

Mount Pleasant Central School District

AP Physics, Science



We believe that all students should have a strong understanding of science and its application to critically assess information in the modern world and make decisions to solve real-world problems.

AP Physics 1 is an algebra-based, introductory college-level physics course. In this course students cultivate their understanding of physics through classroom study, problem solving, in-class activities, and hands-on, inquiry-based laboratory work as they explore concepts like systems, fields, force interactions, change, and conservation.

Unit Title	Month	Content	Vocabulary	Standards	Skills	Big Ideas	Assessments
Kinetics	September	- How do we analyze the motion of a body using mathematical models and graphs?	Scalars / Vectors Frames of reference Relative motion Free fall	LO 1.1.A Describe a scalar or vector quantity using magnitude and direction, as appropriate. LO 1.1.B Describe a vector sum in one dimension. LO 1.3.A Describe the position, velocity, and acceleration of an object using representations of that object's motion LO 1.4.A Describe the reference frame of a given observer. LO Describe the motion of objects as measured by observers in different inertial reference frames LO 1.5.A Describe the perpendicular components of a vector	- Create diagrams, tables, charts, or schematics to represent physical situations. - Create experimental procedures that are appropriate for a given scientific question.	- Representations can be used to model and analyze scientific information as it relates to the motion of objects.	- Labs: Marble roll Falling body Bullseye - Homework - Group problem solving Tippers - Quizzes / Exams
Force and Translational Dynamics	September	Newtons Laws of motion	Force Inertia Resultant	LO 2.1.A Describe the properties and interactions of a system. LO 2.1.B Describe the	- Use free body diagrams and Newton's laws to	Force is an interaction between two objects or systems of objects.	- Labs: Coefficient of Frictions Homework

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			Free body diagram	location of a system's center of mass with respect to the system's constituent parts. LO 2.2.A Describe a force as an interaction between two objects or systems. LO 2.2.B Describe the forces exerted on an object or system using a free-body diagram LO 2.3.A Describe the interaction of two objects using Newton's third law and a representation of paired forces exerted on each object. LO 2.4.A Describe the conditions under which a system's velocity remains constant. LO 2.5.A Describe the conditions under which a system's velocity changes. LO 2.6.A Describe the gravitational interaction	analyze the forces acting on an object and make predictions about it's motion.	Part of the larger study of dynamics, forces provide the context in which we analyze and come to understand a variety of physical phenomena.	Group problem solving Tipers -Quizzes -Exams

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				between two objects or systems with mass. LO 2.7.A Describe kinetic friction between two surfaces LO 2.8.A Describe the force exerted on an object by an ideal spring LO 2.9.A Describe the motion of an object traveling in a circular path			
Work, Energy, Power	November	Relationship between mechanical energy of an object and the work done upon or by the object.	work energy power conservation	LO 3.1.A Describe the translational kinetic energy of an object in terms of the object's mass and velocity LO 3.2.A Describe the work done on an object or system by a given force or collection of forces. LO 3.3.A Describe the potential energy of a system. LO 3.4.A Describe the	- Use work, energy, and conservation of energy to analyze and predict the behavior of objects. -Utilize both familiar and new models and representations to analyze physical situations, now with force or energy as	Conservation is a foundational principle of physics, along with the concept of work as the primary agent of change for energy. Energy and work can be used to analyze physical situations. -Energy alters from one form to another	Labs: Predict speed of an object on a ramp. Homework Group problem solving Tipers -Quizzes -Exams

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				<p>energies present in a system. LO 3.4.B Describe the behavior of a system using conservation of mechanical energy principles LO 3.4.C Describe how the selection of a system determines whether the energy of that system changes. LO 3.5.A Describe the transfer of energy into, out of, or within a system in terms of power.</p>	major components	in the process of doing work.	
Linear Momentum	January	Relationship between force, time, impulse and linear momentum.	momentum impulse elastic collision inelastic collision	LO 4.1.A Describe the linear momentum of an object or system. LO 4.2.A Describe the impulse delivered to an object or system. LO 4.2.B Describe the relationship between the impulse exerted on an	-Use the law of conservation of linear momentum to analyze physical situations -Make connections between momentum	In a closed system, linear momentum is conserved - this allows prediction of future behavior of the system and analysis of past behavior of the	Lab - Analysis of car crash Who's at fault?

