

9th Grade Physical Science Curriculum

<u>Pacing Guide</u>	<u>Topics</u>	<u>Essential Questions</u>	<u>FMWK Codes</u>	<u>Suggested Activities</u>
Week 1 8/30 to 9/3	Introduction to class	How will this science class be run?		<ul style="list-style-type: none"> Quiz on class rules and expectations and/or mission statement
Week 2,3 9/6 to 9/17	<u>Scientific Method</u> <ul style="list-style-type: none"> Observation (Qualitative/Quantitative) Scientific Method - steps Variables - independent/dependent/control 	How is scientific knowledge created and communicated?	Content Standard: Scientific Inquiry D. INQ 1, 3, 4, 5, 9 D. INQ 8	<ul style="list-style-type: none"> CAPT Skateboard lab to show variables Use motion labs for scientific method, graphing, & scientific numeracy ($s=d/t$ $v=d/t$ $a = v_f-v_i/t$ $F=ma$) Graphing worksheets
Week 4 9/20-9/24	<u>Graphing</u> <ul style="list-style-type: none"> Graph Types Relationships (direct/positive & indirect/negative) Analyzing Graphs 	How do you use graphing to display, analyze, and interpret data that shows relationships between variables?		
Week 5,6,7 9/27 – 10/22	<u>Metric Measurement</u> <ul style="list-style-type: none"> Length, perimeter, area Mass, measuring through direct and indirect methods Volume, liquid & solid Density Conversions, dimensional analysis (metric to English) Scientific notation Graphing experimental data (single & multiple lines) 	What are the appropriate tools and techniques to make observations and describe how to gather scientific data?	D. INQ 6	<ul style="list-style-type: none"> Use motion labs for measurement Density column Hands on labs/activities <p>*** give benchmark around 10/22, results due to Victoria by end of week 10 ***</p>
Week 8 10/22 – 10/29	<u>Energy</u> <ul style="list-style-type: none"> Types of energy – potential vs kinetic Relationship b/t energy and mass ($PE = mgh$, $KE = \frac{1}{2}mv^2$) Energy transfers – solar, chemical, electrical, thermal Law of conservation of energy 	How is potential and kinetic energy illustrated in a roller coaster?	Content Standard 9.1 D2 Content Standard 9.1 D3	<p>Embedded task: Energy Use in CT</p> <p>Embedded task: Solar Cooker</p> <ul style="list-style-type: none"> Prism & mirrors Demo - land vs sea breeze Affect of color on heat absorption
Week 9, 10 11/1 – 11/12	<u>Heat and Light</u> <ul style="list-style-type: none"> Solar Energy Principles of light – refraction, reflection, absorption Electromagnetic spectrum Heat energy – convection, conduction, radiation 	How is heat and light transferred?		

