2.5)	SE: 14-21, 468-473, 805-806 <i>Activity</i> 58-59, 148-149, 248-249, 402, 474-475, 649, 692-693
The student will identify appropriate methods for conducting an investigation and affirm the need for proper controls in an experiment. (CLG 1.2.6)	SE: 7-13, 802-807 <i>Activity</i> 116-117, 148-149, 216-217, 348-349, 534-535, 692-693, 727, 786-787

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1.12.5 demonstrate safety when conducting an investigation.	
The student will recognize safe laboratory procedures. (CLG 1.3.2)	SE: 826 <i>Activity 171, 247, 441, 496, 525, 594-595, 649, 662-663, 727</i>
<i>The student will demonstrate safe handling of the chemicals and materials of science. (CLG 1.3.3)</i>	SE: 826 <i>Activity 171, 247, 441, 496, 525, 594-595, 649, 662-663, 727</i>
1.12.6 use mathematical processes (measuring, calculating, etc.) when conducting investigations, analyzing information, and/or displaying information.	
The student will recognize mathematics as part of the scientific endeavor, comprehend the nature of mathematical thinking, and become familiar with key mathematical ideas and skills. (CLG 4.6.2)	SE: 40-41, 128-131, 504-507 <i>Activity 148-149, 692-693</i> <i>Math Skills Activity 24, 128, 270, 499, 748</i>
The student will recognize the important role that mathematics serves when solving problems in physics. (CLG 5.7.2)	SE: <i>Math Skills Activity 42, 69, 104, 128, 130, 162, 214, 335, 499</i>
<i>The student will recognize mathematics as an integral part of the scientific process. (CLG 1.7.4)</i>	SE: 40-41, 128-131, 504-507 <i>Activity 148-149, 692-693</i> <i>Math Skills Activity 24, 128, 270, 499, 748</i>
The student will use ratio and proportion in appropriate situations to solve problems. (CLG 1.6.1)	SE: 818, 821 <i>Activity 27, 692-693</i> <i>Math Skills Activity 42, 505, 625, 748</i> <i>MiniLab 19</i> <i>Problem Solving Activity 462</i>
<i>The student will use computers and/or graphing calculators to perform calculations for tables, graphs, or spreadsheets. (CLG 1.6.2)</i>	SE: 24, 812-815 <i>National Geographic 683</i> TWE: CYD 59, 89, 106, 117, 147, 217, 311
The student will express and/or compare small and large quantities using scientific notation and relative order of magnitude. (CLG 1.6.3)	SE: 550 <i>Earth Science Integration 17</i> <i>Problem Solving Activity 393</i> TWE: CUR 522 EX 343 FF 76 FYI 780
<i>The student will manipulate quantities and/or numerical values in algebraic equations. (CLG 1.6.4)</i>	SE: 48-50, 86-87, 820 <i>Activity 148-149</i> <i>Math Skills Activity 42, 69, 104, 128, 335, 499</i>
The student will judge the reasonableness of an answer. (CLG 1.6.5)	SE: 10, 809-811 <i>Earth Science Integration 45-46</i> <i>Problem Solving Activity 230, 658, 680</i> <i>Science and History 118-119</i>
1.12.7 collect, organize, and display data in multiple ways that fit the context using appropriate instruments to effectively convey the information (e.g., calculators, spreadsheets, and databases and graphing programs). (SFS 3.2) (SFS 4.1)	
<i>The student will test a working hypothesis. (CLG 1.2.4)</i>	SE: 8, 802 <i>Activity 58-59, 116-117, 216-217, 248-249, 312-313, 380-381, 442-443, 630-631</i>

CONTENT STANDARDS	PAGE REFERENCES
<i>The student will develop and demonstrate skills in using lab and field equipment to perform investigative techniques. (CLG 1.3.1)</i>	SE: 14-21, 468-473, 805-806 <i>Activity 58-59, 148-149, 248-249, 402, 474-475, 649, 692-693</i>
The student will organize data appropriately using techniques such as tables, graphs, and webs (for graphs: axes labeled with appropriate quantities, appropriate units on axes, axes labeled with appropriate intervals, independent and dependent variables on correct axes, appropriate title). (CLG 1.4.1)	SE: 22-26, 808, 814-815 <i>Activity 311, 312-313, 563, 692-693</i> <i>Math Skills Activity 24, 625</i> <i>Problem Solving Activity 680</i>
The student will use computers and/or graphing calculators to produce tables, graphs, and spreadsheet calculations. (CLG 1.5.5)	SE: 24, 812-815 <i>National Geographic 683</i> TWE: CYD 59, 89, 106, 117, 147, 217, 311
1.12.8 analyze appropriate data to identify trends to form conclusions and apply what has been learned to evaluate the hypothesis.	
