





Physics(Master)


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Month	Content	Skills	Assessment	Resources & Technology
September	<p>CEQ HOW DO WE USE GRAPHICAL AND MATHEMATICAL MODELS TO DESCRIBE MOTION?</p> <p>HOW DO FORCES AFFECT THE MOTION OF OBJECTS?</p> <p>HOW DO THE FOUR FIELD FORCES ALLOW US TO TRANSFORM ENERGY FROM ONE FORM TO ANOTHER?</p> <p>WHAT ARE THE PROPERTIES OF WAVES AND HOW ARE THEY USED TO TRANSFER ENERGY?</p> <p>UEQ </p> <ul style="list-style-type: none"> • <i>What does it mean to say motion is relative?</i> • <i>How do we use mathematical models to describe the way things with constant velocity move?</i> • <i>How do we use mathematical models to describe the way things</i> 	<p>One Dimensional Motion</p> <ol style="list-style-type: none"> 1) Calculate average velocity, displacement, and time for a moving object. 2) Calculate Acceleration, Displacement, Final Velocity, Initial Velocity, or time for an object moving with changing velocity. 3) Given a position time graph draw the corresponding velocity and acceleration time graphs. 4) Calculate displacement and acceleration from a segment of a velocity time graph. 5) Calculate the velocity and position of an object in freefall if given the time falling or being shot upward as well as the initial velocity. <p>Newton's Laws</p> <ol style="list-style-type: none"> 1) Use Newton's 2nd Law to solve for force, mass, and acceleration. 2) Use Newton's laws to explain the motion of an object. 3) Calculate the weight of an object given its mass. 4) Calculate the friction acting on an object given the coefficient of kinetic or static friction and the objects normal force. 5) Draw a free body diagram for an object acted on by multiple forces. 6) Find the net force acting on an object. 7) Given the net force find the acceleration of an object. 	<p>One Dimensional Motion</p> <p>1-3 1D motion lab Outdoor Lesson=3-4 Walking a line graph activity 1-4 Graphing quiz 2 & 5 Freefall Lab 1-5 CA=1D kinematics Test</p> <p>Newton's Laws</p> <p>1-3 Newton's 2nd Law Lab 1- Friction Lab 1-7 CA=Newtons Laws Test</p>	<p><i>One Dimensional Motion</i></p> <p><i>Glencoe Physics Principles and Problems</i></p> <p>Tape Timers</p> <p>Pasco Motion Sensors</p> <p>Data Studio Software</p> <p>Bucket Lids and Sinkers</p> <p>Graph Paper</p> <p>Stop Watches</p> <p>Meter Sticks and Stop Watches</p> <p>Long Metric Tape Measure</p> <p>"tech integration: Pasco motion detector with data studio software"</p> <p>"Outdoor Lesson: Walking a line graph activity"</p> <p>Key Vocabulary</p> <p>Distance</p>

	<p><i>with uniform acceleration move?</i></p> <ul style="list-style-type: none"> • <i>How do we change between graphs of position vs. time, velocity vs. time, and acceleration vs. time?</i> • <i>How does gravity affect the motion of an object?</i> <p>One Dimensional Motion</p> <p>Distance vs. displacement Speed vs. velocity Acceleration Graphing motion Freefall</p> <p>UEQ </p> <ul style="list-style-type: none"> • How are Free Body Diagrams used to account for the forces acting on an object? • How do Newton's 3 Laws of motion apply to constant and changing velocity of objects? • How do frictional forces affect the motion of an object? 			<p>Displacement</p> <p>Speed</p> <p>Velocity</p> <p>Acceleration</p> <p>Freefall</p> <p>Scalar</p> <p>Vector</p> <p>Rate</p> <p>Terminal Velocity</p> <p>Newton's Laws</p> <p>Force Scales</p> <p>Pasco Cars</p> <p>Pulleys</p> <p>Mass Sets</p> <p>Stop Watches</p> <p>Key Vocabulary</p> <p>Mass</p> <p>Weight</p>
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	<p>Newton's Laws</p> <p>Inertia $F=ma$ Equal and opposite reactions Friction Weight and Mass Free Body Diagrams Tension Net Force</p>			<p>Inertia Force Net Force Tension Friction Coefficient of Friction Normal Free Body Diagram</p>
