

MVS Course Alignment Document

PHYSICS MMC

STANDARD P1: INQUIRY, REFLECTION, AND SOCIAL IMPLICATIONS

P1.1 Scientific Inquiry		Unit	Lesson	Resources Used
P1.1A	Generate new questions that can be investigated in the laboratory or field.	All Units	Lesson 3	All Labs and DB's
P1.1B	Evaluate the uncertainties or validity of scientific conclusions using an understanding of sources of measurement error, the challenges of controlling variables, accuracy of data analysis, logic of argument, logic of experimental design, and/or the dependence on underlying assumptions.	All Units	Labs for Unit	All Labs and DB's
P1.1C	Conduct scientific investigations using appropriate tools and techniques (e.g., selecting an instrument that measures the desired quantity—length, volume, weight, time interval, temperature—with the appropriate level of precision).	All Units	Labs for Unit	All Labs and DB's
P1.1D	Identify patterns in data and relate them to theoretical models.	All Units	Labs for Unit	All Labs and DB's
P1.1E	Describe a reason for a given conclusion using evidence from an investigation.	All Units	Labs for Unit	All Labs and DB's
P1.1f	Predict what would happen if the variables, methods, or timing of an investigation were changed.	All Units	Labs for Unit	All Labs and DB's
P1.1g	Based on empirical evidence, explain and critique the reasoning used to draw a scientific conclusion or explanation.	All Units	Labs for Unit	All Labs and DB's
P1.1h	Design and conduct a systematic scientific investigation that tests a hypothesis. Draw conclusions from data presented in charts or tables.	All Units	Labs for Unit	All Labs and DB's
P1.1i	Distinguish between scientific explanations that are regarded as current scientific consensus and the emerging questions that active researchers investigate.	All Units	Labs for Unit	All Labs and DB's
P1.2 Scientific Reflection and Social Implications		Unit	Lesson	Resources Used
P1.2A	Critique whether or not specific questions can be answered through scientific investigations.	All Units	Labs for Unit	All Labs and DB's
P1.2B	Identify and critique arguments about personal or societal issues based on scientific evidence.	All Units	Labs for Unit	All Labs and DB's
P1.2C	Develop an understanding of a scientific concept by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information.	All Units	Labs for Unit	All Labs and DB's
P1.2D	Evaluate scientific explanations in a peer review process or discussion format.	All Units	Labs for Unit	All Labs and DB's
P1.2E	Evaluate the future career and occupational prospects of science fields.	All Units	Labs for Unit	All Labs and DB's
P1.2f	Critique solutions to problems, given criteria and scientific constraints.	All Units	Labs for Unit	All Labs and DB's
P1.2g	Identify scientific tradeoffs in design decisions and choose among alternative solutions.	All Units	Labs for Unit	All Labs and DB's
P1.2h	Describe the distinctions between scientific theories, laws, hypotheses, and observations.	All Units	Labs for Unit	All Labs and DB's
P1.2i	Explain the progression of ideas and explanations that lead to science theories that are part of the current scientific consensus or core knowledge.	All Units	Labs for Unit	All Labs and DB's
P1.2j	Apply science principles or scientific data to anticipate effects of technological design decisions.	All Units	Labs for Unit	All Labs and DB's
P1.2k	Analyze how science and society interact from a historical, political, economic, or social perspective.	All Units	Labs for Unit	All Labs and DB's

Standard P2: MOTION OF OBJECTS

P2.1 Position — Time		Unit	Lesson	Resources Used
P2.1A	Calculate the average speed of an object using the change of position and elapsed time.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 1, Web 11-16, A11-17, DB11, V11-12
P2.1B	Represent the velocities for linear and circular motion using motion diagrams (arrows on strobe pictures).	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 1, Web 11-16, A11-17, DB11, V11-12

