CV Guarantee - Energy and Work
(Honors Physics 10-12)

<table>
<tr><td colspan="2">Big Idea: How energy is transferred and conserved.</td></tr>
<tr><td>Standard:

HS-PS3: Energy

HS-PS3-1:Standard: 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-PS3-2: Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields.

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-PS3-4: Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components (second law of thermodynamics).</td><td>Timeline:

3 Weeks</td></tr>
<tr><td>Key Vocabulary:
work, energy, kinetic energy, potential energy, gravitational potential energy, elastic potential energy, mechanical energy, conservation of energy, power, efficiency, joule, watt, force, newton, friction, thermal energy, heat, law of conservation of energy, work-energy theorem, system</td><td>Vocabulary Activities:

• Interactive notebook entries
• Worksheets
• Classroom activities
• Quizizz
• Kahoot
• Quizlet</td></tr>
</table>

Knowledge	Reasoning	Performance Skills	Product Examples
Define kinetic energy and potential energy. List the units used to measure energy and work. Identify the law of conservation of energy.	Investigate the relationship between work, force, and distance by conducting a simple experiment.	• Perform algebraic manipulations of formulas Students will design, build, and test a model roller coaster to demonstrate principles of energy conservation, potential and kinetic energy, and the conversion of energy between forms.	• Students will compile a comprehensive portfolio that documents the design, construction, testing, and analysis of their roller coaster model, showcasing their understanding of energy transformations and conservation principles.
Resources: Mrs. Brousseu's Physics Bundle, Teachers Pay Teachers, The Physics Classroom Conceptual Physics, Hewitt.			

Aug 12, 2024 12:00 AM PDT

CV Guarantee Nuclear Reactions
(Honors Physics 10-12)

Big Idea: Nuclear Reactions and Processes

Standard:

HS-PS1-8: 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.

PS3: Energy

- **PS3.A: Definitions of Energy**
  - Discusses the concept of energy in nuclear reactions, where energy is released or absorbed.
- **PS3.D: Energy in Chemical Processes**
  - This can relate to the energy changes during chemical reactions, including those involving nuclear processes.

Timeline:

3 Weeks

Key Vocabulary:

Isotope, nuclear reaction, mass number, average atomic mass, radioactive decay, alpha decay, beta decay, gamma decay, beta particle, alpha particle, half-life, fusion, fission, parent isotope, daughter isotope, chain reaction, mass binding energy,

Vocabulary Activities:

- **Interactive notebook entries**
- **Worksheets**
- **Classroom activities**
- **Quizizz**
- **Kahoot**
- **Quizlet**

Knowledge	Reasoning	Performance Skills	Product Examples
• Describe the general composition of a stable and unstable nucleus. • Explain the different processes involved in nuclear changes and the conditions required for those processes. • Explain the connection between nuclear changes and the changes in atomic identity.	• Interpret a graph of naturally occurring isotopes. • Write a balanced nuclear equation.	• **Activity**: Conduct a research project where students investigate a nuclear technology application, such as nuclear power plants or medical isotopes. Create a presentation or report analyzing the scientific, environmental, and ethical aspects of the technology. Include a	• Diagram the different nuclear equations for alpha decay, beta decay, gamma decay, fusion and fission. • Nuclear power investigation reflection paper - research and explain the pros and cons associated with the use of Nuclear Power.

		discussion of alternative energy sources and propose solutions to mitigate any negative impacts.	
Resources: Mrs. Brousseu's Physics Bundle, Teachers Pay Teachers. Conceptual Physics, Hewitt.			

Aug 12, 2024 12:00 AM PDT

CV Guarantee - Kinematics
(Honors Physics 10-12)

Big Idea: 1D and 2D motion

Standard:

HS-PS2-1:

- Standard: 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.
- Focus: Using mathematical models to describe and predict motion based on force, mass, and acceleration.

HS-PS2-2:

- Standard: 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.
- Focus: Exploring the conservation of momentum and its applications in collisions and other interactions.

HS-PS2-3:

- Standard: Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.
- Focus: Engineering applications to reduce forces during impacts, linking concepts of momentum and energy.

