Kalkaska High School Curriculum Map March 2023

Subject: Physics

Primary Grade Level:__11/12_____

Month	Unit/Topic of Study	Standards	Key Vocabulary	Test Taking and Reading Strategies	Math Skills	Writing in the Content Area	Kagan Strategies	Assessments
Sept	Mathematical Tool Kit	**State Standard**: **P2.1E Describe and classify motions in one dimension, two dimensions, circular, or periodic motion**. Communicate scientific and technical information Mathematically	Metric system acceleration Scientific Notation negative acceleration Accurate accel. due to gravity precise displacement significant digits dependent and independent variables linear slope, vector quadratic equation motion inverse displacement direct distance even leave it scale Resultant polygon method Velocity tip to tail method distance scaler vector Displacement time interval projectile motion average velocity trajectory constant velocity horizontal displacement reference point horizontal	Talk to the text Visualize Summarize Design your own problem, trade and try	Measure & convert in the metric system, use sig.digits., use basic algebra & geometry skills, use scientific notation, "Order of operations" to communicate math skills about all kinds of motion	Communicate scientific and technical information in paragraph form with topic sentences.	Community building: What didn't you do Stand up hands up Quiz-quiz - Trade Carousel Community building with photos	Quizzes Labs (3) Velocity Acceleration Probe lab Physics Skills (3) Design of your own problem Two Unit Tests

Oct	Forces & Interactions	**Common Core State: connections: RST.9-10.7** Translate quantitative or technical information expressed in words, text, and translate information expressed mathematically. State Standard: **HS-PS2-1.** Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net	velocity position vertical displacement instantaneous velocity vertical velocity Periodic motion SHM torque lever arm Force amplitude Period centrifugal centripetal mechanical resonance Force Kepler Copernicus Kinematics Brahe Dynamics satellite Gravitational Force low Earth orbit Newton's 2nd Law Newton's Cannon Newton's 1st Law radius Newton's 3rd law period Mass high tide Weight low tide Friction Universal gravitation Static friction product Sliding friction 6.67 X10^-11 Applied force Kepler's 3-Laws Frictional force variable orbit speed Gravitational force inverse Normal force weightlessness Coefficient of friction spring tide Mu neap tide	Think - Pair-Share Picture Question Summarize Gallery Walks Newtons (3) Question Picture Predict Restate Write Ping-pong	Design and conduct an experiment to gather data and display it in graphs to show the cause and effect relationships between the net **force** on an object, its **mass** and its **acceleration**.	Describe in writing how changing the force of one part of a system influences the forces in other parts of the same system.	Stand up Hands up Coumminity building with fun questions and then Knee to Knee Carousel: Community Building and then into Quiz Quiz Trade Stand up - Hand up Pair up	Labs: Data collection and comparative Graphs Probe Labs Quizzes Written schematics to represent acceleration / Velocity set ups Online Physlets Velocity and acceleration AP Physics Math practice

		force on a macroscopic object, its mass, and its acceleration.	Net Force Einstein theory of Gravitation Terminal Velocity Black HoleAir resistance wormhole					
Nov	Energy	State Standard: **HS-PS3-2.** Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).	Machine simple machine Effort force resistance force Work input work output Ideal machine lever Work = force X distance fulcrum Mechanical advantage effort arm First class lever resistance arm 2nd class lever 3rd class lever Pulleys fixed Movable pulley Block and tackle Pulley Wheel & axle radius Inclined plane screw Wedge Daedalus Compound machine Efficiency power	Think Aloud Pair Think, pair, Share Roles: The listener: Questions to ask: Can you tell me more? What are you focusing on Practice and learn SOLAR skills	Design and build a pulley system with a Mechanical advantage over 7. Build pulleys, balanced levers, Calculate efficiency and Mechanical Advantage	Describe in writing how energy is conserved in each simple machine.	Carousel Quiz-Quiz -Trade Stand up - Hand up Pair up	Labs: Building: Pulley, Lever, Compound machine. Quizzes Design a multi chapter, multi equation AP open-ended math problem Test Online Physlets energy changes

Dec	Forces & Interactions	**HS-PS2-2**. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.	Momentum mass Velocity vector Impulse force Time follow through Kinetic energy Joule Potential energyWork-Energy Theorem Total Energy Gravitational PE Chemical PE zero point Reference Level Conservation of Energy Mechanical Energy Inverse Hyperbola collisions Elastic collisionInelastic collision Completely (Perfectly) Inelastic collision	Drawing Summarizing Design your own problem	Design, evaluate and improve a device that lowers the force on an object (e.g. an egg) when it collides with another object (e.g. the wall).	Lab Report: Follow Rubric to report on the device you designed	Continuous use of Stand up handup pairup Knee to knee Community building with silly questions, photos from N.G. Rally Robin	Several Labs using spring Scales Baseball/ Newton Laws Gallery Walk Presentations Labs: Momentum Pendulum
Jan	Energy influences on States of Matter	**HS-PS3-4.** Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined within a closed system results in a more uniform energy distribution among the	Temperature ThermalEnergy Kinetic-Molecular Theory Conduction Convection Radiation Heat Kelvin Celsius absolute zero Specific Heat Joule	Gallery Walk Energy Types	Calculate thermal energy changes in Joules, find Cp, and % Error for a closed heat transfer	State and explain two Laws of Thermodynamics	Rally Coach Added to the above structures which continue to be used	Formative and summative assessments , quizzes Labs: Calorimeter lab Heat change lab: Design your own, change one

