

COURSE: Physical Science – 15:1
GRADE LEVEL: 11/12

MAIN/GENERAL TOPIC:	SUB-TOPIC:	ESSENTIAL QUESTIONS:	WHAT THE STUDENTS WILL KNOW OR BE ABLE TO DO:	SKILLS:	WHEN STUDENT DOES IT:	ASSESSMENTS:
INQUIRY/PROBLEM SOLVING	<ul style="list-style-type: none"> Scientific Method 	<ul style="list-style-type: none"> What are the steps in the Scientific method? How do we observe and collect data? What data do we use to determine a hypothesis? 	<ul style="list-style-type: none"> How to use Scientific method to formulate a hypothesis How to determine if the hypothesis is valid or invalid 	<ul style="list-style-type: none"> Use senses to make observations Use tools to measure 	Ongoing	<ul style="list-style-type: none"> Observation quiz Observation lab Scientific Method Quiz
	<ul style="list-style-type: none"> Scientific Process 	<ul style="list-style-type: none"> How do we make meaningful explanations for our observations? 	<ul style="list-style-type: none"> How to design, implement, and analyze a controlled scientific experiment 	<ul style="list-style-type: none"> Design a controlled experiment Identify controls Analyze data through graphs and tables Compare results to references 	Ongoing	<ul style="list-style-type: none"> Lab Reports Observations and Conversations during lab
CHEMISTRY	<ul style="list-style-type: none"> Elements 	<ul style="list-style-type: none"> What are the building blocks of the Universe? What are the different types of elements? 	<ul style="list-style-type: none"> Elements/Atoms make up matter Atoms are made up of protons, neutrons and electrons Elements exist as metals, nonmetals and metalloids (semi-metals) 	<ul style="list-style-type: none"> Determine protons, neutrons, electrons Determine metals, nonmetals, semimetals 	Sept.	<ul style="list-style-type: none"> Q&A Quiz
	<ul style="list-style-type: none"> Periodic Table 	<ul style="list-style-type: none"> How was the Periodic table created? How is the table arranged? Is every atom of a particular element the same? 	<ul style="list-style-type: none"> Brief historical perspective on the origins of the P.T. Groups are based on valance electrons and chemical reactivity Rows are based on number of shells The only difference between isotopes of an element are the number of neutrons 	<ul style="list-style-type: none"> Use lab skills to determine properties of elements and design a P.T. of their own Fill in empty P.T. Calculate average atomic mass 	October	<ul style="list-style-type: none"> Blank P.T. fill in Atomic # & Mass weeks Element classification lab Quiz

			<ul style="list-style-type: none"> How to calculate average atomic mass and the atomic number 			
	<ul style="list-style-type: none"> Chemistry of a Family 	<ul style="list-style-type: none"> How can the Periodic Table give us clues about the chemistry of an atom? 	<ul style="list-style-type: none"> Locate and name the families of the Periodic Table Identify and explain properties of elements of a family Define metals, non-metals and semi-metals and know their location on the Periodic Table 	<ul style="list-style-type: none"> Use Periodic Table to identify the chemistry of an element based on what group it is in 	Oct.	<ul style="list-style-type: none"> Library research of a periodic group
	<ul style="list-style-type: none"> Periodic Trends 	<ul style="list-style-type: none"> What information can we get from the Periodic Table? 	<ul style="list-style-type: none"> Define atomic radius, ionization energy, and electro negativity Describe vertical and horizontal trends in atomic radius, ionization energy, electro-negativity, and valence electrons Describe electron shielding 	<ul style="list-style-type: none"> Find trends in seemingly unrelated items Use CRT to collect information on the trends of the Periodic Table and present graphically 	Oct.	<ul style="list-style-type: none"> Periodic Table Logic Puzzle
	<ul style="list-style-type: none"> Solutions and Solubility 	<ul style="list-style-type: none"> Why does water "dissolve" salt? How can you get stuff to dissolve in a solvent? What does concentration mean and how do we represent it? 	<ul style="list-style-type: none"> Define polarity Identify polarity of a given molecule Factors that effect solubility Rules for determining solubility 	<ul style="list-style-type: none"> Interpret solubility curve table in the CRT Create a solubility curve by analyzing crystallization points at various concentrations 	Nov.	<ul style="list-style-type: none"> Solubility Curve Lab Solubility of a Salt Lab Solubility and dissolved O2 levels activity Sports drink article response
	<ul style="list-style-type: none"> Mixtures 	<ul style="list-style-type: none"> Are all mixtures created equal? What else is in the water we drink? Why is salt? Why do we put salt on the roads and in cooking water? 	<ul style="list-style-type: none"> Compare and contrast homogeneous and heterogeneous Describe filtration, distillation, chromatography Ionic compounds consist of metal and nonmetal ions that transfer electrons to satisfy their valence electrons Ionically bond atoms will have a large difference in electro negativity (>1.7) Define colligative properties 	<ul style="list-style-type: none"> Separate a mixture of Fe, SiO₂ & NaCl using proper lab procedure (filtration, evaporate) 	Nov.	<ul style="list-style-type: none"> Mixtures lab Homework and quiz