P2.1C	Create line graphs using measured values of position and elapsed time.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 1, Web 11-16, A11-17,
P2.1D	Describe and analyze the motion that a position-time graph represents, given the graph.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 1, Web 11-16, A11-17, DB11, V11-12
P2.1E	Describe and classify various motions in a plane as one dimensional, two dimensional, circular, or periodic.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 1, Web 11-16, A11-17, DB11, V11-12
P2.1F	Distinguish between rotation and revolution and describe and contrast the two speeds of an object like the Earth.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 1, Web 11-16, A11-17, DB11, V11-12
P2.1g	Solve problems involving average speed and constant acceleration in one dimension.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 1, Web 11-16, A11-17, DB11, V11-12
P2.1h	Identify the changes in speed and direction in everyday examples of circular (rotation and revolution), periodic, and projectile motions.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 1, Web 11-16, A11-17, DB11, V11-12
P2.2	Velocity — Time	Unit	Lesson	Resources Used
P2.2A	Distinguish between the variables of distance, displacement, speed, velocity, and acceleration.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 3, Ettx Ch 3 Sec 3, Web 11-16, A11-17, DB11, V11-12
P2.2B	Use the change of speed and elapsed time to calculate the average acceleration for linear motion.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 3, Ettx Ch 3 Sec 3, Web 11-16, A11-17, DB11, V11-12
P2.2C	Describe and analyze the motion that a velocity-time graph represents, given the graph.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 3, Ettx Ch 3 Sec 3, Web 11-16, A11-17, DB11, V11-12
P2.2D	State that uniform circular motion involves acceleration without a change in speed.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 3, Ettx Ch 3 Sec 3, Web 11-16, A11-17, DB11, V11-12
P2.2e	Use the area under a velocity-time graph to calculate the distance traveled and the slope to calculate the acceleration.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 3, Ettx Ch 3 Sec 3, Web 11-16, A11-17, DB11, V11-12
P2.2f	Describe the relationship between changes in position, velocity, and acceleration during periodic motion.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 3, Ettx Ch 3 Sec 3, Web 11-16, A11-17, DB11, V11-12
P2.2g	Apply the independence of the vertical and horizontal initial velocities to solve projectile motion problems.	PhyA - Unit 2	Lesson 1	Ettx Ch 2 Sec 3, Ettx Ch 3 Sec 3, Web 11-16, A11-17, DB11, V11-12
P2.3	Frames of Reference	Unit	Lesson	Resources Used
P2.3a	Describe and compare the motion of an object using different reference frames.	PhyA - Unit 2	Lesson 2	Ettx Ch 3 Sec 4, Web16-17, A18-22, DB15, V13

Standard P3 FORCES AND MOTION

P3.1	Basic Forces in Nature	Unit	Lesson	Resources Used
P3.1A	Identify the force(s) acting between objects in “direct contact” or at a distance.	PhyA - Unit 3	Lesson 1	Ettx Sec 1-2, DB12 & 16, V14
P3.1x	Forces	Unit	Lesson	Resources Used
P3.1b	Explain why scientists can ignore the gravitational force when measuring the net force between two electrons.	PhyA - Unit 3	Lesson 1	Ettx Ch 4 Sec 1-2, DB12 & 16, V14
P3.1c	Provide examples that illustrate the importance of the electric force in everyday life.	PhyA - Unit 3	Lesson 1	Ettx Ch 4 Sec 1-2, DB12 & 16, V14
P3.1d	Identify the basic forces in everyday interactions.	PhyA - Unit 3	Lesson 1	Ettx Ch 4 Sec 1-2, DB12 & 16, V14
P3.2	Net Forces	Unit	Lesson	Resources Used
P3.2A	Identify the magnitude and direction of everyday forces (e.g., wind, tension in ropes, pushes and pulls, weight).	PhyA - Unit 3	Lesson 1	Ettx Ch 4 Sec 4, DB12 & 16, V14
P3.2B	Compare work done in different situations.	PhyA - Unit 3	Lesson 1	Ettx Ch 4 Sec 4, DB12 & 16, V14
P3.2C	Calculate the net force acting on an object.	PhyA - Unit 3	Lesson 1	Ettx Ch 4 Sec 4, DB12 & 16, V14
P3.2d	Calculate all the forces on an object on an inclined plane and describe the object's	PhyA - Unit 3	Lesson 1	Ettx Ch 4 Sec 4, DB12 & 16, V14
P3.3	Newton's Third Law	Unit	Lesson	Resources Used
P3.3A	Identify the action and reaction force from examples of forces in everyday situations (e.g., book on a table, walking across the floor, pushing open a door).	PhyA - Unit 3	Lesson 1	Ettx Ch 4 Sec 3, Web18, A27, DB15, V17
P3.3b	Predict how the change in velocity of a small mass compares to the change in velocity of a large mass when the objects interact (e.g., collide).	PhyA - Unit 3	Lesson 1	Ettx Ch 4 Sec 3, Web18, A27, DB15, V17
P3.3c	Explain the recoil of a projectile launcher in terms of forces and masses.	PhyA - Unit 3	Lesson 1	Ettx Ch 4 Sec 3, Web18, A27, DB15, V17
P3.3d	Analyze why seat belts may be more important in autos than in buses.	PhyA - Unit 3	Lesson 1	Ettx Ch 4 Sec 3, Web18, A27, DB15, V17
P3.4	Forces and Acceleration	Unit	Lesson	Resources Used
P3.4A	Predict the change in motion of an object acted on by several forces.	PhyA - Unit 3	Lesson 2	Ettx Ch 4 Sec 3, Web18, A27, DB15, V17
P3.4B	Identify forces acting on objects moving with constant velocity (e.g., cars on a highway).	PhyA - Unit 3	Lesson 2	Ettx Ch 4 Sec 3, Web18, A27, DB15, V17