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				object or a system and the change in momentum of the object or system. LO 4.3.A Describe the behavior of a system using conservation of linear momentum. LO 4.3.B Describe how the selection of a system determines whether the momentum of that system changes. LO 4.4.A Describe whether an interaction between objects is elastic or inelastic.	and kinetic energy of objects or systems and see under what conditions these quantities remain constant.	system.	
Torque and Rotational dynamics	February	Rotational equivalent of force and linear motion.	Torque center of mass moment of inertia angular velocity angular acceleration	LO 5.1.A Describe the rotation of a system with respect to time using angular displacement, angular velocity, and angular acceleration. LO 5.2.A Describe the linear motion of a point on a rotating rigid system that	-Compare and connect understanding of linear and rotational motion, dynamics, energy, and momentum to	A rotating object can be analyzed from both a linear and a rotational perspective. Forces applied at a distance from the center of mass of an	Labs: - Calculate the moment of inertia of an object by direct measurement and by experimentation. - Tension in a conical

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				corresponds to the rotational motion of that point, and vice versa. LO 5.3.A Identify the torques exerted on a rigid system. LO 5.3.B Describe the torques exerted on a rigid system. LO 5.4.A Describe the rotational inertia of a rigid system relative to a given axis of rotation LO 5.4.B Describe the rotational inertia of a rigid system rotating about an axis that does not pass through the system's center of mass. LO 5.5.A Describe the conditions under which a system's angular velocity remains constant. LO 5.6.A Describe the conditions under which a system's angular velocity	develop holistic models to evaluate physical phenomena.	object produce rotation.	pendulum (flying pigs) -Homework -Group problem solving -Tipers -Quizzes -Exams

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				changes.			
Energy and Momentum of Rotating Systems	March	Rotational equivalent of momentum and energy.	Rotational energy rotational momentum	LO 6.1.A Describe the rotational kinetic energy of a rigid system in terms of the rotational inertia and angular velocity of that rigid system. LO 6.2.A Describe the work done on a rigid system by a given torque or collection of torque Lo 6.3.A Describe the angular momentum of an object or rigid system. LO 6.3.B Describe the angular impulse delivered to an object or rigid system by a torque. Lo 6.3.C Relate the change in angular momentum of an object or rigid system to the angular impulse given to that object or rigid system. LO 6.4.A Describe the	Apply knowledge of motion, energy and momentum to rotating systems.	Energy and momentum in rotating systems are changed by external torques. Internal torques produce no changes.	Labs: Measuring energy in a rotating system. -Homework -Group problem solving -Tipers -Quizzes -Exams

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				behavior of a system using conservation of angular momentum. LO 6.4.B Describe how the selection of a system determines whether the angular momentum of that system changes. LO 6.5.A Describe the kinetic energy of a system that has translational and rotational motion. LO 6.5.B Describe the motion of a system that is rolling without slipping. LO 6.5.C Describe the motion of a system that is rolling while slipping. LO 6.6.A Describe the motions of a system consisting of two objects interacting only via gravitational forces.			
Oscillations	April	Motion, work, energy	period	LO 7.1.A Describe simple harmonic motion.	Apply	-Even in new	Labs:

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		in oscillating systems such as spring mass systems and pendulums.	frequency oscillation spring constant periodic elastic potential energy	LO 7.2.A Describe the frequency and period of an object exhibiting SHM. LO 7.3.A Describe the displacement, velocity, and acceleration of an object exhibiting SHM. LO 7.4.A Describe the mechanical energy of a system exhibiting SHM.	Previously-encountered models and methods of analysis to simple harmonic motion	situations, the fundamental laws of physics remain the same	- Measuring K of a spring. - Egg bungee - Measuring spring constant in series and parallel -Homework -Quizzes -Exams
Fluids	April	Forces, work, energy, conservation applied to fluids and objects interacting with fluids.	pressure gauge pressure density buoyancy force	LO 8.1.A Describe the properties of a fluid. LO 8.2.A Describe the pressure exerted on a surface by a given force. LO Describe the pressure exerted by a fluid. LO 8.3.A Describe the conditions under which a fluid's velocity changes. LO 8.3.B Describe the buoyant force exerted on an object interacting with a	Use previously developed understanding of forces, work, and energy to analyze behavior of fluids and objects interacting with fluids.	Fluids follow the same laws of motion and energy that all other objects follow.	-Labs: Measuring buoyancy force -Homework -Group problem solving -Tipers -Quizzes - Exams

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				fluid LO 8.4.A Describe the flow of an incompressible fluid through a cross-sectional area by using mass conservation. LO 8.4.B Describe the flow of a fluid as a result of a difference in energy between two locations within the fluid-Earth system.			