

Course Title <i>Clarification: This is the name of the course as it would appear in the program of studies.</i>	9th Grade Conceptual Physics					
Author	David McNally, revised August 2025 Adapted from Pattern Physics developed from the Portland Metro STEM Partnership’s High School Science for All.					
Statement of Outcome <i>Clarification: This is a general statement of what a student would get out of taking this class.</i>	Through completion of this course students will have a deeper understanding of basic physics concepts, science practices, and scientific communication. The content covered includes: patterns and inquiry, energy and engineering with a bungee jump, engineering a shoe (impulse, forces, and momentum), waves and technology with sending a text, electricity/power/ and climate change, and space & the universe. Conceptual physics will put less emphasis on mathematical calculations and instead focus on patterns, processes, and dynamics of systems.					
Unit Name & Timeframe <i>Clarification: What is the name of your unit? Approximately how long will it last?</i>	SEMESTER 1		SEMESTER 2		POTENTIAL UNITS	
	Unit 1 Inquiry & Patterns 6 weeks	Unit 2 Energy & Engineering 6 weeks	Unit 3 Engineering a Shoe 6 weeks	Unit 4 Waves & Technology 7 weeks	Unit 5 Electricity, Power, & Climate 8 weeks	Unit 6 Space & the Universe 3 weeks
Topic(s) and driving question. <i>Clarification: This is stuff or “content” you will use to teach the GP indicators and GX and the questions you use to frame the big ideas.</i>	EQ: How do we find and use patterns in nature to make predictions and data-informed decisions ? - Scientific Process - Data analysis - Pendulum, Velocity - Patterns - mathematical shapes of curves	EQ: How can we use STEM to make thrilling experiences safe? - Tracking Energy - System analysis - Modeling Eg and Ek - Using a spreadsheet	EQ: How do design and STEM come together to turn imagination into reality? - Engineering a Shoe - Impulse (cushion) lab - Momentum - Newton’s 2nd law	EQ: How are you hearing me? - Experimenting with waves? - Ultrasound - Cell Phones cause cancer? - How does the ear hear? - Encoding and Decoding - Engineering Sending a Signal	EQ: How does STEM inform our future? - Voices of the world - Motors and Generators - Wind Power - Solar Power - Climate Science 50 Year Energy Plan	EQ: How do we use STEM to understand the universe? - Halley’s Comet - Orbital Motion - Understanding the Big Bang
GX Focus <i>Clarification: This is the GX’s you plan to pay particular attention to.</i>	PRACTICE CT GX Inquiry Analysis Findings	PRACTICE CT GX Inquiry Investigation Analysis Findings Reflection	PRACTICE CT GX Inquiry Investigation Analysis Findings Reflection	PRACTICE CT GX Inquiry Investigation Analysis Findings Reflection	PRACTICE CT GX Inquiry Investigation Analysis Findings Reflection	PRACTICE CT GX Inquiry Investigation Analysis Findings Reflection
GP- Content Indicators <i>Clarification: These are the performance indicators you will teach, assess and report on.</i>	- SR.AID.9-10.2 - SR.AID.9-10.3 - SR.CEA.9-10.4	- SR.DUM.9-10.1 - SR.AID.9-10.2 - SR.CEA.9-10.3 - SR.PCO.9-10.2	- SR.PCO.9-10.3 - SR.AID.9-10.3 - SR.CEA.9-10.2 - SR.DUM.9-10.4 - SR.AID.9-10.2	- SR.AID.9-10.2 - SR.CEA.9-10.2 - SR.PCO.9-10.3	- SR.AID.9-10.2 - SR.CEA.9-10.1 - SR.CEA.9-10.4	- SR.AID.9-10.2 - SR.CEA.9-10.3

Summative Assessment Clarification: <i>This is a brief description of the task and or product you will use to assess student proficiency on the performance indicators you identified above.</i>	- KEY WHS 1.3 Practice with Pro... - WHS 1.3 Lab Report for Ball on... - WHS 1.3 QUIZ Big Ideas with t... - WHS 1.5 Lab Report for Ball on... - WHS 1.6 Lab Report for Playing... - WHS 1.7b Patterns in Your Life ...	- WHS QUIZ Basic Physics of Energ... - WHS 2.4 Modeling Eg and Ek - WHS 2.5 Lab Report for Elastic Ene... - WHS 2.7 Computational Thinking a... - WHS FINAL 2.0 Engineering Portf... Bungee Jump Engineering (RECORDED)	4EP - Portfolio for Engineeri... 4Q5 - Quiz on Data-Informe...	5EP - Cell Phone Communication Portfolio 5Q3 - Science Task: Evaluating Sources f...	Quiz on the Basic Physics of Motors & Generators Lab for Investigating a Parameter of Wind Turbine Design Quiz on the Basic Physics of Wind Turbine Investigation to Optimize a Solar Cell Panel Quiz on the Basic Physics of Climate Science 50 Year Energy Plan 50 Year Plan Portfolio	Data Mining Halley's Comet for Universal Gravity Orbital Motion with Energy Bar Charts Construct an explanation of the Big Bang Theory
Link to Unit	From Curriculum: 1.0 Learning Plan for Patterns an... Adapted WHS CP Unit 1 - CPHYSICS - UNIT 1 Backward...	From Curriculum: 2.0 Learning Plan for Energy and En... Adapted WHS CP Unit 2 - CPHYSICS - UNIT 2 Backward Pla...	From Curriculum: 3 Learning Plan for Engineer... Adapted WHS CP Unit 3 CPHYSICS - UNIT 3 Backward Planning Template	From Curriculum: 4 Learning Plan for Waves and Technolog... Adapted WHS CP Unit 4 - CPHYSICS - UNIT 4 Backward Planning...	From Curriculum: P.5 Learning Plan for ... Adapted WHS CP Unit 5	From Curriculum: Adapted WHS CP Unit 6
NGSS Standards	Science Practices: Asking Questions, Developing and using models, planning and carrying out investigations, Using mathematical models, and constructing explanations.	HS-PS3-1. Create a 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-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.	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. 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.	HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. HS-PS4-2. Evaluate questions about the advantages of using a digital transmission and storage of information. HS-PS4-4. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. HS-PS4-5. Communicate 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.	HS-PS2-5. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. 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-PS4-3. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. HS-ETS1-3. Evaluate a solution to a complex real-world problem	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-ESS1-2. Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe. HS-ESS1-4. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

					based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate. HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.*	
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Supplies List:

 WHS Patterns Physics Materials List (Broken Down by need)