	<ul style="list-style-type: none"> Physical & Chemical Properties 	<ul style="list-style-type: none"> How do you describe a tree vs. describing a fire? 	<ul style="list-style-type: none"> A physical property can be determined by your senses Physical change does not change the nature of the matter A chemical property can be determined through conducting a reaction Chemical change alters the nature of the substance to another 	<ul style="list-style-type: none"> Compare physical and chemical properties Compare physical and chemical changes 	Dec.	<ul style="list-style-type: none"> Homework Quiz
	<ul style="list-style-type: none"> Phases of Elements 	<ul style="list-style-type: none"> What are the three phases of elements? How can we describe them? How much heat does it take to go from a solid to a gas? 	<ul style="list-style-type: none"> <u>Liquids</u>: Identify substances that are liquids, what causes the change in the form of matter <u>Solids</u>: Identify substances that are solids and describe the forces associated with the phase change <u>Gases</u>: No set volume or shape. Highest energy level of the 3 phases 	<ul style="list-style-type: none"> Illustrate at the molecular level the appearance of each phase of matter (s, l, g) Draw and explain phase change diagrams in terms of matter and energy Identify the solid, liquid & gas elements 	Jan.	<ul style="list-style-type: none"> Observations and discussion during in class practice problems and homework Phases of water lab Quiz
	<ul style="list-style-type: none"> Atomic Structure 	<ul style="list-style-type: none"> What is the structure of an atom? 	<ul style="list-style-type: none"> Identify the basic part of an atom 	<ul style="list-style-type: none"> Draw diagram of the atomic model 	Jan.	<ul style="list-style-type: none"> Design an atom
PHYSICS: CARS AND OTHER TYPES OF VEHICLES	<ul style="list-style-type: none"> Velocity 	<ul style="list-style-type: none"> What does it mean to measure something? What is an estimate? What differences and similarities are there between distance and displacement? What is the relationship between a change in location and time? What differences and similarities are there between speed and velocity? 	<ul style="list-style-type: none"> Measurement is a comparison between an unknown quantity and a standard An estimate is an approximate calculation Physics uses the metric system with SI units for its standards Displacement is an absolute linear difference in location from a starting point; a car driven around and parked in the same place has a displacement of zero Velocity is a relationship between displacement and time; cars moving at a constant speed 	<ul style="list-style-type: none"> Make accurate measurements reasonable (order of magnitude) estimations Calculate displacement and velocity of objects (cars) in motion Graph displacement vs. time to determine velocity 	Feb.	<ul style="list-style-type: none"> Measure and Estimation Lab Constant Velocity Car Lab Air Track Lab Journal Entries Quiz(es)

			in a straight line have a constant velocity			
	<ul style="list-style-type: none"> Acceleration 	<ul style="list-style-type: none"> What is the relationship between a change in a car's velocity and time? What is the meaning of a decreasing acceleration? 	<ul style="list-style-type: none"> Acceleration is a relationship between velocity and time; cars with a changing velocity are accelerating Acceleration can be positive or negative Freely falling bodies have a constant acceleration near the Earth 	<ul style="list-style-type: none"> Calculate acceleration of objects (cars) in motion Graph velocity vs. time to determine acceleration 	Feb.	<ul style="list-style-type: none"> Balloons in the front seat video analysis I Make your own jar accelerometer Journal Entries Quiz(es) and Test
	<ul style="list-style-type: none"> Force (plus Work, Power and Torque) 	<ul style="list-style-type: none"> What causes cars (things) to move? What is a force? What is inertia and how does it relate to mass? How do we measure gravity? What is Power? What is Torque? 	<ul style="list-style-type: none"> Forces are pushes or pulls Forces can add to zero and balance out Unbalanced forces cause accelerations Objects with mass have inertia Force applied over distance does work Work performed over a time interval produces power Force of gravity and weight are the same thing 	<ul style="list-style-type: none"> Predict accelerations using net forces Calculate work & power using observational data 	Feb.	<ul style="list-style-type: none"> Generate your horsepower on the stairs Journal entries Quiz(es)
	<ul style="list-style-type: none"> Friction 	<ul style="list-style-type: none"> What causes a car to grip the road? How can work be negative if we know work is non-directional? 	<ul style="list-style-type: none"> Friction is an oppositional force due to the interaction of two surfaces There is a difference between static and kinetic friction Lost energy due to friction is negative work 	<ul style="list-style-type: none"> Determine the coefficient of friction for two surfaces Measure energy loss from friction 	March	<ul style="list-style-type: none"> Skid pad/Merry go-round exercise Sox/Linoleum Lab Tire Skid Mark Lab Journal Entries Quiz(es)
	<ul style="list-style-type: none"> Energy 	<ul style="list-style-type: none"> What is energy, where does it come from in a car and where does it go? How can mechanical energy be stored? 	<ul style="list-style-type: none"> Energy is the ability to do work Energy can be transformed from one form to another (stored) Energy is conserved 	<ul style="list-style-type: none"> Show that acceleration (-) due to friction is not weight dependent 	March	<ul style="list-style-type: none"> Skid Mark Lab II Car off roof Lab II Journal Entries Quiz(es) and Test

