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| **Physical Science 2016-2017** | | |
| **\*Inquiry, Math, and Technology/Engineering standards should be embedded in your instruction and used all year.** | | |
| **Unit #** | **Unit Name** | **# of days** |
| 1 | **Introduction to Energy:**  A. Investigate the law of conservation of energy.  1. Describe transfer within and between types of energy.  2. Investigate the relationships among kinetic energy, elastic energy, gravitational energy, and total energy within a closed system.  **Begin Monday, Aug. 8 – Monday, Aug. 22**   * Types of energy * Transfer of energy * Graphical quantification of energy | 10 |
| 2 | **Motion:**  B. Investigate kinematics and dynamics.  4. Investigate the relationships among speed, position, time, velocity, and acceleration.  **Begin Tuesday, Aug. 23 – Tuesday, Oct. 4**   * Change in motion, motion maps, position/time, time/speed/velocity * Unit can be split into two units: constant velocity and acceleration | 30 |
| 3 | **Force:**  B. Investigate kinematics and dynamics.  5. Analyze and apply Newton’s three laws of motion.  **Begin Wednesday, Oct. 5 – Wednesday, Nov. 2**   * Force diagrams | 16 |
| 4 | **Energy Revisited**  A. Investigate the law of conservation of energy  1. Describe transfer within and between types of energy.  2. Investigate the relationships among kinetic, elastic energy, gravitational energy, and total energy within a closed system.  3. Calculate kinetic energy and gravitational energy.  **Begin Thursday, Nov. 3 – Wednesday, Nov. 30**   * Quantify different types of energy, identify a closed system * Work and power can be added at teacher’s discretion as it fits when time allows | 15 |
| 5 | **Mechanical Waves and Electromagnetic Spectrum**  F. Investigate the properties and characteristics of waves.  24. Classify waves as transverse or longitudinal.  25. Investigate and analyze wavelength, frequency and amplitude of longitudinal and transverse waves.  26. Compare and contrast the five types of wave interactions: reflection, refraction, diffraction, interference, and scattering.  27. Describe the characteristics of the electromagnetic spectrum.  **Begin Thursday, Dec. 1 – Friday, Jan. 13**   * Mechanical waves * Electromagnetic spectrum | 15 |
| **Review and Semester Exam Monday, Dec. 12 – Friday, Dec. 16 (5 days)**  **Benchmark 1**  **Monday, December 5, 2016 – Thursday, December 15, 2016**  Units 1 – 5 and all appropriate Math, T/E and Inquiry GLE’s and CFU’s | | |
| 6 | **Electricity**  E. Investigate the characteristic properties of static and current electricity.  19. Use Ohm's Law to design, build and analyze electric circuits.  20. Distinguish among electric forces, charges and fields.  21. Explore static charge in all matter.  22. Demonstrate how objects become charged.  23. Describe the electric potential as it pertains to electric fields and electric circuits.  **Begin Tuesday, Jan. 17 – Monday, Feb. 6**   * Statics * Sticky tape lab | 15 |
| 7 | **Matter and its Changes**  C. Explore properties and changes in matter.  6. Differentiate among solids, liquids, and gases as they relate to particle arrangement, motion, and energy.  7. Explore the law of conservation of mass.  8. Describe the relationships among volume, temperature, and pressure of a gas, both qualitatively and  quantitatively.  9. Differentiate between physical and chemical properties.  10. Explain the concept of specific heat as it relates to heat transfer.  **Begin Tuesday, Feb. 7 – Thursday, Mar. 2**   * Solids, liquids, gases/energy involved/particle diagrams * Physical properties/change * Mass/volume/density * Gas laws * Heating and specific heat | 17 |
| 8 | **Atomic Structure and the Periodic Table**  D. Investigate atomic structure and molecular interactions.  11. Differentiate between elements and compounds.  12. Compare and contrast the properties and locations of subatomic particles.  13. Use periodic table to identify the number of protons, neutrons and electrons in an atom.  14. Use the periodic table to identify and predict properties of elements based on the patterns of electrons in the outermost energy level of atoms.  **Begin Friday, Mar. 3 – Thursday, Mar. 23**   * Subatomic particles, atomic theory – history, isotopes | 15 |
| **Benchmark 2**  Monday, April 3, 2017 – Friday, April 7, 2017  Units 6 – 8 ; all appropriate Math, T/E and Inquiry GLE’s and CFU’s | | |
| 9 | **Molecular Interactions**  D. Investigate atomic structure and molecular interactions.  7. Explore the law of conservation of mass.  9. Differentiate between physical and chemical properties.  15. Differentiate between ionic and covalent bonding and its uniqueness.  16. Balance simple chemical equations  **Begin Friday, Mar. 24 – Friday, May 5**   * Periodic table, ionic/covalent, elements and compounds, chemical changes/properties, balancing equations | 25 |