The student will analyze data to make predictions, decisions, or form conclusions. (CLG 1.4.2)	SE: 10 <i>Activity 216-217, 692-693</i> <i>Earth Science Integration 11, 45-46</i> <i>Explore Activity 543, 607</i> <i>Problem Solving Activity 303, 658, 680</i>
The student will use experimental data from various investigators to validate results. (CLG 1.4.3)	SE: 547-549, 554-555, 811 <i>Activity 28-29, 58-59, 90-91, 338, 348-349</i> <i>Astronomy Integration 86</i>
The student will determine the relationships between quantities and develop the mathematical model that describes these relationships. (CLG 1.4.4)	SE: 48-50, 69-70, 76-78, 86-88, 162-163, <i>Activity 148-149, 348-349,</i> <i>Problem Solving Activity 462</i>
The student will check graphs to determine that they do not misrepresent results. (CLG 1.4.5)	SE: 10, 25, 811 TWE: AS 26 EX 23 IM 43
The student will describe trends revealed by data. (CLG 1.4.6)	SE: 22-26, 162-163, 296-297, 504-507 <i>Activity 180-181, 496, 594-595, 727, 728-729</i> <i>Problem Solving Activity 462</i>
The student will use analyzed data to confirm, modify, or reject an hypothesis.(CLG 1.4.9)	SE: 10, 809-811 <i>Activity 58-59, 116-117, 216-217, 248-249, 380-381, 442-443, 534-535, 786-787</i>
1.12.9 interpret and communicate findings through speaking, writing, and drawing in a form suited to the purpose and audience, using developmentally appropriate methods including technology tools and telecommunications. (SFS 3.1) (SFS 4.1)	
The student will demonstrate the ability to summarize data (measurements/observations). (CLG 1.5.1)	SE: 22-26, 43, 806-808 <i>Activity 148-149, 312-313, 459, 496, 563, 692-693, 776</i>

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The student will explain scientific concepts and processes through drawing, writing, and/or oral communication. (CLG 1.5.2)	SE: 587-593, 811 <i>Activity 28-29, 410-411, 564-565</i> <i>Problem Solving Activity 590</i> <i>Science and Language Arts 30-31</i> TWE: A 9 CYD 402 SJ 12
The student will use tables, charts, and graphs to display data in making arguments and claims in both oral and written presentations. (CLG 2.8.3), (CLG 5.6.4)	SE: 22-26, 43, 806-808 <i>Activity 148-149, 312-313, 459, 496, 563, 692-693, 776</i>
<i>The student will use computers and/or graphing calculators to produce the visual materials (tables, graphs, and spreadsheets) that will be used for communicating results. (CLG 1.5.3)</i>	SE: 24, 812-815 <i>National Geographic 683</i> TWE: CYD 59, 89, 106, 117, 147, 217, 311
The student will communicate conclusions derived through a synthesis of ideas. (CLG 1.5.9)	SE: 810-811 <i>Activity 148-149, 312-313, 410-411, 563, 692-693, 756-757</i> <i>National Geographic 2-3, 322-323, 604-605</i>
Critical Thinking	
1.12.10 analyze similarities and differences of objects, materials, concepts, and actions.	
The student will describe similarities and differences when explaining concepts and/or principles. (CLG 1.5.8)	SE: 296-297, 465-466, 489-495, 532, 608-609, 616-617, 810 <i>Activity 208, 338, 525</i>
1.12.11 construct various classification systems and infer degree of divergence and/or kinship of various objects, materials, concepts, actions, and organisms.	