<p>October</p>	<p>UEQs </p> <ul style="list-style-type: none"> • <i>How is the force of weight resolved for objects on inclined planes?</i> • <i>How are force and velocity vectors resolved into components to make predictions about static and dynamic situations?</i> • <i>How does projectile motion represent an application of both constant velocity and constant acceleration?</i> <p>Vectors and Two-Dimensional Motion Vector Scalar Vector Components</p>	<p>Vectors and Two-Dimensional Motion</p> <ol style="list-style-type: none"> 1. Use trigonometry to resolve vectors into x- and y- components 2. Resolve the weight vector for objects on inclined planes 3. Use free-body diagrams and vector components to predict the motion of an object acted on by forces in two dimensions. 4. Apply kinematic equations to calculate the motion of objects in two-dimensions 5. Resolve the displacement, velocity, and acceleration of a projectile into their horizontal and vertical components 	<p>Vectors and Two-Dimensional Motion</p> <p>1-3 Coefficient of Friction Quarter Lab 1-3 2-D Forces Quiz 4-6 Projectile Motion Lab 4-6 Bulls-Eye Lab 1-6 CA = Vectors and 2-D Motion Test</p> <p>Energy, Momentum, and Conservation Laws</p> <p>1-2 Conservation of Momentum Lab 1-4 Momentum Quiz 5-7 Conservation of Energy Lab 5-7 Energy Quiz 7-9 "Bungee Jumper" Lab 1-10 CA = Energy, Momentum, and</p>	<p>Vectors and Two-Dimensional Motion</p> <p><i>Glencoe Physics Principles and Problems</i></p> <p>CPO marble launchers, photogates Quarters Ramps Marbles Graph paper Meter sticks Stopwatches Protractors</p> <p>Key Vocabulary Resultant Resolve Components Trajectory</p>


	<p>Inclined Plane Net Force Free-Body Diagrams Projectile Motion</p> <p>UEQs </p> <ul style="list-style-type: none"> • <i>What is the impulse momentum theorem?</i> • <i>How do we use conservation laws to interpret interactions between objects?</i> • <i>How do we distinguish between elastic and inelastic collisions?</i> • <i>What is energy?</i> • <i>What are some forms of potential energy and how is potential energy gained?</i> <p>Energy, Momentum, and Conservation Laws Momentum Conservation of Momentum Impulse-Momentum Theorem Elastic Collision Inelastic Collision Perfectly Inelastic Collision Energy Conservation of Energy Work Work-Energy Theorem Power</p>	<p>6. Describe the motion of a projectile using the equations for constant velocity and constant acceleration</p> <p>Energy, Momentum, and Conservation Laws</p> <ol style="list-style-type: none"> 1. Determine the momentum vector for moving objects 2. Use the Law of Conservation of Momentum to calculate momentum of objects before and after collisions 3. Calculate the change in momentum due to a force acting for a given time using the Impulse-Momentum Theorem. 4. Describe how an elastic collision differs from an inelastic collision. 5. Calculate the kinetic energy of a given mass moving at a known velocity. 6. Calculate the gravitational potential of a mass at a given height. 7. Use the law of conservation of energy to calculate the results of an energy transformation from kinetic to potential or potential to kinetic. 8. Calculate the work done by a known force acting over a given displacement. 9. Use the work-energy theorem to calculate the change in kinetic energy due to a given amount of work being done. 	<p>Conservation Laws Test</p>	<p>Projectile Range Equilibrium</p> <p>Energy, Momentum, and Conservation Laws <i>Glencoe Physics Principles and Problems</i></p> <p>CPO tracks and cars Pasco Cars and Motion Sensors Ramps Springs Billiard balls Graph paper Stopwatches Meter Sticks</p> <p>Key Vocabulary Momentum Conservation Impulse Elastic Collision Inelastic Collision Perfectly Elastic Collision Energy Kinetic Energy Potential Energy Work Power</p>
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		10. Calculate power given work done in a period of time.		
