**2020-21 Honors Physical Science Objectives:**

**Chemistry (3rd Quarter)**

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| **6. ATOMS, BONDING, AND CHEMICAL REACTIONS**  The student will be able to: | Text Section | Key Concepts |
| 1. Explain how the atomic theory has evolved over time. | 4.1, 4.3 | Model, Democritus/Leucippus, Dalton, Thomson, Rutherford, Bohr, Electron Cloud Model |
| 2. Classify elements as metals, nonmetals, and metalloids based on their properties and position on the periodic table. | 5.1-5.3 | Mendeleev, Conductivity, Luster, Malleability |
| 3. Identify periods and families on the periodic table by name, common properties, and valence electrons. | 5.2-5.3 | Valence, Charge (oxidation #), Period, Family, Electronegativity, Atomic Radius, Ionization Energy, Dot Diagram |
| 4. Explain how ionic compounds are formed and predict their formulas. | 6.1 | Cation, Anion, Reduction, Oxidation |
| 5. Explain how covalent compounds are formed and draw their Lewis structures. | 6.2 | Polar bonds (electronegativity differences) |
| 6. Compare and contrast the physical & chemical properties of ionic and covalent compounds. | 6.1-6.2 | Melting point, Solubility, State at room temperature, Conductivity |
| 7. Balance a chemical equation using atom counts and coefficients. | 7.1 | Law of conservation of matter |
| 8. Identify the types of common chemical reactions. | 7.2 | Synthesis, Decomposition, Single Replacement, Double Replacement, Combustion |
| 9. Outline factors which affect the rate of chemical reactions. | 7.4 | Surface area, Temperature, Concentration, Catalyst |

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| **7. KINETIC MOLECULAR THEORY AND MATTER** | Text Section | Key Concepts |
| 1. Describe particle arrangement and particle motion in the four states of matter. | 3.1-3.3 | Intermolecular Attraction |
| 2. Illustrate the effect of pressure and temperature on state of matter using a phase diagram. | 3.3 | Boiling/vaporization, Evaporation, Condensation, Melting, Freezing, Sublimation, Deposition, Pressure |
| 3. Describe the relationship between temperature and state of matter using a heating curve. | 3.3  7.3 | Specific Heat, Q = mcΔT, Latent heat of fusion, Latent heat of vaporization,  Q = mL, Endothermic, Exothermic |
| 4. Demonstrate the relationships between pressure, moles, volume, and temperature of a confined gas. | 3.2 | Combined gas law, P1V1/T1=P2V2/T2  Ideal gas law, PV=nRT |
| 5. Distinguish between chemical and physical properties of matter. | 2.2-2.3 | Reactivity, Flammability, Melting Point, Boiling Point, Density |
| 6. Categorize substances as elements, compounds, mixtures and pure substances. | 2.1 | Heterogeneous, Homogeneous, Solution |

**2020-21 Honors Physical Science Objectives:**

**Earth Science (4th Quarter)**

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| **8. SYSTEMS OF THE EARTH**  The student will be able to: | Text  Pages | Key Concepts |
| 1. Describe & use evidence to explain how land, atmosphere, & oceans changed throughout Earth’s history. | GS 22.1- 22.3  15.1 | Cyanobacteria, Supercontinent, Differentiation, Outgassing, Meteoroid, Red bed |
| 2. Illustrate how the geosphere, hydrosphere, atmosphere, & biosphere interact on earth. | GS 1.1 | Biogeochemical cycles |
| 3. Outline the properties of water which make it unique and important to life on Earth. | GS  25.4 | Polarity, Heat capacity, Expansion upon freezing, Universal solvent |
| 4. Illustrate the movement of carbon, nitrogen, and water through earth’s spheres in terms of chemical and physical changes. | GS 9.1 | Reservoir, Mechanism, Evaporation, Transpiration, Condensation, Precipitation, Collection, Runoff, Percolation, Infiltration, Photosynthesis, Cellular Respiration, Nitrogen Fixation |
| 5. Describe natural causes/influences on global climate. | GS 14.1, 14.3 | Weather, Earth’s orbit, Axis tilt, Mountain ranges, Oceans, Differential heating (latitude), Greenhouse effect, Volcanism, Milankovitch cycles |
| 6. Investigate scientific evidence for atmospheric changes of specific greenhouse gases and evaluate the human impact on these processes. | GS 14.4 | Climate change, Sequestration |
| 7. Evaluate how changes to the oceans (natural and artificial) affect Earth’s spheres. | GS 15.2- 15.3 | Acidity, Salinity, Temperature |
| 8. Compare and contrast the pros and cons of renewable and nonrenewable energy sources. | 10.4, 15.3  GS 26.1- 26.2 | Coal, Oil, Natural Gas, Nuclear, Wind, Solar, Geothermal, Hydro (Dam/Tidal), Biomass, Nuclear vs chemical energy |
| 9. Develop a plan for both individuals and communities to conserve energy resources. | GS 26.3 | Carbon footprint |