The student will use, explain, and/or construct various classification systems. (CLG 1.5.7)	SE: 196-197, 465-466, 554-561, 582-586, 685-690, 746-749, 809 <i>Activity 208, 525</i> <i>Life Science Integration 9</i>
1.12.12 critique scientific information in order to detect bias and analyze the source of the bias. (SFS 2.2)	
The student will critique arguments that are based on faulty, misleading data or on the incomplete use of numbers. (CLG 1.1.3)	SE: 555, 798 TWE: AS 26 CUR 10 EX 23 IM 198
The student will recognize data that are biased. (CLG 1.1.4), (CLG 2.8.2), (CLG 5.6.2)	SE: 811 TWE: AS 26 EX 23 FF 10
The student will explain the factors that produce biased data. (CLG 1.1.5)	SE: 811 TWE: AE 283 AS 26 EX 23 FF 10

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1.12.13 analyze the adequacy of the supporting evidence used to form conclusions, devise a plan, or solve a practical problem. (SFS 2.2)	
The student will determine the sources of error that limits the accuracy or precision of experimental results. (CLG 1.4.7)	SE: 14-21, 811, 819 <i>Activity</i> 28-29, 216-217, 534-535, 594-595, 786-787
1.12.14 provide supporting evidence when forming conclusions, devising a plan or solving a practical problem. (SFS 2.2)	
The student will defend the need for verifiable data. (CLG 1.2.8)	SE: 8-10, 17-21, 810-811 <i>Activity</i> 311, 312-313, 402, 534-535, 594-595, 692-693, 756-757
<i>1.12.15 analyze and extend patterns.</i>	
1.12.16 analyze conclusions and modify ideas based on new information from developmentally appropriate readings, data, and the ideas of others.	
The student will modify or affirm scientific ideas according to accumulated evidence. (CLG 1.1.2)	SE: 7-10, 547-549, 802-811 <i>Astronomy Integration</i> 86, 562 <i>Earth Science Integration</i> 45-46 <i>Math Skills Activity</i> 505 <i>Science and History</i> 118-119 <i>Science and Society</i> 412-413, 788-789
1.12.17 describe to others how scientific information was used.	
Applications of Science	
1.12.18 apply scientific principles and/or concepts to understand a new situation.	
1.12.19 The student will apply skills, processes, and concepts of biology, chemistry, physics, and earth/space science to societal issues. (CLG 1.7.1)	SE: 296-297, 301-303, 305-310 <i>Environmental Science Integration</i> 242, 783 <i>Science and Society</i> 314-315, 382-383, 412-415, 476-477, 788-789
<i>The student will describe the role of science in the development of literature, art, and music. (CLG 1.7.3)</i>	SE: 369-373, 428-429, 435 <i>Activity</i> 374 <i>Science and Language Arts</i> 60-61, 218-219, 444-445
<i>The student will apply chemistry to the concepts of biology, earth/space science, and environmental science. (CLG 4.6.1)</i>	SE: 532-533, 656-661, 673-677 <i>Astronomy Integration</i> 562 <i>Earth Science Integration</i> 271, 589 <i>Environmental Science Integration</i> 400, 619 <i>Health Integration</i> 580, 611
<i>The student will apply physics to the concepts of biology, earth/space science, and environmental science. (CLG 5.7.1)</i>	SE: 174-175, 264, 278 <i>Earth Science Integration</i> 229 <i>Life Science Integration</i> 230, 300, 360-362, 463-467 <i>Science and History</i> 250-251 <i>Science and Society</i> 476-477
<i>The student will investigate the role of chemistry in areas of human endeavor and achievement. (CLG 4.6.3)</i>	SE: 610-620, 622-629, 640-648, 653-655, 672-682, 685-690 <i>National Geographic</i> 519, 652, 751
<i>The student will investigate the role of physics in all areas of human endeavor and achievement. (CLG 5.7.3)</i>	SE: 132-136, 138-146, 172-178, 237-239, 298-303, 369-373, 403-409, 434-435 <i>Science and History</i> 250-251, 350-351

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1.12.20 defend a position on a scientific issue and take into account the different types of risks and benefits in formulating a plan of action. (SFS 2.3)	