November	<p>UEQ </p> <ul style="list-style-type: none"> • How may Newton’s laws be utilized to analyze real and perceived phenomena for a body in circular motion? • What factors affect the rotational inertia of a rigid object? • How do we distinguish between linear and angular velocity, acceleration, and momentum? • How do we balance clockwise and counterclockwise torques about an objects pivot point or center of mass? • Why does gravity play the dominant role of the four field forces in universal interactions. <p>Circular and Rotational Motion</p> <p>Centripetal force</p>	<p>Circular and Rotational Motion</p> <ol style="list-style-type: none"> 1) Calculate the centripetal acceleration of revolving mass given its radius and period. 2) Identify and solve for centripetal forces acting on objects in uniform circular motion. 3) Make predictions about the rotational inertia of various objects. 4) Balance torques acting on a mass 5) Solve for the gravitational force between 2 masses. 	<p>Circular and Rotational Motion</p> <ol style="list-style-type: none"> 1-2 Circular motion lab 3 Soup can races 4 Torque worksheet <p>1-5 CA=Circular & Rotational Motion</p>	<p>Circular and Rotational Motion</p> <p>Rubber Stopper String Mass Sets Stop Watches Meter Sticks</p> <p>Key Vocabulary Centripetal Centrifugal Torque Radius Period Frequency Angular Displacement Angular Velocity Angular Acceleration Moment of Inertia Universal Gravitation</p>


	<p>linear velocity angular velocity angular momentum rotational inertia torque gravitational force</p>			
<p>December</p>	<p>UEQs </p> <ul style="list-style-type: none"> • <i>What factors affect the movement of charge?</i> • <i>How is Ohm's Law used to calculate the equivalent resistance of series and parallel circuits as well as the current in and voltage across its various components?</i> • <i>What is the relationship between electricity and magnetism</i> • <i>What technology takes advantage of electromagnetism and electromagnetic induction?</i> • <i>How does production and transmission of alternating current differ from direct current?</i> <p>Electricity and Magnetism Charge Proton Electron Neutron Coulomb's Law Electric Potential Voltage Resistance</p>	<p>Electricity and Magnetism 1 Describe how an object becomes charged. 2 Make predictions about the behavior of charged objects 3 Use Coloumbs law to calculate the forces acting between electric charges at various distances. 4 Calculate electric field surrounding a charge 5 Calculate electric potential difference and relate it to work and energy 6 Draw circuit diagrams for series and parallel circuits 7 Use Ohms law to calculate current in and voltage across resistors in series and parallel circuits 8 Calculate the power dissipated by a resistor as well as energy use in KWH. 9 Make predictions about the froces between magnetic poles 10 Use the right hand rule to predict the direction of magnetic field around a current carrying wire 11 Use the right hand rule to predict the direction of force on a moving charge in a magnetic field and calculate the strenght of the force 12 Use the right hand rule to predict the direction of force on a current carrying wire in a magnetic field and calculate the strength of the force.</p>	<p>Electricity and Magnetism 1-3 Coulombs law problems wksht 4-5 Electirc Field Problems 6-7 Series and Parallel Problems worksheet 6-8 Ohm's law lab 9-12 Electromagnetism Worksheet 12 Speaker Design Project 13 Electromagnetic Induction Wksht 1-13 CA=EM test</p>	<p>Electricity and Magnetism Animal fur Core-X Rubber Rods Silk and Glass Rods Aluminum Pans Electroscope Balloons Van De Graf Generator Circuit Boards with batteries and resistors Multimeters Magnets DC Power Supplies Naills and Wire for electromagnets Skeweres, wire, and paper for speakers DC Motors CPO ripcord generators</p> <p>Key Vocabulary Proton Neutron Electron Positive Charge Negative Charge</p>