EXPLOSIONS AND LOUD NOISES	<ul style="list-style-type: none"> Waves Behavior 	<ul style="list-style-type: none"> What causes waves? How do mechanical waves travel? What causes resonance? 	<ul style="list-style-type: none"> Waves are a transfer energy, not mass A single wave is a pulse and periodic waves are continuous There is a fundamental dimensional difference between longitudinal and transverse waves 	<ul style="list-style-type: none"> Describe wavelength and frequency and speed of traveling and standing waves 	March	<ul style="list-style-type: none"> Singing Rod Orchestra Lab Ella Fitzgerald Effect Lab Journal Entries Quiz(es)
	<ul style="list-style-type: none"> Speed of Sound 	<ul style="list-style-type: none"> What is sound? What determines the speed of sound? 	<ul style="list-style-type: none"> Sound waves are mechanical waves with speed determined by the medium in which they travel 	<ul style="list-style-type: none"> Calculate speed of sound in air at a given temperature 	April	<ul style="list-style-type: none"> Sound at distance lab Journal Entries Quiz
	<ul style="list-style-type: none"> Speed of Light 	<ul style="list-style-type: none"> What is light? What determines the speed of light? 	<ul style="list-style-type: none"> List is electromagnetic radiation which is not a mechanical wave and therefore needs no medium for propagation 	<ul style="list-style-type: none"> Calculate speed of light in air 	April	<ul style="list-style-type: none"> Marshmallow lab Laser beam lab Journal Entries Quiz and test
BRIGHT COLORS	<ul style="list-style-type: none"> Colors 	<ul style="list-style-type: none"> What is the nature and meaning of color? 	<ul style="list-style-type: none"> Color is the part of the electromagnetic spectrum visible to the eye that is not absorbed by an object 	<ul style="list-style-type: none"> Describe color by its frequency and wavelength 	April	<ul style="list-style-type: none"> Light box lab Journal Entries
	<ul style="list-style-type: none"> Polarization 	<ul style="list-style-type: none"> Is light a wave, a particle, neither, or both? 	<ul style="list-style-type: none"> Polarization is evidence of light's wave behavior 	<ul style="list-style-type: none"> Explain the wave nature of light 	May	<ul style="list-style-type: none"> Polarizer lab Journal Entries
	<ul style="list-style-type: none"> Photoelectric Effect 	<ul style="list-style-type: none"> Is light a particle, a wave, both or neither? 	<ul style="list-style-type: none"> The photoelectric effect is evidence of light's particle behavior 	<ul style="list-style-type: none"> Explain the particle nature of light 	May	<ul style="list-style-type: none"> Photoelectric Lab Journal Entries Quiz and Test
SHOCKS AND ATTRACTIONS	<ul style="list-style-type: none"> Static Electricity 	<ul style="list-style-type: none"> What is an electric shock? What is electrical charge? How is charge conserved? 	<ul style="list-style-type: none"> Charged objects have an excess or deficiency of electrons Charge can be neither created nor destroyed and is therefore conserved 	<ul style="list-style-type: none"> Explain why charged objects can be attractive and repulsive 	June	<ul style="list-style-type: none"> Home made Vander Graff generator Project Journal Entries Quiz(es)

	<ul style="list-style-type: none">• Magnetic Force	<ul style="list-style-type: none">• What causes magnetic attraction and repulsion?• What is the relationship between electric current and magnetism?	<ul style="list-style-type: none">• Magnetic fields of force result from moving electrical charge• Magnetic fields are regions of magnetic force• Moving charges behave predictably in a magnetic field	<ul style="list-style-type: none">• Map the magnetic field of a magnet• Describe the direction force on a current in a magnetic field	June	<ul style="list-style-type: none">• Magnetic field Mapping lab• Build an Electric Motor Lab• Journal Entries• Quiz and Test
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