<i>The student will investigate an issue such as climatic changes or electric power generation. (CLG 2.8.1)</i>	SE: 290-297, 301-303, 305-310, 400, 752 <i>Activity 756-757</i> <i>Science and Society 314-315, 382-383, 412-413, 788-789</i>
<i>The student will investigate a social issue related to physics such as alternate energy source, fiber optics in telecommunications, nuclear power, microwave technology, effect of power lines, etc. (CLG 5.6.1)</i>	SE: 174-175, 298-303, 305-310 <i>Activity 312-313, 380-381, 756-757</i> <i>Science and Society 314-315, 382-383, 412-413</i>
1.12.21 The student will recognize that real problems have more than one solution and decisions to accept one solution over another are made on the basis of many issues. (CLG 1.1.1), (CLG 2.8.5), (CLG 5.6.3) (SFS 2.3)	SE: 296-297, 305-310 <i>Activity 312-313, 563</i> <i>Science and Society 314-315, 382-383, 412-413, 788-789</i> TWE: FYI 244, 299
The student will explain why curiosity, honesty, openness, and skepticism are highly regarded in science. (CLG 2.8.4)	SE: 7-10, 497-500, 547-549, 554-555 <i>Accidents in Science 282-283, 596-597, 664-665, 758-759</i> <i>National Geographic 2-3</i> <i>Science and Society 694-695</i>
Technology	
1.12.22 design, construct, and use models (e.g., math, computer, physical) to make predictions about actual events.	
<i>The student will use models and computer simulations to extend his/her understanding of scientific concepts. (CLG 1.4.8)</i>	SE: 11, 547-549, 807 <i>Activity 148-149, 171, 216-219, 280-281, 402, 630-631</i>
1.12.23 demonstrate and explain how using existing tools extend knowledge and identify the limitations, which drive the need for new technologies (i.e., create improvements in observing, estimating, measuring, computing, collecting, and communicating scientific data and information).	
The student will explain how development of scientific knowledge leads to the creation of new technology and how technological advances allow for additional scientific accomplishments. (CLG 1.7.6)	SE: 13, 650-655, 672-677, 681-684 <i>Accidents in Science 282-283, 596-597</i> <i>Science and Society 150-151, 476-477, 694-695</i> TWE: FYI 12
1.12.24 explain that when designing a device, process, or system (e.g., manufacturing, marketing, operating, maintaining, replacing, and disposing of) risk analysis and technology assessment determines how it will be employed.	
1.12.26 explain that science and technology have strongly influenced the course of history and cite how human inventiveness has brought new risks as well as improvements to human existence.	
The student will identify and evaluate the impact of scientific ideas and/or advancements in technology on society. (CLG 1.7.2)	SE: 13, 56, 138-146, 172-178, 211-215, 237-246, 290-297, 301-304, 650-655, 681-684

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History of Science	
1.12.27 describe how various cultures from ancient times to the present have made contributions that led to current scientific ideas and technological invention.	
1.12.28 explain that scientific careers differ from one another in what is studied, techniques used, where studied, and outcomes sought but they share a common purpose and philosophy and are part of the same scientific enterprise.	
The student will investigate career possibilities in the various areas of science. (CLG 1.7.5)	SE: 276-278, 377-379 Career Connection 31, 61, 219, 445 Science and History 250-251, 350-351 Science and Society 476-477, 694-695
4.0 Chemistry - Students will use scientific skills and processes to explain the composition, structure, and interactions of matter in order to support the predictability of structure and energy transformations.	
Structure of Matter	
4.12.1 use observation of the properties of matter to predict its structure and changes to its structure.	