P3.4C	Solve problems involving force, mass, and acceleration in linear motion (Newton's second law).	PhyA - Unit 3	Lesson 2	Ettx Ch 4 Sec 3, Web18, A27, DB15, V17
P3.4D	Identify the force(s) acting on objects moving with uniform circular motion (e.g., a car on a circular track, satellites in orbit).	PhyA - Unit 3	Lesson 2	Ettx Ch 4 Sec 3, Web18, A27, DB15, V17
P3.4e	Solve problems involving force, mass, and acceleration in two-dimensional projectile motion restricted to an initial horizontal velocity with no initial vertical velocity (e.g., a ball rolling off a table).	PhyA - Unit 3	Lesson 2	Ettx Ch 4 Sec 3, Web18, A27, DB15, V17
P3.4f	Calculate the changes in velocity of a thrown or hit object during and after the time it is acted on by the force.	PhyA - Unit 3	Lesson 2	Ettx Ch 4 Sec 3, Web18, A27, DB15, V17
P3.4g	Explain how the time of impact can affect the net force (e.g., air bags in cars, catching a ball).	PhyA - Unit 3	Lesson 2	Ettx Ch 4 Sec 3, Web18, A27, DB15, V17
P3.5x	Momentum	Unit	Lesson	Resources Used
P3.5a	Apply conservation of momentum to solve simple collision problems.	PhyA - Unit 4	Lesson 2	Ettx Ch 6 Sec 1, Web 19, A25, DB19&20, V17&18
P3.6	Gravitational Interactions	Unit	Lesson	Resources Used
P3.6A	Explain earth-moon interactions (orbital motion) in terms of forces.	PhyA - Unit 5	Lesson 1	Ettx Ch 7 Sec 3, Web20, A29&30
P3.6B	Predict how the gravitational force between objects changes when the distance between them changes.	PhyA - Unit 5	Lesson 1	Ettx Ch 7 Sec 3, Web20, A29&30
P3.6C	Explain how your weight on Earth could be different from your weight on another planet.	PhyA - Unit 5	Lesson 1	Ettx Ch 7 Sec 3, Web20, A29&30
P3.6d	Calculate force, masses, or distance, given any three of these quantities, by applying the Law of Universal Gravitation, given the value of G .	PhyA - Unit 5	Lesson 1	Ettx Ch 7 Sec 3, Web20, A29&30
P3.6e	Draw arrows (vectors) to represent how the direction and magnitude of a force changes on an object in an elliptical orbit.	PhyA - Unit 5	Lesson 1	Ettx Ch 7 Sec 3, Web20, A29&30
P3.7	Electric Charges	Unit	Lesson	Resources Used
P3.7A	Predict how the electric force between charged objects varies when the distance between them and/or the magnitude of charges change.	PhyA - Unit 5	Lesson 1	Ettx Ch 17 Sec 1-2, Web57-58, A65-67, DB51, V47
P3.7B	Explain why acquiring a large excess static charge (e.g., pulling off a wool cap, touching a Van de Graaff generator, combing) affects your hair.	PhyA - Unit 5	Lesson 1	Ettx Ch 17 Sec 1-2, Web57-58, A65-67, DB51, V47
P3.7x	Electric Charges — Interactions Chapter 17 and Chapter 18	Unit	Lesson	Resources Used
P3.7c	Draw the redistribution of electric charges on a neutral object when a charged object is brought near.	PhyB - Unit 3	Lesson 1	Ettx Ch 17-18, Web57-58, A65-67, DB51, V47
P3.7e	Explain why an attractive force results from bringing a charged object near a neutral object.	PhyB - Unit 3	Lesson 1	Ettx Ch 17-18, Web57-58, A65-67, DB51, V47
P3.7f	Determine the new electric force on charged objects after they touch and are then separated.	PhyB - Unit 3	Lesson 1	Ettx Ch 17-18, Web57-58, A65-67, DB51, V47
P3.7g	Propose a mechanism based on electric forces to explain current flow in an electric circuit.	PhyB - Unit 3	Lesson 1	Ettx Ch 17-18, Web57-58, A65-67, DB51, V47
P3.p8	Magnetic Force (prerequisite)	Unit	Lesson	Resources Used
P3.p8A	Create a representation of magnetic field lines around a bar magnet and	PhyB - Unit 5	Lesson 1	Ettx Ch 21, A75-76, DB57, V50
P3.8x	Electromagnetic Force	Unit	Lesson	Resources Used
P3.8b	Explain how the interaction of electric and magnetic forces is the basis for electric motors, generators, and the production of electromagnetic waves.	PhyB - Unit 5	Lesson 1	Ettx Ch 21, A75-76, DB57, V50