Timeline:

5 Weeks

Key Vocabulary:

Scalar, vector, distance, displacement, speed, velocity, acceleration, position, free fall, magnitude, projectile, trajectory, projectile,

Vocabulary Activities:

- **Interactive notebook entries**
- **Worksheets**
- **Classroom activities**
- **Quizizz**
- **Kahoot**
- **Quizlet**

Knowledge	Reasoning	Performance Skills	Product Examples
Define kinematics and its significance in physics. List the three main equations of motion for uniformly accelerated motion. Identify the differences between scalar and vector quantities in kinematics.	Analyze the effects of changing variables on an object's motion.	• Perform algebraic manipulations of formulas Conduct an experiment where students alter one variable (e.g., angle of a ramp) and analyze its effect on the motion of an object. Collect data and present findings.	• Students will conduct an experiment to investigate how changing the angle of a ramp affects the motion of an object, analyze the data collected, and present their findings. • Draw conclusions based on the data analysis.
Resources: Mrs. Brousseu's Physics Bundle, Teachers Pay Teachers, The Physics Classroom Conceptual Physics, Hewitt.			

Aug 12, 2024 12:00 AM PDT

CV Guarantee - Waves and EM Radiation
(Honors Physics 10-12)

Big Idea: Waves and Electromagnetic Radiation

Standard:	**Timeline:**
HS-PS4-1 **Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.**	**Quarter 3** **4 Weeks**
Key Vocabulary: Simple harmonic motion, equilibrium, amplitude, cycle, period, frequency, vibration, motion, crest, trough, medium, intensity, velocity, transerve, longitudinal, compression, rarefaction, phase change, constructive interference, destructive interference, wavelength, solid, liquid, gas, Hertz, P wave, S wave, speed of sound, speed of light, doppler effect.	**Vocabulary Activities:** • **Interactive notebook entries** • **Worksheets** • **Classroom activities** • **Quizizz** • **Kahoot** • **Quizlet**

Knowledge	Reasoning	Performance Skills	Product Examples
• Describe simple harmonic motion. • Explain how different waves transfer energy • Explain the difference between mechanical and electromagnetic waves • Understand how to manipulate algebraic equations to solve for unknowns	• Examine data and results from Hooke's Law Lab • Analyze the Electromagnetic spectrum	• Perform algebraic manipulations of formulas • Perform a Slinky Law to demonstrate the different types of mechanical waves • Draw a diagram showing a series circuit with resistor and capacitors	• CER for Hooke's Law Lab • CER for Pendulum Lab

Resources: Mrs. Brousseu's Physics Bundle, Teachers Pay Teachers, The Physics Classroom Conceptual Physics, Hewitt.

Aug 12, 2024 12:00 AM PDT

CV Guarantee Electricity
(Honors Physics 10-12)

Big Idea: Electrostatic forces and interactions

Standard:

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.

Timeline:

Quarter 1

3 Weeks

Key Vocabulary:

Ion, electric charge, Coulomb, electrostatics, anion, cation, friction, conduction, induction, circuit, resistance, ohm, conductor, insulator, current, grounding, electric force, series circuit, parallel circuit, polarity, quantized

Vocabulary Activities:

- **Interactive notebook entries**
- **Worksheets**
- **Classroom activities**
- **Quizizz**
- **Kahoot**
- **Quizlet**

Knowledge	Reasoning	Performance Skills	Product Examples
• Describe the different subatomic particles and their respective charges. • Explain how charges can be transferred during conduction, friction, and induction. • Explain the connection between ions and static charge. • Understand the Law of Conservation of Electricity during electrical interaction.	• Use Coulomb's Law to predict the charge of electrostatic forces	• Draw a diagram labeling the correct flow of electrons for conduction, induction and friction. • Draw a diagram showing a parallel circuit with resistors and capacitors • Draw a diagram showing a series circuit with resistor and capacitors	• Build successful parallel and series circuit • Diagram the different nuclear equations for alpha decay, beta decay, gamma decay, fusion and fission. • CER for Electrostatics lab • CER for Circuits lab

Resources: Mrs. Brousseu's Physics Bundle, Teachers Pay Teachers.
Conceptual Physics, Hewitt.

Aug 12, 2024 12:00 AM PDT