

<p>Unit 1: Kinematics in One Dimension</p> <p><u>Enduring Understandings:</u></p> <p>Measure mass, length, volume, time with appropriate instruments</p> <p>Evaluate uncertainty in real measurements with %Error calculation</p> <p>Graphically and numerically determine state of motion of a system at any point in time</p>			<p><u>Standards-Based Essential Skills</u></p> <p>Standard 4</p> <p><u>Understandings:</u></p> <p>5.1a: Measured quantities can be classified as either vector or scalar.</p> <p>5.1d: An object in linear motion may travel with a constant velocity* or with acceleration*.</p> <p><u>Skills:</u></p> <p>5.1 i: Construct and interpret graphs of position, velocity, or acceleration versus time</p> <p>5.1 ii: determine and interpret slopes and areas of motion graphs</p>	<p><u>Strategies to Teach Skills & Concepts</u></p> <p>Class notes</p> <p>Guided practice with math concepts</p> <p>Reference table practice</p> <p>Homework practice</p> <p>Lab exercises</p> <p>Demo: Pasco Cart – Const V, A</p>	<p><u>Resources</u></p> <p>L-1: Intro to Excel</p> <p>L-2: Measurement</p> <p>L-3: Kinematics</p>
<p><u>Assessments:</u></p> <p>Formative:</p> <p>Unit 1 Homework</p> <p>Summative:</p> <p>Unit 1 Exam</p> <p>Lab reports</p>	<p><u>Literacy Stds</u></p>	<p><u>Tier 2:</u></p> <p>Position</p> <p>Distance</p> <p>Speed</p> <p>Elapsed</p>	<p><u>Tier 3:</u></p> <p>Scalar</p> <p>Vector</p> <p>Displacement</p> <p>Velocity</p> <p>Acceleration</p>	<p><u>Video, ppt</u></p> <p>Kinematics ppt</p>	
<p><u>Time Frame:</u></p> <p>September</p> <p>(1.5 Weeks)</p>	<p><u>Vocabulary</u></p>	<p><u>Review:</u></p>	<p><u>Notes:</u></p>	<p><u>Misc</u></p> <p><u>Web</u></p>	

Unit 2: Projectile Motion		Enduring Understandings: Decompose displacement, velocity and acceleration of an object into components Analyze x- and y- components of motion separately Graphically and numerically combine components to determine state of motion of a system at any point in time		Standards-Based Essential Skills		Strategies to Teach Skills & Concepts		Resources			
Assessments: Formative: Unit 2 Homework		<u>Content Outcomes</u> Standard 4 Understandings: 5.1b A vector may be resolved into perpendicular components.* 5.1c The resultant of two or more vectors, acting at any angle, is determined by vector addition. 5.1e An object in free fall accelerates due to the force of gravity.* Friction and other forces cause the actual motion of a falling object to deviate from its theoretical motion. 5.1f The path of a projectile is the result of the simultaneous effect of the horizontal and vertical components of its motion; these components act independently. 5.1g A projectile's time of flight is dependent upon the vertical component of its motion. Skills: 5.1 iii: determine the acceleration due to gravity near the surface of Earth 5.1 iv: determine the resultant of two or more vectors graphically or algebraically 5.1 v: draw scaled force diagrams using a ruler and a protractor 5.1 vi: resolve a vector into perpendicular components both graphically and algebraically 5.1 vii: sketch the theoretical path of a projectile 5.1 viii: use vector diagrams to analyze mechanical systems (equilibrium and nonequilibrium)		Class notes Guided practice with math concepts Reference table practice Homework practice Lab exercises Demos: Free Fall – Book & Paper Free Fall – Ball in Motion Shoot the Monkey		<u>Labs</u> L-4: Accel Due to Gravity L-5: Speed of a Projectile L-6: Projectile Motion					
								<u>Literacy Stds</u>		<u>Web</u> Video: Monkey Shoot Ppt: Vector Addition Ppt: Projectile Motion	
								<u>Vocabulary</u>			
Summative: Unit 2 Exam Lab reports		<u>Tier 2:</u> Perpendicular Parallel Magnitude Pythagorean Theorem Component		<u>Tier 3:</u> Scalar Vector Resultant Equilibrant		<u>Review:</u>		<u>Notes:</u>			
<u>Time Frame:</u> September (2 Weeks)											

