FRANKLIN-SIMPSON HIGH SCHOOL

Course Name: Physics **Unit Name:** **Work and Energy**

Quality Core Objectives:

Unit 5 Work and Energy	
A.1. Scientific Inquiry	a. Identify and clarify research questions and design experiments
	b. Design experiments with controlled variables and appropriate numbers of trials
	c. Collect, organize, and analyze data accurately and use appropriate techniques and devices
	d. Interpret results and draw conclusions, revising hypotheses as necessary and/or formulating additional questions or explanations
	e. Write and speak effectively to present and explain scientific results, using appropriate terminology and graphics
	f. Safely use laboratory equipment and techniques when conducting scientific investigations
	g. Routinely make predictions and estimations
A.2. Mathematics and Measurement in Science	a. Distinguish between precision and accuracy with respect to experimental data
	b. Use appropriate SI units for length, mass, time, temperature, area, volume, and density; describe the relationships among SI unit prefixes (e.g., centi-, milli-, kilo-) and how to convert between English units and SI units
	d. Calculate/estimate, using significant figures, the uncertainty in experimental results, and use the uncertainty to evaluate and interpret results
	e. Express numbers in scientific notation when appropriate
	f. Solve for unknown quantities by manipulating variables
	g. Use graphical, mathematical, and/or statistical models to express patterns and relationships inferred from sets of scientific data
B.3. Work and Energy	a. Describe the relationship between work and energy
	b. Distinguish between kinetic energy and potential energy

	c. Discuss the relationship between work and kinetic energy and between work and gravitational potential energy, using Newton's second law
	d. Calculate the amount of work done by a given force exerted on a body that is constrained to move on a given plane
	e. Calculate the change in energy (kinetic, gravitational potential, and elastic potential) that results from performing a specified amount of work on a body
	f. Use the laws of the conservation of momentum and the conservation of mechanical energy to solve problems involving elastic collisions
	g. Write the equation for the force exerted by an ideal spring, both as a function of the amount the spring is stretched and as a function of the amount the spring is compressed; in each case, write the equation for the potential energy stored in the spring
	h. Identify and explain situations in which mechanical energy is conserved and in which mechanical energy is not conserved, even though energy is conserved
	i. Relate power to work, and solve problems involving acceleration, force, distance, and time

Purpose of the Unit:

The purpose of this unit is for students to understand that work and energy can be defined and calculated using the basic understanding of physics. Students will be able to distinguish between what is potential and what is kinetic energy and the relationship that connects the two. Students will be able to calculate the energy of a system, the work done on a system and explain how the laws of conservation apply.

Prerequisites:

Understanding of Newton's Laws. Be able to solve for unknown quantities by manipulating variables.

Daily Lesson Guide

Day	Lesson Content and Objectives	Focus Questions	Critical Thinking (High Yield / Literacy /LTF/etc.)	Engagement	Assessment and/or Accommodations
	Standard Number -This is what I'm doing for activities.	This is where I put focus questions.	How do I bring things up to the next level?	Can I incorporate any of the Antonetti engagement strategies?	How do I know that students are LEARNING the objectives?
1	Introduction to Energy & Work -Notes on Work -Definitions -Units for Work/Energy (Joules) - PE & KE (Alternative: P.H. video & notes)	- Is lifting &/or holding a book WORK? - What is ENERGY? - What forms can ENERGY take? - What types of ENERGY are there?	Identify how each ***type*** of ENERGY is in each ***form.***		
2	*Staircase Lab* -Students gather data for analysis of work, energy & power.	How is WORK, ENERGY & POWER related?	How does this also relate to VELOCITY & ACCELERATION? (Similarities & Differences)		
3	Graphing and Analysis of lab results - Discussion - Worksheet (begin)	What does the area of a FORCE v. DISTANCE graph represent?			
4	*Pendulum Lab* - Students gather data for analysis of PE & KE	What is the PE & KE of a pendulum? Where are the maximum points of PE & KE?	How does this also relate to VELOCITY & ACCELERATION?		Pre-AP alternative lab: *Energy of a Tossed Ball Lab* Use of Vernier LabPro

5	**Graphing and Analysis of lab results** **- Discussion** **- Worksheet (cont)**	**What does the curve of a KE v. VELOCITY show? What type of curve is KE v. VELOCITY?**			
6	**Review of WORK, ENERGY, POWER, PE & KE** **Review of worksheets**				
7	**UNIT ASSESSMENT**				
8	**Additional day (if needed)**				**Pre-AP alternative lab:** ***Energy in Simple Harmonic Motion*** **Use of Vernier LabPro**
9	**Additional day (if needed)**		**(Similarities & Differences)**		**Pre-AP alternative lab:** ***Momentum, Energy & Collisions*** **Use of Vernier LabPro**
10					
11					
12					