	<p>Current Alternating Current Direct Current Ohm's Law Magnetism Electromagnetism Induction Motors Generators Speakers</p> <p>Mousetrap Car Design Engineering Design Process Measuring Efficiency</p>	<p>13 Describe how electromagnetism can be harnessed for practical application 14 Describe how changing magnetic fields can generate electric potential differences. 15 Describe how electromagnetic induction is applied in the construction of generators and transformers.</p> <p>Mousetrap Car Design 1) Build a car powered by a mousetrap and make modifications to improve its efficiency 2) Calculate the work done by a variable force in pulling back the mousetrap 3) Calculate the kinetic energy of the car 4) Calculate the cars efficiency</p>		<p>Coulomb's Law Electric Field Voltage Electric Potential Capacitor Ohm's Law Battery Resistance Current Series Circuit Parallel Circuit Circuit Breaker Fuse Switch Power Power Dissipated Electrical Energy Kilowatt-Hour</p>
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<p>January</p>	<p>UEQ </p> <ul style="list-style-type: none"> • What are the properties of waves? • How do waves transfer energy? • What causes standing waves and how do they differ from traveling waves? • What causes resonance? • How do wave properties explain the production and transfer of sound and music? • What causes the Doppler Effect and what is it used for? • How are light and sound waves different? <p>Waves, Sound, & Light Transverse waves Longitudinal waves Mechanical waves Sound Waves Ultrasound Infrasound Frequency/Pitch Amplitude Decibels Standing Waves Resonance Interference</p>	<p>Waves, Sound, & Light</p> <ol style="list-style-type: none"> 1. Draw a sine wave and label its parts 2. Draw a longitudinal wave and label it. 3. Calculate wave speed from frequency and wavelength. 4. Use resonance to find the natural frequency of an open or closed tube. 5. Calculate the wavelength of an open or closed tube. 6. Explain how waves are transmitted (and refracted), reflected, or absorbed at a boundary between media 7. Use the principal of superposition to explain interference of waves 8. Calculate the beat frequency of 2 sound waves that are close in pitch 9. Describe how sound is transferred through your ear to your brain. 10. Calculate the doppler shift in frequency for a moving source or observer. 11. Describe how standing waves set up in strings or air columns. 12. Explain the ray model of light 13. Describe the effect of distance on lights illumination 14. Solve problems involving the speed of light. 	<p>Waves, Sound, & Light</p> <p>1-5 Waves Quiz 3-5 Speed of sound lab 7-11 Sound Worksheet 7-11 Sound topic presentation 1-14 CA=Waves Sound and Light Test</p>	<p>Waves, Sound, & Light</p> <p>Boom Wacker Sound Tubes Resonance Tubes Tuning Forks Waves demonstratos Sine Wave Generator Waveport Software Laser Decibel Meter</p> <p>Key Vocabulary Transverse waves Longitudinal waves Mechanical waves Sound Waves Ultrasound Infrasound Frequency/Pitch Amplitude Decibels Standing Waves Resonance Interference Doppler Effect Electromagnetic waves Electromagnetic Spectrum Reflection Absorption Transmission</p>
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	<p>Doppler Effect Electromagnetic waves Electromagnetic Spectrum Reflection Absorption Transmission</p>			