Unit 3: Newton's Laws of Motion		Resources	
<p><u>Enduring Understandings:</u></p> <p>Analyze evidence for and importance of Newton's 1st Law - Inertia</p> <p>Apply 2nd Law to motion problems</p> <p>Recognize presence and significance of 3rd Law pairs of forces</p>		<p>L-7: Newton's 2nd Law</p>	
<p><u>Assessments:</u></p> <p>Formative: Unit 3 Homework</p> <p>Summative: Unit 3 Exam Lab reports</p>		<p><u>Content Outcomes</u></p>	
<p><u>Literacy Stds</u></p>		<p><u>Standards-Based Essential Skills</u></p> <p>Standard 4</p> <p>Understandings:</p> <p>5.1i: Inertia of an object is proportional to its mass. An object's motion remains unchanged unless acted upon by an unbalanced force.</p> <p>5.1j: When the net force on a system is zero, the system is in equilibrium.</p> <p>5.1k: An unbalanced force causes a mass to accelerate*.</p> <p>5.1l: Weight is the gravitational force with which a planet attracts a mass*.</p> <p>5.1q: Forces occur in equal and opposite action/reaction pairs.</p>	
<p><u>Vocabulary</u></p>		<p><u>Strategies to Teach Skills & Concepts</u></p> <p>Class notes</p> <p>Guided practice with math concepts</p> <p>Reference table practice</p> <p>Homework practice</p> <p>Lab exercises</p> <p>Demos:</p> <p>1 kg Mass</p> <p>Pasco Cart – Force Probe</p> <p>3rd Law – Violent Pull</p> <p>Pasco Cart – 3rd Law</p> <p>2-Coin Drop</p>	
<p><u>Review:</u></p> <p>Tier 2:</p> <p>Proportional</p> <p>Constant</p> <p>Unbalanced</p> <p>External/Outside</p> <p>Equilibrium</p>		<p><u>Notes:</u></p> <p>Tier 3:</p> <p>Force</p> <p>Inertia</p> <p>Mass</p> <p>Weight</p> <p>Normal Force</p>	
<p><u>Time Frame:</u></p> <p>October</p> <p>(2.5 weeks)</p>		<p><u>Misc</u></p> <p>Pasco Carts & Track</p>	
<p><u>Web</u></p>		<p><u>Video, ppt</u></p>	
<p><u>Labs</u></p>		<p>0</p>	

Unit 4: Net Force & Friction		Enduring Understandings: Identify and determine the net force acting on an object in a system of forces. Evaluate frictional force in a system and the normal force influencing it Assess the relationship between a stretched spring and the resulting restoring force		Standards-Based Essential Skills		Strategies to Teach Skills & Concepts		Resources	
Assessments: Formative: Unit 4 Homework		<u>Content Outcomes</u>		Standard 4 Understandings: 5.1j When the net force on a system is zero, the system is in equilibrium. 5.1m Elongation or compression of a spring depends upon its spring constant and the magnitude of the applied force.* 5.1o Kinetic friction* is a force that opposes motion.		Class notes Guided practice with math concepts Reference table practice Homework practice Lab exercises		L-8: Hooke's Law	
		<u>Literacy Stds</u>						Labs	
Summative: Unit 4 Exam Lab reports		<u>Vocabulary</u>		Tier 2: Incline Normal force		Tier 3: Net Force Friction		Video, ppt	
								Web	
Time Frame: October (1.5 weeks)		<u>Review:</u>		<u>Notes:</u>		<u>Misc</u>		Pasco Carts & Track	