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| **9. ASTRONOMY**  The student will be able to: | Text Pages | Key Concepts |
| 1. Explain the evolution of astronomical theories due to changing technologies and methods. | GS 28.1 | Hipparchus, Ptolemy, Copernicus, Brahe, Kepler, Galileo, Newton, Hubble, Penzias and Wilson  Geocentric, Heliocentric, Sextant, Parallax, Retrograde motion, Telescope (reflector/refractor, space/land- based, wavelengths), Spectroscopy, Space probes |
| 2. Explain the common terms and methods astronomers use to locate and study celestial objects in the sky. | GS 28.3 | Declination, Right Ascension, Ecliptic, Zenith, Altitude, Azimuth, Paths of celestial bodies, North star and Southern cross, constellations |
| 3. Describe the structural organization of the solar system. | GS 29.4 | Sun, Planets, Terrestrial, Jovian, Asteroid belt, Kuiper belt, Oort cloud, Comets, Meteoroids |
| 4. Explain each of Kepler’s Laws and apply them qualitatively. | GS  29.1 | Eccentricity, Semi-major axis |
| 5. Compare & contrast the properties of different stars. | GS 30.2- 30.3 | Magnitude, Temperature, Brightness, Luminosity, Mass, Composition, HR Diagram    b=L/(4πd2), λT=2.90\*10-3 m\*K |
| 6. Sequence & summarize the processes in the life cycle of the stars. | GS 30.3 | Nebula, Protostar, Main Sequence Star, Red Giant, Super Red Giants, White Dwarf, Black Dwarf, Red Dwarf, Neutron Star, Black Hole, Element formation |
| 7. Compare relative distances and sizes of astronomical entities. | GS 30.2 | Astronomical Unit, Light year, Parsec, Relative distances between/radius of: Planets, Stars, Galaxies, Universe |
| 8. Explain the Big Bang Theory & summarize supporting evidence. | GS 31.2- 31.3 | Steady State Theory, Hubble’s Constant, Redshift, Cosmic Microwave Background, Open/Closed/Flat Universe, Critical density |

Honors Physical Science Quarter 3

*Unit 6: Atoms, Bonding and Chemical Reaction (5 weeks)*

Week 1—Atomic Model, Intro to periodic table and periodicity (Ch 4.3, 5.2-3)

Week 2—Valence electrons and intro to bonding (Ch 6.1-2)

Week 3—Bonding and properties of compounds, Balancing Equations

Week 4—Introduction to chemical equations and reaction types (Ch 7.1-2)

Week 5— Factors which influence rates of chemical reactions (Ch 7.4), Review, EXAM 6

*Unit 7: Kinetic Molecular Theory and Matter (4 weeks)*

Week 1—Review KMT, phase diagrams, Heating curve intro & explanation (Ch 3.1, 3.3)

Week 2—Gas Laws (Ch 3.2)

Week 3—Classification of matter, Review, EXAM 7 (Ch 2.1-2.3)

Week 4—Review, Quarter 3 Final Exam

Honors Physical Science Quarter 4

*Unit 8: Systems of the Earth (4 weeks)*

Week 1—Overview of earth’s evolution (GS Ch 22.1-3), water’s unique properties (GS Ch 15.1)

Week 2— Biogeochemical cycles (GS Ch 1.1, 9.1), Natural global climate influences (GS Ch 14.1, 14.3)

Week 3—Climate change, artificial (human) impacts (GS Ch 14.4), changes in oceans (GS 15.2-3)

Week 4—Energy resources and energy conservation, EXAM (Ch 10.4, 15.3, GS 26.1-2)

*Unit 9: Astronomy (5 weeks)*

Week 1—Methods and technologies, astronomical terms (GS Ch 28.1, 29.1)

Week 2—Continue with astronomical terms, Solar system (GS Ch 29.4)

Week 3—Kepler’s Laws (GS Ch 29.1), Star Properties (GS Ch 30.2-3)

Week 4—Star Properties (GS Ch 30.2-3), Stellar Evolution (GS Ch 30.3)

Week 5—Universe, EXAM (GS Ch 31.2-3)

4th Quarter Final Exam