

Mount Pleasant Central School District

Physics R, 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.

How can we apply physical laws in order to understand and predict the behavior of objects in the real world? In this class, students will explore the laws of motion and energy and how these help us to understand and influence our world. Our main goal is to develop an understanding of forces and motion, energy, electricity, light, and sound, as well as how mathematics is used to model these phenomena. We utilize a problem-solving approach with an emphasis on critical thinking skills. Students will be assessed on their ability to apply mathematics and conceptual understanding to solve problems. This will include performance in lab activities where students apply their skills and understanding in a real-world setting.

Unit Title	Month	Content	Vocabulary	Standards	Skills	Big Ideas	Assessments
Mathematics	September	- algebra - unit conversion	variable quantity	AI-N.Q.1 Reason quantitatively and use units to solve problems. AI-A.SSE Interpret expressions that represent a quantity in terms of its context	- convert between different units - use algebraic manipulation to solve for a variable of interest	Quantities can be expressed in different ways without changing their meaning	Lab activities Metric Olympics Walk This Way Graphing Your Motion Speed Trap Homework Quizzes
1D Kinematics	September/ October	- How do we analyze the motion of objects?	distance / displacement speed / velocity acceleration scalar / vector	HS-PS2-1. Analyze data to support the claim that Newton's Second Law of Motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. AI-N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems.	- use mathematical modeling to analyze motion - use graphs to analyze motion	There are many ways to describe and analyze motion	Lab activities "g" Willikers Hang Time Homework Quizzes

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2D Kinematics	November	<ul style="list-style-type: none"> - Adding vectors using components. - Analyze two dimensional motion 	resultant components	HS-PS2-1 Analyze data to support the claim that Newton's Second Law of Motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. AI-N.Q.1 Reason quantitatively and use units to solve problems. AI-A.SSE Interpret expressions that represent a quantity in terms of its context	<ul style="list-style-type: none"> - use mathematical modeling to find resultants and components - 	Motion occurs independently in multiple dimensions.	Lab activities Vector Addition Horizontal Launch bullseye Max Range Angle Launch bullseye Homework Quizzes
Forces	December/ January	<ul style="list-style-type: none"> - Use Newton's Laws of Motion to analyze and predict the behavior of objects 	inertia equilibrium net Force friction universal Gravitation	HS-PS2-1. Analyze data to support the claim that Newton's Second Law of Motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. AI-N.Q.1 Reason	<ul style="list-style-type: none"> - use diagrams to analyze the forces acting on an object - use Newton's laws to derive equations applicable to different situation. 	Objects do not speed up, slow down, or change direction unless an unbalanced force is exerted on them.	Lab Activities Newton's 2nd Law Phet Ramp on an Incline Static vs Kinetic Friction U of your shoe

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				quantitatively and use units to solve problems. AI-A.SSE Interpret expressions that represent a quantity in terms of its context			Homework Quizzes
Momentum	February	- Use the law of conservation of momentum to analyze interactions between objects.	momentum collision elastic inelastic	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. HS-PS2-3. Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.	- Use mathematical modeling to predict motion of objects before and after a collision.	Because momentum is conserved, knowing the momentum of a system allows us to make predictions about what will happen after a collision or figure out what happened before a collision.	Lab Activities Momentum Phet Conservation of Momentum Lab Homework Quizzes
Energy	February/	- Analyze systems	gravitational potential	HS-PS3-1. Create a	- Use energies to	Energy is conserved	Lab Activities

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	March	utilizing energy. - Understand how energy can be added to or removed from a system.	energy kinetic energy elastic potential energy work power	computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. 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) HS-PS3-3Design, build, and refine a device that works within given constraints to convert one form of energy into	diagram a variety of systems. - Use energy transformations to mathematically predict the motion of objects.	within a system. Work can change the energy of a system.	Conservation of Energy Challenge Spring Lab Speed on a Ramp Efficiency of a Bouncing Ball Homework Quizzes

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				another form of energy.*			
Electricity	March/April	<ul style="list-style-type: none"> - Defines a circuit and identify the properties of a circuit. - Identify different types of circuits. 	current resistance voltage series parallel	HS-PS2-4 Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. HS-PS3-5 Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. HS-PS3-6 HS-PS3-6. Analyze data to support the claim that Ohm's Law describes the mathematical relationship	<ul style="list-style-type: none"> - Analyze circuits - Set up physical circuits and take measurements of current, resistance, voltage. 	Electrical circuits behave differently depending on how the components are arranged.	Lab Activities Prep for a Hurricane Ohm's Law Resistors in Series/ Parallel Series/Parallel Circuits Homework Quizzes

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				among the potential difference, current, and resistance of an electric circuit.			
Magnetism	May	- Identify what causes objects to be magnetic and how magnetic poles interact with each other.	poles induction	HS-PS3-5 Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. AI-N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems.	Predict direction of fields and forces around and between magnets.	Magnetic forces can act without direct contact between objects.	Lab Activities Magnetism Lab Motors/Generators Homework Quiz
Waves / Optics	May/June	-Analyze how waves travel through materials.	Electromagnetic spectrum Reflection	HS-PS4-1 Use mathematical representations to support	Predict direction of light ray passing through glass and	Light travels at different speeds in different materials.	Lab Activities Characteristics of Waves

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		- Analyze the behavior of light as it moves through different materials.	Refraction Snell's Law	a claim regarding relationships among the period, frequency, wavelength, and speed of waves traveling and transferring energy (amplitude, frequency) in various media. HS-PS4-5Communicate 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.	water. Draw ray diagrams.	Light changes direction as it passes from one material to another.	Tuning Fork Lab Ray Tracing with Mirrors Ray Tracing with Lenses
					-		
					-		