The student will select and use appropriate devices to measure directly or indirectly the length, mass, volume, or temperature of a substance (centigram balances, graduated cylinders & pipettes, metric rulers, thermometers & temperature probes). (CLG 4.1.1)	SE: 14-21, 805-806 Activity 27, 28-29, 90-91, 116-117, 180-181, 496, 692-693, 755
The student will gather and interpret data related to physical and chemical properties of matter such as density and percent composition (constructing data tables, graphing linear relationship, appropriate technology to analyze data). (CLG 4.1.2)	SE: Activity 208, 508-509, 630-631, 692-693, 728-729, 776 Earth Science Integration 674 MiniLab 19, 673 Science and Society 694-695
The student will distinguish among metallic, ionic, and covalent solids in terms of observable properties (solubility, melting point, boiling point, conductivity). (CLG 4.2.4)	SE: 576-578, 582-584 Activity 594-595, 621 TWE: CH 586 FYI 575
The student will illustrate the structure of the atom and describe the characteristics of the particles found there (protons, neutrons, & electrons; nucleus). (CLG 4.2.1)	SE: 258-262, 545-549, 552-553, 558-560, 576-577 Activity 579 TWE: FYI 610
Physical or Chemical Changes	
4.12.3 explain how the number and arrangement of electrons can be used to predict when an atom will transfer or share electrons to form a bond and explain how the resulting materials are different from the original materials (i.e., organic, biochemical, and inorganic examples).	
The student will demonstrate that the arrangement and number of electrons determine the properties of an element and that these properties repeat in a periodic manner illustrated by their arrangement in the periodic table (atomic number, mass number, valence electrons, chemical properties/families). (CLG 4.2.2)	SE: 554-555, 558-561, 576-577, 608-620, 622-627 Science and History 632-633

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The student will explain how atoms interact with other atoms through the transfer and sharing of electrons in the formation of chemical bonds (characteristics of a neutral atom, formation of ions, ionic bonding, covalent bonding). (CLG 4.2.3)	SE: 558-561, 574-578, 580-584, 642-644, 646, 681-682 <i>Activity 579, 662-663</i>
The student will summarize that the properties of a molecule are determined by the number and types of atoms it contains and how these compounds are arranged (determine the types and numbers of atoms represented by a given formula, polar and nonpolar molecules). (CLG 4.2.5)	SE: 574-575, 580-584, 586-593, 640-648, 653-654, 656-661 <i>Activity 594-595, 649, 662-663</i> <i>National Geographic 585</i>
The student will explain why organic compounds have such diverse properties and give examples of how they have had an impact on society (unique characteristics of carbon, fuels and plastics). (CLG 4.2.6)	SE: 640-648, 653-661, 685-690 <i>Activity 649, 662-663, 692-693</i> <i>National Geographic 652</i> <i>Science and Society 694-695</i>
Classification of Matter	
The student will illustrate that substances can be represented by formulas (know that symbols are used to represent elements; identify the atomic mass of the element; write formulas for compounds given the name of the compound; name binary compounds given the formula; calculate the molecular weight of a compound given the periodic table). (CLG 4.4.1)	SE: 518-519, 544, 556-561, 574-575, 583-584, 587-593, 640-648, 656-661 <i>Activity 564-565</i>
The student will show that chemical reactions can be represented by symbolic or word equations that specify all reactants and products involved. (CLG 4.4.2)	SE: 738-741, 743-749, 772-773, 777-778, 784-785 <i>Activity 662-663</i> <i>Explore Activity 737</i>
The student will use the law of conservation of mass and energy to balance simple equations (use appropriate coefficients to balance a given symbolic equation). (CLG 4.4.3)	SE: 738-741, 743-745, 777 <i>Math Skills Activity 748</i> TWE: AS 742, 749
The student will classify chemical reactions into general types based on the nature of the observed changes (synthesis and decomposition, combustion, single and double displacement). (CLG 4.4.4)	SE: 746-749, 777, 784-785 <i>Activity 662-663, 755</i> TWE: CH 655 EX 657
The student will demonstrate that adjusting quantities of reactants will affect the amounts of products formed (use the coefficients of a balanced equation to predict amounts of reactants and products). (CLG 4.4.5)	SE: 741, 775, 780 <i>Problem Solving Activity 781</i>
The student will describe a neutralization reaction (properties of acids and bases, characteristics of weak and strong acids and bases, characteristics of salts, indicators, pH scale). (CLG 4.4.6)	SE: 766-769, 772-775, 777-781 <i>Activity 776, 786-787</i> <i>Explore Activity 765</i> <i>Life Science Integration 770</i> <i>Science and Society 788-789</i>

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4.12.5 explain that all matter has structure and the structure serves as the basis for the properties of and the changes in matter.	