Standard P4 FORMS OF ENERGY AND ENERGY TRANSFORMATIONS

P4.1	Energy Transfer	Unit	Lesson	Resources Used
P4.1A	Account for and represent energy into and out of systems using energy transfer diagrams.	PhyB - Unit 5	Lesson 1	Ettx, DB18, V16, A24
P4.1B	Explain instances of energy transfer by waves and objects in everyday activities (e.g., why the ground gets warm during the day, how you hear a distant sound, why it hurts when you are hit by a baseball).	PhyB - Unit 5	Lesson 1	Ettx, DB18, V16, A24
P4.1x	Energy Transfer - Work	Unit	Lesson	Resources Used
P4.1c	Explain why work has a more precise scientific meaning than the meaning of work in everyday language.	PhyA - Unit 4	Lesson 1	Ettx Ch 5 Sec 1, DB18, V16, A24
P4.1d	Calculate the amount of work done on an object that is moved from one position to another.	PhyA - Unit 4	Lesson 1	Ettx Ch 5 Sec 1, DB18, V16, A24

	P4.1e	Using the formula for work, derive a formula for change in potential energy of an object lifted a distance h .	PhyA - Unit 4	Lesson 1	Ettx Ch 5 Sec 1, DB18, V16, A24
P4.2	Energy Transformation		Unit	Lesson	Resources Used
	P4.2A	Account for and represent energy transfer and transformation in complex processes (interactions).	PhyA - Unit 4	Lesson 1	Ettx, Web 59, A69-70, DB53, V48
	P4.2B	Name devices that transform specific types of energy into other types (e.g., a device that transforms electricity into motion).	PhyA - Unit 4	Lesson 1	Ettx, Web 59, A69-70, DB53, V48
	P4.2C	Explain how energy is conserved in common systems (e.g., light incident on a transparent material, light incident on a leaf, mechanical energy in a collision).	PhyB - Unit 4	Lesson 1	Ettx, Web 59, A69-70, DB53, V48
	P4.2D	Explain why all the stored energy in gasoline does not transform to mechanical energy of a vehicle.	PhyB - Unit 4	Lesson 1	Ettx, Web 59, A69-70, DB53, V48
	P4.2e	Explain the energy transformation as an object (e.g., skydiver) falls at a steady velocity.	PhyB - Unit 4	Lesson 1	Ettx, Web 59, A69-70, DB53, V48
	P4.2f	Identify and label the energy inputs, transformations, and outputs using qualitative or quantitative representations in simple technological systems (e.g., toaster, motor, hair dryer) to show energy conservation.	PhyB - Unit 4	Lesson 1	Ettx, Web 59, A69-70, DB53, V48
P4.3	Kinetic and Potential Energy		Unit	Lesson	Resources Used
	P4.3A	Identify the form of energy in given situations (e.g., moving objects, stretched springs, rocks on cliffs, energy in food).	PhyA - Unit 4	Lesson 1	Ettx Ch 5 Sec 1-2, DB18, V16, A24
	P4.3B	Describe the transformation between potential and kinetic energy in simple mechanical systems (e.g., pendulums, roller coasters, ski lifts).	PhyA - Unit 4	Lesson 1	Ettx Ch 5 Sec 1-2, DB18, V16, A24
	P4.3C	Explain why all mechanical systems require an external energy source to maintain their motion.	PhyA - Unit 4	Lesson 1	Ettx Ch 5 Sec 1-2, DB18, V16, A24
P4.3x	Kinetic and Potential Energy — Calculations		Unit	Lesson	Resources Used
	P4.3d	Rank the amount of kinetic energy from highest to lowest of everyday examples of moving objects.	PhyA - Unit 4	Lesson 1	Ettx Ch 5 Sec 1-2, DB18, V16, A24