Unit 5: Circular Motion		Enduring Understandings: Determine direction, magnitude, and factors controlling circular force, gravity Evaluate gravitational force for earth and other planets as a circular force		Standards-Based Essential Skills		Strategies to Teach Skills & Concepts		Resources	
Assessments: Formative: Unit 5 Homework		Content Outcomes		Standard 4 Understandings: 5.11: Weight is the gravitational force with which a planet attracts a mass*. The mass of an object is independent of the gravitational field in which it is located. 5.1n: Centripetal force* is the net force which produces centripetal acceleration. * In uniform circular motion, the centripetal force is perpendicular to the tangential velocity. 5.1t Gravitational forces are only attractive. 5.1u The inverse square law applies gravitational* fields produced by point sources.		Class Notes Guided practice with math concepts Reference Table Practice Homework practice Lab exercises Demos: Ball on string		L-8: Centripetal Force	
		Literacy Stds						Video, ppt Ppt - Circular Motion	
Summative: Unit 5 Exam Lab reports		Vocabulary		Tier 2: Circular Universal Radius		Tier 3: Centripital Free fall		Web	
		Time Frame: October (1.5 Weeks)		Review:		Notes:		Misc Ball on String	

<p>Unit 6: Work & Energy</p> <p><u>Enduring Understandings:</u></p> <p>Calculate work needed to move an object Derive and apply the KE equation Determine PE stored in springs and objects raised against gravity Identify and apply the Law of Conservation of ME Calculate power in changes of ME</p>			<p>Standards-Based Essential Skills</p> <p>Standard 4 Understandings: 4.1a: All energy transfers are governed by the law of conservation of energy.* 4.1b: Energy may be converted among mechanical, electromagnetic, nuclear, and thermal forms. 4.1c: PE is the energy an object possesses by virtue of its position or condition. 4.1d: KE* is the energy an object possesses by virtue of its motion. 4.1e: The sum of the kinetic and potential energies (mechanical energy) is constant.* 4.1f: In a nonideal mechanical system, as mechanical energy decreases there is a corresponding increase in other energies such as internal energy.* 4.1g: When work* is done on or by a system, there is a change in the TE* of the system. 4.1h: Work done against friction results in an increase in the internal energy of the system.</p>	<p>Strategies to Teach Skills & Concepts</p> <p>Class Notes Guided practice with math concepts Reference Table Practice Homework practice Lab exercises Demos: Consrv of ME Incline Air T Powerful Class</p>	<p>Resources</p> <p>L-9: Kinetic E – Pendulum L-10: Consrv of ME - Pendulum L-11: Elastic PE</p>
<p><u>Assessments:</u></p> <p>Formative: Unit 6 Homework</p> <p>Summative: Unit 6 Exam Lab reports</p>	<p><u>Literacy Stds</u></p>	<p><u>Tier 2:</u> Kinetic Potential Mechanical Electrical Gravitational</p>	<p><u>Tier 3:</u> Work Energy Kinetic Energy Potential Energy</p>	<p><u>Video, ppt</u></p>	
<p><u>Time Frame:</u> November (2-3 weeks)</p>	<p><u>Vocabulary</u></p>	<p><u>Review:</u></p>	<p><u>Notes:</u></p>	<p><u>Misc</u></p>	