		components in the system (second law of thermodynamics).	Calorimeter Heat of Fusion Heat of vaporization Thermal dynamics Laws (1 & 2) Entropy		system in our lab. draw and describe solid, liquid, gas, and plasma. I can describe Bernoulli's, Archimede, and Pascal's principle			variable Flat line at Boiling lab Design your own Math problem - Multi Chapter, at least three equations Test
Feb	Structure and Properties of Matter Thermal Dynamics	**PS2-6** Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.*	Fluid liquid gas Pressure force Pascal Pascal's principle Hydraulic Machines Buoyant Force Archimedes' principle Bernoulli's Principle Flight Lift curve ball spoiler Cohesive spherical adhesion Capillary action evaporation volatile Condensation plasma Turbulent Laminar Eddy Current Ideal Gas non-Viscous Amorphous solid Thermal Expansion Elasticity ductile malleability	Think, pair, share Predicting Modeling Summarizing	Show energy changes using the Second law of Thermodynamics Lab: Flat lining of energy at boiling - show evidence of this our lab.	Define heat, energy, specific heat, calorimeter, % error, Joule's Communicate how the above words work together to	Jot Thought added to the stuctructures above which continue to be used weekly for community building and then content	Quizzes Heat change lab Design

			Coefficient of linear expansion bimetallic Coefficient of volumetric expansion thermostat			influence matter		
March	Waves & Electromagnetic Radiation	**HS-PS4-5.** Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.*	Time wavelength Frequency Hertz Light sound Transverse wave Compression wave Electromagnetic Radiation mechanical wave Electromagnetic wave Longitudinal Wave Electromagnetic spectrum compression Wave Pulse rarefaction Traveling wave crest/peak Amplitude wavelength Trough period Interference Standing waves Node antinode Superposition of waves Reflection Constructive and destructive interference Diffraction Refraction Radio wave microwave Infrared radiation visible Ultraviolet X-Ray Gamma Ray nm Ray Quantum Theory Photon double slit Transparent translucent Opaque Galileo Ole Roemer Finite AA Michelson C Speed of light Laser: Coherence Luminous illuminated Angle of incidence = Angle of reflection	Drawing Modeling, Think pair, Share	**Calculate** harmonics Intensity Doppler changes Period Frequency Wavelength Magnification Object Distance Image distance Radius of curvature Design your own Object Distance problem		Carousel Quiz -Quiz trade community build and then content Rally Coach	Sound pipe labs Refraction Lab Reflection Lab PHyslets online Optics Bench

			Diffuse Reflection Magnification Regular reflection (specular)Concave mirror Total Internal Reflection Convex mirror Dispersion by refraction diverge Spherical aberration Cassegrain telescope Primary additive colors Primary subtractive colors polarization					
April		PS 4-3 Waves and applications	Longitudinal wave sound Compression wave mechanical wave Velocity frequency Wave length compression Rarefaction Doppler Shift Pitch loudness Octave sound level Decibels (dB) vibrate - source Brass reed Stringed outer ear Resonance middle ear Timbre Inner ear Beat dissonance Consonance harmonics Odd harmonics -closed		I can calculate the velocity, wavelength, harmonic, Intensity For waves	I can compare and contrast light and sound waves	**Carosel Feedback** STand up handup pair up	
May	Forces & Interactions	**HS-PS2-5.** Plan and conduct an investigation to	Static Electricity conductor Electrons insulator	Talk to text	Calculate voltage, resistance, and power for	Write paragraphs to describe how changing one	Knee to knee, Rally coach Roud Robin	Circuit building: Four labs

	Electromagnetism Bridge Building	provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.	Grounded magnetism Electroscope parallel circuit Series circuit voltmeter Multimeter breadboard Resistor flowing electrons Lightning current Voltage potential energy Amperes resistance Ohms dry cell Wet cell Ohm's Law Capacitor switch Fuse generator Permanent magnet Temporary Magnet Polarity attract Repel electromagnet ALNICO Magnetic Fields True North magnetic North Magnetic Declination Field force Magnetic flux Superconductor Right Handed Rules (3) Domain force	Think Pair share Draw what you read	circuits I build. I can build an electric circuit system, or a motor and connect it with another group's system. I can use a voltmeter or magnetic field meter to show how changes in one system result from manipulating the other system .I can design and build a complete circuit on a breadboard that changes a compass needle placed near the circuit	part of a circuit influences other parts.	Jot thought **Rally Coach** Keep trading writers and coaches **Carousel Feedback** **Rally Coach On Bridges**	Light bulbs & wires Bread Board and Switches Design a circuit Resistor reading Quizzes Test (2) Labs: Build and Electromagnet

			Current closed loops: **out** North, **in** South Strength(B Teslas Magnetic Induction galvanometer Electric motors AC DC anaerobic bacteria					
June	Nuclear Power	HS-PS1-3, 1-8 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of forces between particles. Cross cut: In nuclear processes, atoms are not conserved, but the total number of protons plus neutrons is conserved.	fission fusion half life radioactive Nuclear Power nuclear waste power generation heat pollution clean energy fossil fuel radiation detector Geiger counter Chernobyl Three Mile Island JapanAlternate energy sources Sodium-oxygen battery	Research, Defining what quality resources are Making connections Question	I can calculate half-life	I can write, present, and argue my opinion on the use of Nuclear Power. I can base my thoughts on researched facts from Scientific Journals about the advantages/ disadvantages and history of Nuclear power	**Timed - Pair Share** This will be used each day after each student researches independently, but before they write their paragraph	Research topic/ daily Drawings Presentation Final Opinion with supporting facts paper Presentation