February	<p>UEQ </p> <p><i>How do wave properties of energy transfer apply to electromagnetic waves?</i> <i>How does optical technology apply reflection and refraction of light?</i></p> <p><i>How is interference of diffracted waves affected by wavelength?</i> <i>How does refraction cause dispersion?</i></p> <p>Optics</p> <p>Law of Reflection Snells Law Ray Diagrams focal point Convex and Concave Lenses Convex and Concave Mirrors Convergent and Divergent Rays Real and Virtual Images Total Internal Reflection Diffraction Single Slit, Double Slit, and Grating interference Polarization Dispersion</p>	<p>Optics</p> <ol style="list-style-type: none"> 1) Use the law of reflection to predict the position of a reflected image 2) Use snells law to find the index of refracton of a transparent object. 3) Construct Ray diagrams to find the position, size, and orientation of images with concave and convex mirrors and lenses. 4) Find the critical angle for optically dense mediums and describe how total internal reflection can be used in fiber optics. 5) Use diffraction to make predictions about maxima and minima at various distances when laser light is shined thru single slits, double slits, and diffraction gratings. 6) Explain applications of polarizing filters for light. 7) Explain how refraction causes dispersion 	<p>Optics</p> <p>1-3 Ray diagrams worksheet 1-3 Optical Bench Lab 5 Diffraction Lab 5 Diffraction Problems 1-7 CA=Optics Test</p>	<p>Optics</p> <p>Meter Sticks Plane Mirrors Concave and Convex Mirrors Concave and Convex Lenses Candles Gratings Lasers Lucite Fiber Optics Material Polarizing Filters Overhead Projector</p> <p>Key Vocabulary Law of Reflection Snells Law Ray Diagrams focal point Convex Concave Convergent rays Divergent Rays Real Images Virtual Images Total Internal Reflection Diffraction Single Slit Interference Double Slit Interference Grating interference Polarization</p>

				Dispersion
March	<p>UEQ </p> <p><i>What developments, early in the 1900s led to a quantum view of atoms and energy?</i></p> <p><i>What historical evidence supports the particle and wave nature of light?</i></p> <p><i>What causes transmutation of radioactive isotopes and what are the characteristics of the various types of radiation produced?</i></p> <p><i>How do we use fission and fusion to convert potential energy from the strong nuclear force to other forms of energy?</i></p> <p>Modern and Nuclear Blackbody Radiation The Photoelectric Effect Cathode Ray Tube Milikan Oil Drop Experiment Rutherford Model Bohr Model and Spectral Line Compton Effect Matter Waves and Debroglie's Equation Schroedinger Model and Wave Equation Heisenberg Uncertainty Principle Pauli Exclusion Principle Bequeral and Radiation Transmutation of Atoms Isotopes Fission and Fussion $E=mc^2$</p>	<p>Modern and Nuclear</p> <ol style="list-style-type: none"> Describe the spectrum of a hot body Explain the photoelectric effect and make calculations of stopping potential if given incident frequency and work function for a metal. Explain how Milikan found the charge of an electron. Describe evidence for the wave nature of matter Describe the structure of the atom Use the Bohr model to explain spectral lines. Calculate the products of alpha and beta decay of atoms Identify the number of protons and neutrons for an isotope Use activity to predict the half life of a radioactive isotope. Explain how binding energy per nucleon changes with atoms size and relate this to fission and fusion 	<p>Modern and Nuclear</p> <ol style="list-style-type: none"> Photoelectric Problems Millikans Black Box Lab Transmutation Series Exp. Decay lab <p>1-9 CA=Modern and Nuclear Test</p> <ol style="list-style-type: none"> Day 1 reaction paper 	<p>Modern and Nuclear</p> Laser Cathode Rays Gas Tube Lamps Gratings Cups and Masses for Millikan Lab Dry Ice and Isopropyl Alcohol for cloud chamber Dice for exponential Decay activity CPO Atom Buildier
				<p>Persuasive=Day 1 reaction</p> <p>Key Vocabulary Blackbody Radiation The Photoelectric Effect Cathode Ray Tube Milikan Oil Drop Experiment Rutherford Model Bohr Model Spectral Line Compton Effect Matter Waves Debroglie's Equation Schroedinger Model Wave Equation Heisenberg Uncertainty Principle Pauli Exclusion Principle Bequeral Radiation Transmutation of Atoms Isotopes Fission Fusion $E=mc^2$</p>