<p>Unit 7: Power & Momentum</p> <p><u>Enduring Understandings:</u></p> <ul style="list-style-type: none"> Calculate power expended in a system Determine Momentum of each part of a system Apply Conserv of Mtm law to solve collision problems 			<p>Standards-Based Essential Skills</p> <p>Standard 4 Understandings: 4.1i: Power* is the time-rate at which work is done or energy is expended. 5.1p: The impulse* imparted to an object causes a change in its momentum*. 5.1r: Momentum is conserved in a closed system.*</p>	<p>Strategies to Teach Skills & Concepts</p> <p>Class Notes Guided practice with math concepts Reference Table Practice Homework practice Lab exercises</p> <p>Demos: Pasco Carts – Mtm Transfer Newton's Cradle</p>	<p><u>Labs</u></p>	<p>Resources</p> <p>L-12: Inelastic Collisions</p>
<p><u>Assessments:</u></p> <p>Formative: Unit 7 Homework</p> <p>Summative: Unit 7 Exam Lab reports</p>	<p><u>Literacy Stds</u></p>	<p><u>Tier 2:</u> Incline Linear</p>	<p><u>Tier 3:</u> Power Impulse Momentum</p>	<p><u>Video, ppt</u></p>		
<p><u>Time Frame:</u></p> <p>November (1-2 Weeks)</p>	<p><u>Vocabulary</u></p>	<p><u>Review:</u></p>	<p><u>Notes:</u></p> <p>0</p>	<p><u>Misc</u></p>	<p>Pasco Carts & Track Newton's Cradle</p>	

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<p><u>Assessments:</u></p> <p>Formative: Unit 7 Homework</p> <p>Summative: Unit 7 Exam Lab reports</p>	<p><u>Content Outcomes</u></p>	<p><u>Literacy Stds</u></p>	<p><u>Tier 2:</u> Incline Linear</p> <p><u>Tier 3:</u> Power Impulse Momentum</p>	<p><u>Video, ppt</u></p>	
<p><u>Time Frame:</u></p> <p>November (1-2 Weeks)</p>	<p><u>Vocabulary</u></p>	<p><u>Review:</u></p>	<p><u>Notes:</u></p> <p>0</p>	<p><u>Misc</u></p> <p>Pasco Carts & Track Newton's Cradle</p>	

Unit 9: Waves		Enduring Understandings: Identify examples of SHM Discuss basic wave properties, reflection, refraction, diffraction, interference Determine wave, f , v for waves & SHM		Standards-Based Essential Skills		Strategies to Teach Skills & Concepts		Resources	
Assessments: Formative: Unit 9 Homework Summative: Unit 9 Exam Lab reports		<u>Content Outcomes</u>		Standard 4 Understandings: 4.3a An oscillating system produces waves. 4.3b Pulses & waves carry energy and information without transferring mass. 4.3c A wave has characteristics of amplitude, wavelength,* frequency*, period*, wave speed*, and phase. 4.3d Mechanical waves require a material medium through which to travel. 4.3e Waves are categorized as transverse and longitudinal waves. 4.3h When a wave strikes a boundary between two media, reflection*, transmission, and absorption occur. 4.3i When a wave moves from one medium into another, the wave may refract due to a change in speed. A angle of refraction depends on angle of incidence and properties of media.* 4.3j Diffraction occurs when waves pass by obstacles or through openings. 4.3m Interference occurring when waves meet may be explained by principle of superposition. Standing waves are a special case of interference.		Class Notes Guided practice with math concepts Reference Table Practice Homework practice Lab exercises Demos: Hanging slinky waves SHM – Mass on spring SHM – Pendulum		L-14: SHM Spring L-15: SHM Pendulum L-16: Waves on String	
		<u>Literacy Stds</u>							
Time Frame: January (2 weeks)		<u>Vocabulary</u>		Simple Harmonic Motion (SHM) Pulse Wave Wavelength Amplitude Period Frequency Phase Transverse wave Longitudinal wave Incidence Reflection Refraction Superposition		Web Web Physics Applets		Misc	
		<u>Review:</u>							