	P4.3e	Calculate the changes in kinetic and potential energy in simple mechanical systems (e.g., pendulums, roller coasters, ski lifts) using the formulas for kinetic energy and potential energy.	PhyA - Unit 4	Lesson 1	Ettx Ch 5 Sec 1-2, DB18, V16, A24
	P4.3f	Calculate the impact speed (ignoring air resistance) of an object dropped from a specific height or the maximum height reached by an object (ignoring air resistance), given the initial vertical velocity.	PhyA - Unit 4	Lesson 1	Ettx Ch 5 Sec 1-2, DB18, V16, A24
P4.4	Wave Characteristics		Unit	Lesson	Resources Used
	P4.4A	Describe specific mechanical waves (e.g., on a demonstration spring, on the ocean) in terms of wavelength, amplitude, frequency, and speed.	PhyB - Unit 1	Lesson 2	Ettx Ch 12, WEB45-49, A48-53, DB45-46, V45
	P4.4B	Identify everyday examples of transverse and compression (longitudinal) waves.	PhyB - Unit 1	Lesson 2	Ettx Ch 12, WEB45-49, A48-53, DB45-46, V45
	P4.4C	Compare and contrast transverse and compression (longitudinal) waves in terms of wavelength, amplitude, and frequency.	PhyB - Unit 1	Lesson 2	Ettx Ch 12, WEB45-49, A48-53, DB45-46, V45
P4.4x	Wave Characteristics — Calculations		Unit	Lesson	Resources Used
	P4.4d	Demonstrate that frequency and wavelength of a wave are inversely proportional in a given medium.	PhyB - Unit 1	Lesson 2	Ettx Ch 12 Sec 2, WEB45-49, A48-53, DB45-46, V45
	P4.4e	Calculate the amount of energy transferred by transverse or compression waves of different amplitudes and frequencies (e.g., seismic waves).	PhyB - Unit 1	Lesson 2	Ettx Ch 12 Sec 2, WEB45-49, A48-53, DB45-46, V45
P4.5	Mechanical Wave Propagation		Unit	Lesson	Resources Used
	P4.5A	Identify everyday examples of energy transfer by waves and their sources.	PhyB - Unit 1	Lesson 2	Ettx Ch 12 Sec 3-4, WEv45-49, A48-53, DB45-46, V45
	P4.5B	Explain why an object (e.g., fishing bobber) does not move forward as a wave passes under it.	PhyB - Unit 1	Lesson 2	Ettx Ch 12 Sec 3-4, WEv45-49, A48-53, DB45-46, V45
	P4.5C	Provide evidence to support the claim that sound is energy transferred by a wave, not energy transferred by particles.	PhyB - Unit 1	Lesson 2	Ettx Ch 12 Sec 3-4, WEv45-49, A48-53, DB45-46, V45
	P4.5D	Explain how waves propagate from vibrating sources and why the intensity decreases with the square of the distance from a point source.	PhyB - Unit 1	Lesson 2	Ettx Ch 12 Sec 3-4, WEv45-49, A48-53, DB45-46, V45
	P4.5E	Explain why everyone in a classroom can hear one person speaking, but why an amplification system is often used in the rear of a large concert auditorium.	PhyB - Unit 1	Lesson 2	Ettx Ch 12 Sec 3-4, WEv45-49, A48-53, DB45-46, V45
P4.6	Electromagnetic Waves		Unit	Lesson	Resources Used
	P4.6A	Identify the different regions on the electromagnetic spectrum and compare them in terms of wavelength, frequency, and energy.	PhyB - Unit 2	Lesson 1	Ettx Ch 14 Sec 1, A54-59, Web50-54
	P4.6B	Explain why radio waves can travel through space, but sound waves cannot.	PhyB - Unit 2	Lesson 1	Ettx Ch 14 Sec 1, A54-59, Web50-54