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Week 11,12,13 11/15 – 12/3	<u>Electricity</u> <ul style="list-style-type: none"> ▪ Static electricity & electric charges ▪ Circuits – open/closed, series/parallel, read & analyze circuit diagrams ▪ Alternating current (AC) vs Direct Current (DC) ▪ Ohm’s Law ($I = V/R$) – current, voltage, resistance, friction ▪ Types of lighting – heating elements ▪ Electricity safety & conservation 	What is the relationship among voltage, current, and resistance in simple series and parallel circuits?	Content Standard 9.2 D4, D5	<ul style="list-style-type: none"> ▪ Combs & balloons ▪ Van de Graff generators ▪ Create series & parallel circuits ▪ Comparison b/t incandescent, compact fluorescent, & infrared
Week 14 12/6 – 12/10	<u>Magnetism</u> <ul style="list-style-type: none"> ▪ Magnetic fields (like poles vs unlike poles) ▪ Magnetosphere, magnetic domain, ferromagnetic materials <u>Electromagnetism</u> <ul style="list-style-type: none"> ▪ Electromagnetic induction ▪ Transformers – step up/step down ▪ Generators ▪ Motors ▪ Power grids & electricity pathways 	How does the Earth illustrate magnetic properties?	Content Standard 9.2 D6	<ul style="list-style-type: none"> ▪ Electromagnetic Lab ▪ Schematic diagram of power grid & electricity pathway
Week 15 12/13 – 12/17	<u>Global impacts on the environment</u> <ul style="list-style-type: none"> ▪ Fossil fuels – formation, nonrenewable, pollution issues ▪ Pros/cons of using fossil fuels to generate electricity ▪ Greenhouse effect, global warming, climate change 	How does the use of fossil fuels as a primary energy resource create environmental and sustainability issues?	Content Standard 9.3, 9.8, 9.9 D7, D8, D9, D23, D26	<ul style="list-style-type: none"> ▪ Research different types of fossil fuels ▪ Construct model to show greenhouse effect
Week 16, 17 12/20 – 12/23 1/3 – 1/7	<u>Pros and cons of alternative resources</u> <ul style="list-style-type: none"> ▪ Renewable vs nonrenewable sources ▪ Availability, portability, efficiency, expense, & environmental impact for each resource <ul style="list-style-type: none"> ⌚ Nuclear ⌚ Solar ⌚ Wind ⌚ Geothermal ⌚ Biomass ⌚ Hydropower ⌚ Hydrogen fuel cells 	How can alternative energy resources be used to address the disadvantages of fossil fuels?	Content Standard 9.3, 9.8, 9.9 D7, D8, D9, D23, D25	<ul style="list-style-type: none"> ▪ Compare & contrast fossil fuels to alternative energies ▪ Explore which energy resources are being used in CT ▪ Construct models to show active & passive solar heating ▪ Research effects of biofuels

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Week 18 1/10 – 1/14	Midterm Review/Exams	What have you learned thus far?	Scientific inquiry, 9.1, 9.2, 9.3, 9.8, 9.9	<ul style="list-style-type: none"> ▪ Crossword puzzles ▪ Games
Week 19,20,21 1/18 – 2/4	<u>Matter</u> <ul style="list-style-type: none"> ▪ States of matter ▪ Physical/chemical changes ▪ Mixtures (heterogeneous) ▪ Solutions (homogeneous) ▪ Solubility, solvents, solutes ▪ Physical/chemical properties (inc. melting & boiling point) ▪ Phase changes – exothermic & endothermic ▪ Water cycle – Law of conservation of matter 	How does the structure of matter affect the properties and uses of materials?	Content Standard 9.1, 9.4 D1	<ul style="list-style-type: none"> ▪ Demos for mixtures vs solutions ▪ Solubility curves ▪ Demo of supersaturated solution ▪ CAPT lab – ice cold, ice pack
Week 22 2/7 – 2/10	<u>Atoms</u> <ul style="list-style-type: none"> ▪ Protons, electrons, neutrons (P,E,N) ▪ Atomic number & mass ▪ Bohr model (mention cloud model – honors) 	How does the placement of an element in the periodic structure indicate its atomic structure?	Content Standard 9.4 D10	Cooperative instruction w/ media center. Media center will teach citations, determining valid websites, how to use search engine, and plagiarism.
Week 23,24,25 2/14 – 3/4	<u>Periodic Table</u> <ul style="list-style-type: none"> ▪ Energy levels/valence electrons/Lewis dot diagrams ▪ Patterns in the periodic table ▪ Metals/nonmetals/metalloids ▪ Properties of families ▪ How the presence of metallic & nonmetallic elements affect human health (honors). 		Content Standard 9.4 D10	
Week 26,27,28 3/7 – 3/25	<u>Bonding</u> <ul style="list-style-type: none"> ▪ Atoms/molecules/compounds ▪ Ionic/covalent/metallic bonds ▪ Simple nomenclature <u>Chemical Equations</u> <ul style="list-style-type: none"> ▪ Reactants vs products ▪ Law of conservation of mass – simple balancing equations ▪ General reaction types (oxidation-reduction – honors) ▪ Exothermic vs endothermic reactions (honors) 	How do atoms join together to form compounds?	Content Standard 9.4, 9.5 D11, D14	Suggested Embedded Tasks: 1) Elemental Poisoning Lead, Arsenic, Mercury, Etc 2) Baby/Element & Family book Research an element and its family