Unit 10: Sound		Enduring Understandings: Analyze resonant standing wave in strings and air columns Discuss sound processes in m instruments Calculate doppler effect in moving system		Standards-Based Essential Skills		Strategies to Teach Skills & Concepts		Resources	
Assessments: Formative: Unit 10 Homework Summative: Unit 10 Exam Lab reports		<u>Content Outcomes</u>		Standard 4 Understandings: 4.3f Resonance occurs when energy is transferred to a system at its natural frequency. 4.3h When a wave strikes a boundary between two media, reflection*, transmission, and absorption occur. 4.3i When a wave source and an observer are in relative motion, the observed wave frequency shifted (Doppler effect).		Class Notes Guided practice with math concepts Reference Table Practice Homework practice Lab exercises Demos: Waves in guitar strings Interference – tuning forks Doppler – tuning fork		L-17: Sound & Air Columns	
		<u>Literacy Stds</u>						<u>Video, ppt</u> Excel – sound beats	
Time Frame: February (1.5 weeks)		<u>Vocabulary</u>		Fundamental Vibration		Sound Standing Wave Node Antinode Harmonic Doppler Effect		<u>Web</u> Web Physics Applets	
		<u>Review:</u>				<u>Notes:</u>		<u>Misc</u>	

<p>Unit 12: Static Electricity</p> <p>Enduring Understandings:</p> <ul style="list-style-type: none"> Determine shape & magnitude of E fields of various configs using Coulomb's law Analyze E potential wrt an arrangement of charges Calculate capacitance of a given parallel plate configuration 			<p>Standards-Based Essential Skills</p> <p>Standard 4</p> <p>Understandings:</p> <ul style="list-style-type: none"> 4.1j Energy may be stored in electric* fields. 5.1t Electrical and magnetic forces can be attractive or repulsive. 5.1u The inverse square law applies to electrical* fields produced by point sources. 	<p>Strategies to Teach Skills & Concepts</p> <p>Class Notes</p> <ul style="list-style-type: none"> Guided practice with math concepts Reference Table Practice Homework practice Lab exercises <p>Demos:</p> <ul style="list-style-type: none"> Static electricity Van de Graaf generator 	<p>Resources</p>		
<p>Assessments:</p> <p>Formative:</p> <ul style="list-style-type: none"> Unit 12 Homework <p>Summative:</p> <ul style="list-style-type: none"> Unit 12 Exam Lab reports 	<p><u>Literacy Stds</u></p>			<p><u>Video, ppt</u></p>			
<p>Time Frame:</p> <ul style="list-style-type: none"> Feb-Mar (2weeks) 	<p><u>Vocabulary</u></p>	<p>Conservation Atom Electron Attraction Repulsion</p>	<p><u>Notes:</u></p> <p>Electric Charge Field</p>	<p><u>Web</u></p>			
					<p><u>Review:</u></p>		<p><u>Misc</u></p> <p>Static Electricity Stuff Van de Graaff</p>

Unit 13&14: Electricity & Magnetism		Enduring Understandings: 1. Explain and apply ohm's law to simple circuits 2. Calculate resistance of wires given geometry and temp Analyze simple circuits, parallel, serial, and combo circuits for V, I, and R Analyze RC circuits Analyze shape & mag of B fields of current carrying wires		Standards-Based Essential Skills		Strategies to Teach Skills & Concepts		Resources	
Assessments: Formative: Unit 13&14 Homework Summative: Unit 12 Exam Lab reports		Content Outcomes Standard 4 Understandings: 4.1j: Energy may be stored in magnetic fields. 4.1k: Moving electric charges produce magnetic fields. The relative motion between a conductor and a magnetic field may produce a potential difference in the conductor. 4.1l: All materials display a range of conductivity. Common metallic conductors obey Ohm's Law*. 4.1m: The factors affecting resistance in a conductor are length, cross-sectional area, temperature, and resistivity.* 4.1n: A circuit is a closed path in which a current* can exist. 4.1o: Circuit components may be connected in series* or in parallel*. 4.1p: Electrical power* and energy* can be determined for electric circuits.		Class Notes Guided practice with math concepts Reference Table Practice Homework practice Lab exercises Demos: Magnetic fields Magnets & Induction		Labs		L-18: Resistivity L-19: Temp & Resistivity L-20: Internal Resist of EMF L-21: Electrical Circuits L-22: RC Circuits	
Literacy Stds		Vocabulary Resistance Power Metal Series Parallel		Electrical Current Ampere Ohm Conduction Field Pole		Video, ppt		Web	
Time Frame: Mar-Apr (3-3.5 weeks)		Review:		Notes:		Misc		Electrical Parts	