| 10 | **Water and Carbon: Their Uniqueness**  D. Investigate atomic structure and molecular interactions.  17. Investigate the structure and properties of water  18. Examine carbon and its role in the formation of organic compounds.  **Begin Monday, May 8 – Wednesday, May 17**   * Water and its properties * Carbon and its properties | 8 |
| **Review and Final Exam Thursday, May 18 – Wednesday, May 24 (5 days)** | | |

**Physical Science Embedded Standards**

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| **Embedded Inquiry**  **CLE 3202.Inq.1** Recognize that science is a progressive endeavor that reevaluates and extends what is already accepted.  **CLE 3202.Inq.2** Design andconduct scientific investigations to explore new phenomena, verify previous results, test how well a theory predicts, and compare opposing theories.  **CLE 3202.Inq.3** Use appropriate tools and technology to collect precise and accurate data.  **CLE 3202.Inq.4** Apply qualitative and quantitative measures to analyze data and draw conclusions that are free of bias.  **CLE 3202.Inq.5** Compare experimental evidence and conclusions with those drawn by others about the same testable question.  **CLE 3202.Inq.6** Communicate and defend scientific findings. |
| **✓ 3202.Inq.1** Trace the historical development of a scientific principle or theory.  **✓ 3202.Inq.2** Conduct scientific investigations that include testable questions, verifiable hypotheses, and appropriate variables to explore new phenomena or verify the experimental results of others.  **✓ 3202.Inq.3** Select appropriate tools and technology to collect precise and accurate quantitative and qualitative data.  **✓ 3202.Inq.4** Determine if data supports or contradicts a hypothesis or conclusion.  **✓ 3202.Inq.5** Compare or combine experimental evidence from two or more investigations.  ✓ 3202.Inq.6 Recognize, analyze, and evaluate alternative explanations for the same set of observations.  **✓ 3202.Inq.7** Analyze experimental results and identify possible sources of experimental error.  **✓ 3202.Inq.8** Formulate and revise scientific explanations and models using logic and evidence.  ✓ 3202.Inq.9 Evaluate the accuracy and precision of data.  **✓ 3202.Inq.10** Explore how bias can affect conclusions and identify conclusions that are affected by bias. |
| **Embedded Technology & Engineering**  **CLE 3202.T/E.1** Explore the impact of technology on social, political, and economic systems.  **CLE 3202.T/E.2** Differentiate among elements of the engineering design cycle: design constraints, model building, testing, evaluating, modifying, and retesting.  **CLE 3202.T/E.3** Explain the relationship between the properties of a material and the use of the material in the application of a technology.  **CLE 3202.T/E.4** Describe the dynamic interplay among science, technology, and engineering within living, earth-space, and physical systems. |
| **✓3202.T/E.1** Select appropriate tools to conduct a scientific inquiry.  **✓3202.T/E.2** Apply the engineering design process to construct a prototype that meets developmentally appropriate specifications.  **✓3202.T/E.3** Explore how the unintended consequences of new technologies can impact human and non-human communities.  **✓3202.T/E.4** Present research on current engineering technologies that contribute to improvements in our daily lives.  **✓3202.T/E.5** Design a series of multi-view drawings that can be used by other students to construct an adaptive design and test its effectiveness.  **✓3202.T/E.6** Evaluate the overall benefit to cost ratio of a new technology. |
| **Embedded Mathematics**  **CLE 3202.Math.1** Understand the mathematical principles that underlie the science of physics.  **CLE 3202.Math.2** Utilize appropriate mathematical equations and processes to solve basic physics problems. |
| **✓3202.Math.1** Use a variety of notations appropriately (e.g., exponential, functional, square root).  **✓3202.Math.2** Select and apply an appropriate method for computing with real numbers, and evaluate the reasonableness of results.  **✓3202.Math.3** Apply and interpret rates of change from graphical and numerical data.  **✓3202.Math.4** Analyze graphs to describe the behavior of functions.  **✓3202.Math.5** Interpret results of algebraic procedures.  **✓3202.Math.6** Model real-world phenomena using functions and graphs.  **✓3202.Math.7** Articulate and apply algebraic properties in symbolic manipulation.  **✓3202.Math.8** Apply geometric properties, formulas, and relationships to solve real-world problems.  **✓3202.Math.9** Make decisions about units, scales, and measurement tools that are appropriate for problem situations involving measurement.  **✓3202.Math.10** Collect, represent, and describe linear and nonlinear data sets developed from the real world.  **✓3202.Math.11** Make predictions from a linear data set using a line of best fit.  **✓3207.Math.12** 1nterpret a data set using appropriate measures of central tendency.  **✓3202.Math.13** Choose, construct, and analyze appropriate graphical representations for a data set.  **✓3202.Math.14** Use concepts of length, area, and volume to estimate and solve real-world problems. |