

# Oscillating Particle Skill Objectives

What you should know and be able to do by the end of the unit:

## 1. Explore the nature of Simple Harmonic Motion through the development of an oscillating particle (OP) model.

- Be able to determine the spring constant of a spring and describe the significance of this physical property.
- Be able to determine the effect of changing the amplitude of vibration in an oscillating system on the period of vibration for that system.
- Be able to determine the effect of changing the mass of an oscillating system on the period of vibration for that system.
- Be able to determine the effect of changing the spring constant of an oscillating system on the period of vibration for that system
- Identify the characteristic presence of a restoring force that results in a total force acting upon the oscillating mass that is always directed toward the equilibrium position
- Describe the directly proportional relationship between an oscillating mass' displacement from equilibrium and the restoring force.

## 2. Explore the kinematic, dynamic and energy properties of an oscillating system.

- Compare the graphs of position vs. time, velocity vs. time and acceleration vs. time for an oscillating system and analyze the phase relationships among the various graphs.
- Add a dynamic analysis of the oscillating system by comparing the force vs. time graph to the previously analyzed kinematic graphs.
- Examine graphs of energy stored kinetically vs. time, energy stored elastically vs. time, and total energy vs. time for the oscillating system. Compare energy vs. time graphs to kinematic and dynamic graphs.
- Calculate the amount of energy stored kinetically, elastically, and gravitationally for a simple harmonic oscillator at various positions in the oscillation.