REVISED PHYSICAL SCIENCE

WCSD High School Physical Science Unit Overview

Quarter 1: Physics (Stability and Motion)

	Essential Question	Underlying Concepts	Performance Expectations
Motion and Stability	**Storyline**		Fall Protection > F = mg > PE→KE > mv > F Δt > Design Fall Protection > HS PS 2-1 > HS PS 3-2 > HS PS 2-3 > ETS1 - 4
	How can I organize and analyze data to help me understand a phenomenon?	Students use data to analyze a falling ball and examine the relationship between mass and its acceleration. Correlation vs Causation is explored.	**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.
	How can I use models to help me understand how energy is transferred and transformed?	Students use models to examine the transfer and transformation of energy and to understand that momentum is conserved.	**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 motion of particles (objects) and energy associated with the relative positions of particles (objects).
	What happens when objects collide?	Conservation of momentum is explored as students examine collisions using Newton's Cradle.	**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.
	How can engineering design help reduce damage caused during a collision?	Students gain understanding of the benefit that extending the length of collision time can reduce forces during a collision. Students refine a design to specifically extend collision time.	**HS-PS2-3**: Apply science and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.*
	Why do materials behave the way they do?	Students engage in researching the macroscopic and microscopic behavior of materials to understand the benefits of design at both levels.	**HS-PS 2-6**: Communicate scientific and technical information about why the molecular-level structure is important in the function of designed materials (flexible but durable materials are made up of long chained molecules)

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WCSD High School Physical Science Unit Overview

Quarter 2: Physics (Waves and Their Interactions in Technologies for Information Transfer)

Waves and Their Applications in Technologies for Information Transfer	Essential Question	Underlying Concepts	Performance Expectations
	Storyline		Benefits/Risks → What are waves & Wave behavior → EM wave/particle duality → EM influence on different materials (solar cells/solar ovens/medical techonology) → Devices capture and transmit energy → Design
	What do waves look like and how do they transmit information/ energy?	Students examine the fundamental behavior and form of waves and their mathematical relationships.	**HS-PS 4-1**: Use mathematical representations to support a claim regarding relationships between frequency, wavelength, and speed of waves traveling in various media.
	How does the behavior of EM radiation limit its use?	Students examine the wave/particle duality of EM radiation and how that behavior benefits different technologies.	**HS-PS 4-3**: Evaluate the claims, evidence, and reasoning behind the idea that EM 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.
	How are materials affected by different frequencies of EM radiation?	Students examine various resources for validity and reliability regarding the effects of EM radiation.	**HS PS 4-4:** Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of EM radiation have when absorbed by human tissue.
	Is the risk from technology worth the benefits of its use?	Students ask questions about the benefits and risks of today's technologies and explore solutions.	**HS PS 4-2:** Evaluate questions about the advantages of using a digital transmission and storage of information. [

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Quarter 3: Earth's Place in the Universe (as it Relates to Physics)

	Essential Question	Underlying Concepts	Performance Expectations
Earth's Place in the Universe	**Storyline**		
	How is spectroscopic data analyzed to determine the composition of matter?	Students explore the spectroscopic data (absoprtion lines) of stars to predict the relationships that drive the formation of elements.	**HS ESS 1-3**: Communicate scientific ideas about the way stars, over their life cycle, produce elements. **HS PS 1-8*:** Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. *atomic structure
	How is spectroscopic data used to predict the life cycle of a star like our sun?	Students examine and build models to compare changes in the atomic nucleus (nucleosynthesis) and energy released from these processes.	**HS PS 1-8***: Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. **HS ESS 1-1:** Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation. *fission and fusion
	What are the benefits of radioactive decay in the Earth's core?	Students will explore the radioactive decay within the Earth to explain the function of the magnetic field.	**HS-PS 2-5:** 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 PS 1-8*:** Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. *radioactive decay

*the components of HS-PS1-8 (atomic structure, fission, fusion and radioactive decay) will be covered in each unit separately.

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WCSD High School Physical Science Unit Overview

Quarter 4: Chemistry

Essential Question	Underlying Concepts	Performance Expectations
Storyline		Electrons drive the fundamental interactions between atomic particles.
How do microscopic interactions influence macroscopic properties?	Students use melting temperatures of different substances to build an understanding of the strength of forces between particles.	**HS PS1-3**: Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.
How can we use patterns to help predict and understand relationships between elements?	Students will use patterns to explain the relative placement of elements on the periodic table.	**HS PS1-1:** Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.
How can we use patterns from the periodic table to explain the outcome of a chemical reaction?	Students will use the patterns found in the periodic table to explain simple chemical reactions.	**HS PS1-2** Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
How do we know that matter cannot be created or destroyed?	Students explore conservation of mass.	**HS PS1-7** Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.