	P4.6C	Explain why there is a time delay between the time we send a radio message to astronauts on the moon and when they receive it.	PhyB - Unit 2	Lesson 1	Ettx Ch 14 Sec 1, A54-59, Web50-54
	P4.6D	Explain why we see a distant event before we hear it (e.g., lightning before thunder, exploding fireworks before the boom).	PhyB - Unit 2	Lesson 1	Ettx Ch 14 Sec 1, A54-59, Web50-54
P4.6x	Electromagnetic Propagation		Unit	Lesson	Resources Used
	P4.6e	Explain why antennas are needed for radio, television, and cell phone transmission and reception.	PhyB - Unit 2	Lesson 2	Ettx Ch 16, Web55-56, A60-64, DB49, V46
	P4.6f	Explain how radio waves are modified to send information in radio and television programs, radio-control cars, cell phone conversations, and GPS systems.	PhyB - Unit 2	Lesson 2	Ettx Ch 16 Web55-56, A60-64, DB49, V46
	P4.6g	Explain how different electromagnetic signals (e.g., radio station broadcasts or cell phone conversations) can take place without interfering with each other.	PhyB - Unit 2	Lesson 2	Ettx Ch 16, Web55-56, A60-64, DB49, V46
	P4.6h	Explain the relationship between the frequency of an electromagnetic wave and its technological uses.	PhyB - Unit 2	Lesson 2	Ettx Ch 16, Web55-56, A60-64, DB49, V46
P4.r7x	Quantum Theory of Waves (recommended)		Unit	Lesson	Resources Used
	P4.r7a	Calculate and compare the energy in various electromagnetic quanta (e.g., visible light, x-rays) (recommended).	PhyB - Unit 2	Lesson 2	Ettx, Web55-56, A60-64, DB49, V46
P4.8	Wave Behavior — Reflection and Refraction		Unit	Lesson	Resources Used
	P4.8A	Draw ray diagrams to indicate how light reflects off objects or refracts into transparent media.	PhyB - Unit 2	Lesson 2	Ettx Ch 15 Sec 1, Web55-56, A60-64, DB49, V46
	P4.8B	Predict the path of reflected light from flat, curved, or rough surfaces (e.g., flat and curved mirrors, painted walls, paper).	PhyB - Unit 2	Lesson 2	Ettx Ch 15 Sec 1, Web55-56, A60-64, DB49, V46
P4.8x	Wave Behavior — Diffraction, Interference, and Refraction		Unit	Lesson	Resources Used
	P4.8c	Describe how two wave pulses propagated from opposite ends of a demonstration spring interact as they meet.	PhyB - Unit 2	Lesson 2	Ettx Ch 16 Sec 1-2, Web55-56, A60-64, DB49, V46
	P4.8d	List and analyze everyday examples that demonstrate the interference characteristics of waves (e.g., dead spots in an auditorium, whispering galleries, colors in a CD, beetle wings).	PhyB - Unit 2	Lesson 2	Ettx Ch 16 Sec 1-2, Web55-56, A60-64, DB49, V46
	P4.8e	Given an angle of incidence and indices of refraction of two materials, calculate the path of a light ray incident on the boundary (Snell's Law).	PhyB - Unit 2	Lesson 2	Ettx Ch 16 Sec 1-2, Web55-56, A60-64, DB49, V46
	P4.8f	Explain how Snell's Law is used to design lenses (e.g., eye glasses, microscopes, telescopes, binoculars).	PhyB - Unit 2	Lesson 2	Ettx Ch 16 Sec 1-2, Web55-56, A60-64, DB49, V46
P4.9	Nature of Light		Unit	Lesson	Resources Used
	P4.9A	Identify the principle involved when you see a transparent object (e.g., straw, a piece of glass) in a clear liquid.	PhyB - Unit 2	Lesson 1	Ettx Ch 14 Sec 2-4, A54-59, Web50-54
	P4.9B	Explain how various materials reflect, absorb, or transmit light in different ways.	PhyB - Unit 2	Lesson 1	Ettx Ch 14 Sec 2-4, A54-59, Web50-54
	P4.9C	Explain why the image of the Sun appears reddish at sunrise and sunset.	PhyB - Unit 2	Lesson 1	Ettx Ch 14 Sec 2-4, A54-59, Web50-54
P4.r9x	Nature of Light — Wave-Particle Nature (recommended)		Unit	Lesson	Resources Used
	P4.r9d	Describe evidence that supports the dual wave particle nature of light. (recommended)	PhyB - Unit 2	Lesson 1	Ettx, A54-59, Web50-54
P4.10	Current Electricity — Circuits		Unit	Lesson	Resources Used
	P4.10A	Describe the energy transformations when electrical energy is produced and transferred to homes and businesses.	PhyB - Unit 4	Lesson 1	Ettx Ch 19, Web 59, A69-70, DB53, V48
	P4.10B	Identify common household devices that transform electrical energy to other forms of energy, and describe the type of energy transformation.	PhyB - Unit 4	Lesson 1	Ettx Ch 19, Web 59, A69-70, DB53, V48
	P4.10C	Given diagrams of many different possible connections of electric circuit elements, identify complete circuits, open circuits, and short circuits and explain the reasons for the classification.	PhyB - Unit 4	Lesson 1	Ettx Ch 19, Web 59, A69-70, DB53, V48
	P4.10D	Discriminate between voltage, resistance, and current as they apply to an electric circuit.	PhyB - Unit 4	Lesson 1	Ettx Ch 19, Web 59, A69-70, DB53, V48
P4.10x	Current Electricity — Ohm's Law, Work, and Power		Unit	Lesson	Resources Used
	P4.10e	Explain energy transfer in a circuit, using an electrical charge model.	PhyB - Unit 4	Lesson 1	Ettx Ch 19 Sec 2, Web 59, A69-70, DB53, V48
	P4.10f	Calculate the amount of work done when a charge moves through a potential difference, V .	PhyB - Unit 4	Lesson 1	Ettx Ch 19 Sec 2, Web 59, A69-70, DB53, V48