The student will demonstrate how matter may be identified and classified in various ways based upon common properties (states of matter; elements, compounds, mixtures, solutions; metals/nonmetals). (CLG 4.1.3)	SE: 518-524, 554-561, 608-620, 622-629, 685-690, 706-712, 766-769 <i>Activity</i> 525, 563, 621
Conservation of Matter and Energy	
4.12.6 analyze the interrelationship of mass and energy associated with chemical, physical, and nuclear changes (i.e., endothermic, exothermic, kinetic molecular theory, rate of change, and gas laws).	
The student will illustrate that heat energy in a material consists of the ordered and disordered motions of its colliding particles (phase changes). (CLG 4.3.1)	SE: 158-160, 164-165, 488-492, 504-506 <i>Activity</i> 496 <i>Explore Activity</i> 157 TWE: TC 486
The student will explain why the interactions among particles involve a change in the energy system (exothermic change, endothermic change, specific heat). (CLG 4.3.2)	SE: 160-161, 164-165, 750-753 <i>Activity</i> 171, 180-181 TWE: FYI 178
The student will conclude that the conservation of mass and energy holds true for all systems, and that the total amount of energy in any closed system remains constant (total amount of energy in any closed system remains constant). (CLG 4.3.3)	SE: 107-112, 114-115, 135, 290 <i>Activity</i> 116-117 <i>Science and History</i> 118-119 TWE: CH 105
The student will describe the observed changes in pressure, in volume, or temperature of a sample of gas in terms of the behavior of particles (matter is made of small particles; particles are in constant motion; the collisions among particles are elastic collisions). (CLG 4.3.4)	SE: 493, 502-507 <i>Activity</i> 180-181 <i>Explore Activity</i> 487
5.0 Physics - Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur.	
Mechanics	
5.12.1 use algebra and geometry to apply the concepts of energy, force (i.e., Newton's Law , gravitation, friction), and momentum to explain the behavior of objects (i.e., linear and rotational motion , projectiles, collisions).	
The student will use analytical techniques appropriate to the study of physics (symbolically representing vector quantities, using signs to represent directions, selecting and using appropriate equipment for measuring and investigating, using appropriate units and applying dimensional analysis, manipulating equations). (CLG 5.1.1)	SE: 805-806, 816 <i>Activity</i> 58-59, 90-91, 116-117, 148-149, 692-693 <i>Math Skills Activity</i> 69, 128, 499

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The student will use algebraic and geometric concepts to describe an object's motion (direction, position, distance/displacement, speed/velocity, motion with a constant acceleration, one and two dimensional motion, frames of reference). (CLG 5.1.2)	SE: 38-43, 48-50, 68-70, 78-80, 823 <i>Activity 58-59, 116-117</i> <i>Math Skills Activity 69</i>
The student will analyze and explain how changes in an object's motion are described by Newton's Laws (balanced/unbalanced forces, inertia, acceleration, force, and mass, action/reaction). (CLG 5.1.3)	SE: 52-56, 68-73, 76-78, 86-88 <i>Activity 57, 58-59, 90-91, 116-117</i> <i>Astronomy Integration 86</i>
The student will analyze the behavior of forces (recognize the four forces of nature, comparison of relative magnitude, inverse square nature of gravitational and electromagnetic forces, relation to work and energy). (CLG 5.1.4)	SE: 68-70, 75-78, 128-131, 195-196, 259-260 <i>Activity 58-59, 248-249</i> <i>Astronomy Integration 86</i> TWE: CH 201
The student will analyze systems with regard to the conservation laws of momentum and energy (conservation of momentum, conservation of energy). (CLG 5.1.5)	SE: 86-88, 107-112, 135, 290 <i>Activity 90-91, 116-117</i> TWE: CH 105 DI 119
5.12.2 explain the relationship between the universal law of gravitation and the force of gravity on an object at the surface of the Earth.	
Thermodynamics	
5.12.7 analyze and apply the concepts of thermodynamics (i.e., laws, heat energy transfer, equilibrium).	