Unit 15: Light		Enduring Understandings: Describe EM waves as E&B field combo Construct ray diagrams to illustrate reflection, refraction, lenses, mirrors Apply lens/mirror equations Analyze single, double, and multiple slit diffraction patterns		Standards-Based Essential Skills		Strategies to Teach Skills & Concepts		Resources	
Assessments: Formative: Unit 15 Homework Summative: Unit 15 Exam Lab reports		Content Outcomes		Standard 4 Understandings: 4.3g: EM radiation exhibits wave characteristics and can propagate through a vacuum. 4.3h: When a wave strikes a boundary between two media, reflection *, transmission, and absorption occur. A transmitted wave may be refracted. 4.3i: When a wave moves from one medium into another, the wave may refract due to a change in speed. The angle of refraction depends on the angle of incidence and the properties of the media. * 4.3j: The absolute index of refraction is inversely proportional to the speed of a wave. * 4.3k: All frequencies of electromagnetic radiation travel at the same speed in a vacuum. * 4.3l: Diffraction occurs when waves pass by obstacles or through openings. 4.3m: When waves of a similar nature meet, the resulting interference may be explained using the principle of		Class Notes Guided practice with math concepts Reference Table Practice Homework practice Lab exercises Demos: Light Reflect, Refract, Absorb Lenses & Mirrors Diffraction plates & gratings		L-24: Light in Water L-25: Thin Lenses L-26: Single Slit Diffraction L-27: Diffraction Gratings	
		Literacy Stds		Ray Reflection Refraction Diffraction Interference		Electromagnetic Radiation Spectrum Gamma ray X ray Ultraviolet Infrared			
Vocabulary									
Time Frame: Apr-May (3 weeks)		Review:		Notes:		Misc		Light Lab Stuff	
						Web			
						Video, ppt			
						Labs			

Unit 16: Modern Physics Enduring Understandings: Discuss current quantum theory, including Rutherford, Bohr, Schroedinger Explain processes and forces of radioactive decay Discuss how fundamental components combine to give real world particles							
Assessments: Formative: Unit 16 Homework Summative: Unit 16 Exam Lab reports		Standards-Based Essential Skills Standard 4 Understandings: 5.3a States of matter and energy are restricted to discrete values (quantized). 5.3b On the atomic level, charge is restricted to multiples of the elementary charge . On the subnuclear level, charge appears as fractional values of the elementary charge (quarks). 5.3c On the atomic level, energy is emitted or absorbed in discrete packets called photons. * 5.3d The energy of a photon is proportional to its frequency. * 5.3e On the atomic level, energy and matter exhibit the characteristics of both waves and particles. 5.3f Mass-energy and charge are conserved at all levels (from subnuclear to cosmic). 5.3g The Standard Model of Particle Physics states that: • atomic particles are composed of subnuclear particles • the nucleus is a composed of quarks which manifest themselves as protons and neutrons • each elementary particle has a corresponding antiparticle		Strategies to Teach Skills & Concepts Class Notes Guided practice with math concepts Reference Table Practice Homework practice Lab exercises		Resources	
		Content Outcomes		Labs			
Literacy Stds				Video, ppt			
Vocabulary				Web			
Review:		Photoelectric effect Threshold frequency Quantum Photon Proton Neutron Lepton Baryon Hadron Meson Quark Mass defect		Notes:			
Time Frame: May (2 weeks)		Misc					