

Lab: Exploring Potential and Kinetic Energy

CONCEPTUAL PHYSICS: UNIT 3

BACKGROUND: What are the relationships between kinetic energy and potential energy? Energy is the ability to cause change. Energy exists in many forms. Some of these forms include radiant, electrical, chemical, thermal and nuclear energy. Kinetic energy is energy in the form of motion, such as in a bouncing ball. Potential energy is stored energy. The amount of potential energy an object has depends on its position or condition.

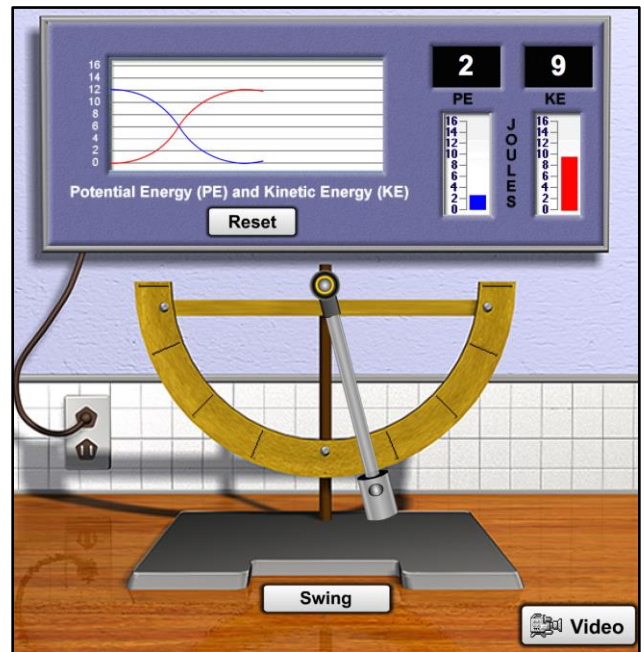
In the Virtual Lab you will learn about the relationship between potential energy and kinetic energy by swinging a pendulum and observing bar and wave graphs as they illustrate its energy. For the purposes of this activity, assume that there is no friction or air resistance.

OBJECTIVES:

- Distinguish between kinetic and potential energy.
- Recognize that energy can change from one form to other forms with no loss of total energy.

PROCEDURE:

1. Log onto http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS05/PS05.html
2. Click the Video button. Watch the video about potential and kinetic energy. Observe the point at which the clock pendulums and the swings are at their highest and lowest kinetic and potential energy. Record your observations in the Journal section, question 1 (page 2).
3. Click the weight at the end of the pendulum arm and drag it to the desired height and then Click the Swing button.
4. Observe what happens to the bar and wave graphs as the pendulum swings. The arrow on the pendulum always points in the direction of its motion.
5. Click the Pause button to stop the pendulum at different points in its swing. Observe the potential and kinetic energy on the graphs at each stopping point. Record this information in Data Table #1 (page 2)
6. To return the pendulum to the center position, click the Reset button.
7. When you have collected data for a number of launch heights and stopping points, make some observations about the relationship between potential and kinetic energy.
8. When you have completed the simulation answer the remaining questions in the Journal section.



DATA TABLE #1

| POTENTIAL ENERGY (J) | KINETIC ENERGY (J) | TOTAL ENERGY (J) |
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JOURNAL:

Question 1: What are the relationships between kinetic energy and potential energy?

Question 2: When do you think the clock pendulums and the swings where at there highest and lowest kinetic and potential energy? Why?

Question 3: What happens to the total energy of the pendulums as it swings? What determines the maximum total energy of the pendulum?

Question 4: How are potential energy and kinetic energy related?

Question 5: How does energy change from potential energy to kinetic energy?

Question 6: What is the relationship between work and the potential energy gained by the pendulum initially?

Question 7: What would happen to the motion of the pendulum if air resistance were present? Explain.

Question 8: How would air resistance affect the total amount of energy that exists? Explain.

Question 9: In your own words, describe the Work-Energy Theorem and Law of Conservation of Energy.

Question 10: Name at least 5 forms of energy that exists in the world around us.