The student will relate thermodynamics to the balance of energy in a system (heat transfer, thermal equilibrium, entropy). (CLG 5.3.1)	SE: 158-161, 164-170 <i>Activity 171, 180-181</i> <i>Math Skills Activity 162</i> TWE: EX 177
Electricity & Magnetism	
5.12.10 analyze electric fields and their effect on charges and electric circuits (i.e., series, parallel, and complex), magnets and magnetic fields , and explain how electricity and magnetism affect one another (i.e., motors and generators).	
The student will describe the types of electric charges and the forces that exist between them (magnitude, sign, Coulomb's Law). (CLG 5.2.1)	SE: 194-196, 200-201 <i>National Geographic 199</i> TWE: FF 214
The student will describe the sources and effects of electric and magnetic fields (static charge, moving charges, simple circuits, permanent magnets). (CLG 5.2.2)	SE: 194-196, 230-234, 244-245 <i>Activity 248-249</i> <i>Earth Science Integration 229</i> <i>National Geographic 199</i> TWE: VL 235
The student will describe how different kinds of materials respond to electric and magnetic fields (conductors, insulators, semiconductors, magnetic materials). (CLG 5.2.3)	SE: 196-197, 205-206, 212, 228, 230-232 <i>Activity 208, 247, 248-249</i> <i>Health Integration 207</i>

CONTENT STANDARDS	PAGE REFERENCES
The student will explain the principle of electromagnetic induction and its applications (motors, generators). (CLG 5.2.4)	SE: 234-238, 240-241, 244-245 <i>Activity 247</i> <i>National Geographic 243</i> TWE: CH 246 IS 248
Wave Interactions	
5.12.14 use energy transformations and physical effects to explain the interactions of waves and physical effects (i.e., Doppler effect and interference patterns).	
The student will describe and demonstrate how waves can be used to transmit energy (physical, electromagnetic). (CLG 5.4.1)	SE: 326-329, 336-337, 363-365, 379, 393-394, 396-401, 432-435 <i>Earth Science Integration 331</i> <i>Science and History 350-351</i> <i>Science and Society 382-383</i>
The student will compare the propagation of mechanical waves (longitudinal, transverse). (CLG 5.4.2)	SE: 332-337, 358-361, 377-378 <i>Activity 338, 348-349, 380-381</i> <i>Earth Science Integration 331</i> <i>National Geographic 376</i> <i>Science and History 350-351</i>
The student will describe and mathematically calculate wave characteristics (wavelength, frequency/period, velocity, amplitude). (CLG 5.4.3)	SE: 332-337, 359-360, 363-366, 369-370, 393-394, 396-401, 403-409 <i>Activity 338, 348-349, 410-411</i>
The student will describe and demonstrate the general behavior of waves (reflection, refraction, diffraction, superposition, interference, Doppler effect). (CLG 5.4.4)	SE: 339-347, 359-360, 367-368, 373, 376-379, 395-401 <i>Activity 348-349, 402, 441</i> <i>Science and History 350-351</i>
Nuclear Energy	
5.12.19 describe developments in modern physics (i.e., nuclear fission, photoelectric effect, wave-particles duality, energy of light) and their applications (e.g., <i>nuclear power, MRI</i>). (i.e., <i>semiconductors</i>).	
The student will cite evidence of the quantum nature of matter and its applications (energy of light waves, photoelectric effect, wave/particle duality, applications). (CLG 5.5.1)	SE: 395, 432, 549, 558-560 <i>Accidents in Science 282-283</i> <i>National Geographic 548</i> <i>Science and History 632-633</i> TWE: FYI 394
The student will explain the processes associated with atomic energy and its applications (atomic energy, radioactive decay, fission, fusion). (CLG 5.5.2)	SE: 113, 258-261, 263-267, 271-276, 298-304 <i>Activity 279, 280-281</i> <i>Math Skills Activity 270</i> <i>Science and Society 314-315</i>

Codes Used for TWE Pages

A	Activity
AE	Analyze the Event
AS	Assessment
CH	Challenge
CUR	Curriculum Connection
CYD	Communicating Your Data
DI	Discussion
EX	Extension
FF	Fun Fact
FYI	Teacher FYI
IM	Identifying Misconceptions
IS	Inclusion Strategies
SJ	Science Journal
TC	Theme Connection
VL	Visual Learning