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Week 29,30 3/28 – 4/8	<u>Organic Chemistry</u> <ul style="list-style-type: none"> ▪ Chemical structure and properties of carbon ▪ Carbon bonding – single, double, triple ▪ Hydrocarbon bonding/monomers ▪ Saturated vs unsaturated hydrocarbons 	How do the properties of carbon allow polymers to form?	Content Standard 9.5, 9.6 D13, D14, D15	<ul style="list-style-type: none"> ▪ Construct polymer models ▪ http://www.pslc.ws/mactest/kids/mac/ (use in search engine: “polymers for kids”)
Week 31 4/11 – 4/15	<u>Natural vs Synthetic Polymers</u> <ul style="list-style-type: none"> ▪ Carbohydrates, DNA, Nucleic Acids (introduced) ▪ Polymerization ▪ Plastic characteristics – abrasion resistance, puncture resistance, transparency, tensile strength 	How does the chemical structure of a polymer affect its physical properties?	D16, D17, D18	Embedded task: Synthetic Polymers
Week 32, 33 4/25 5/6	<u>Acids & bases</u> <ul style="list-style-type: none"> ▪ Characteristics of acids and bases ▪ pH scale ▪ Neutralization reaction ▪ Rock cycle 	How are neutralization reactions important to the environment?	Content Standard 9.4, 9.7 D12, D21, D22	Embedded task: Acid Rain <ul style="list-style-type: none"> ▪ Test substances w/ litmus & pH paper ▪ Rock/water filtration ▪ Water testing/tasting
Week 34 5/9 – 5/13	<u>Natural Cycles</u> <ul style="list-style-type: none"> ▪ Nutrient cycle – Nitrogen ▪ Nutrient cycle – Carbon ▪ Nutrient cycle – Phosphorous ▪ Review water cycle 	How do the natural cycles illustrate the law of conservation of matter?	Content Standard 9.7, 9.9 D19, D20, D25, D26	<ul style="list-style-type: none"> ▪ Schematic drawings & diagrams
Week 35, 36 5/16 – 5/27	<u>Brownfields & impacted habitats</u> <ul style="list-style-type: none"> ▪ What are they ▪ Topography/geological maps ▪ Point and nonpoint sources of pollution ▪ Tests for pollutants – air, ground, water ▪ Measurement – ppm & ppb ▪ Watersheds and aquifers – HDPE vs LDPE ▪ Metal contamination, soil factors, bioaccumulation ▪ Bioremediation – phytoremediation, other types ▪ Eutrophication 	How are contaminants cleaned up in water and in soil?	Content Standard 9.6, 9.7, 9.8, 9.9 D18, D24, D25, D26	Embedded task: Brownfields <ul style="list-style-type: none"> ▪ Construct models of aquifers, brownfield site, or mining site ▪ Analyze CT superfund site

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Upper level additional topics if time permits	<p><u>Sustainability and human problem solving</u></p> <ul style="list-style-type: none"> ▪ Raw materials vs recycling ▪ Waste disposal options and recycling codes ▪ Waste reduction & conservation <p><u>Green living</u></p> <ul style="list-style-type: none"> ▪ Green chemistry & technology ▪ Mass transportation ▪ Appliance options 	How do the choices we make today impact future societies?	<p>Content Standard 9.4, 9.5 D11, D14</p>	<ul style="list-style-type: none"> ▪ Design recycling program for their high school ▪ Create recycling poster advertising campaign ▪ Construct a green community
<p>Week 37,38 5/31 – 6/3</p>	Final Exams	What have you learned?	<p>Scientific inquiry & 9.1 – 9.9</p>	<ul style="list-style-type: none"> ▪ Crossword puzzles ▪ Games