P4.10g	Compare the currents, voltages, and power in parallel and series circuits.	PhyB - Unit 4	Lesson 2	Ettx Ch 19 Sec 2, Web60-61, A71-74, DB54, V49
P4.10h	Explain how circuit breakers and fuses protect household appliances.	PhyB - Unit 4	Lesson 2	Ettx Ch 19 Sec 2, Web60-61, A71-74, DB54, V49
P4.10i	Compare the energy used in one day by common household appliances (e.g., refrigerator, lamps, hair dryer, toaster, televisions, music players).	PhyB - Unit 4	Lesson 2	Ettx Ch 19 Sec 2, Web60-61, A71-74, DB54, V49
P4.10j	Explain the difference between electric power and electric energy as used in bills from an electric company.	PhyB - Unit 4	Lesson 2	Ettx Ch 19 Sec 2, Web60-61, A71-74, DB54, V49
P4.11x	Heat, Temperature, and Efficiency	Unit	Lesson	Resources Used
P4.11a	Calculate the energy lost to surroundings when water in a home water heater is heated from room temperature to the temperature necessary to use in a dishwasher, given the efficiency of the home hot water heater.	PhyA - Unit 6	Lesson 2	Ettx Ch 11 Sec 3, Web24, DB21, V19
P4.11b	Calculate the final temperature of two liquids (same or different materials) at the	PhyA - Unit 6	Lesson 2	Ettx Ch 11 Sec 3, Web24, DB21, V19
P4.12	Nuclear Reactions	Unit	Lesson	Resources Used
P4.12A	Describe peaceful technological applications of nuclear fission and radioactive decay.	PhyB - Unit 6	Lesson 1	Ettx Ch 25 Sec 3, Web63-64, A79-81, DB59-61, V51-52
P4.12B	Describe possible problems caused by exposure to prolonged radioactive decay.	PhyB - Unit 6	Lesson 1	Ettx Ch 25 Sec 3, Web63-64, A79-81, DB59-61, V51-52
P4.12C	Explain how stars, including our Sun, produce huge amounts of energy (e.g., visible, infrared, or ultraviolet light).	PhyB - Unit 6	Lesson 1	Ettx Ch 25 Sec 3, Web63-64, A79-81, DB59-61, V51-52
P4.12x	Mass and Energy	Unit	Lesson	Resources Used
P4.12d	Identify the source of energy in fission and fusion nuclear reactions.	PhyB - Unit 6	Lesson 1	Ettx Ch 25 Sec 1, Web63-64, A79-81, DB59-61, V51-52