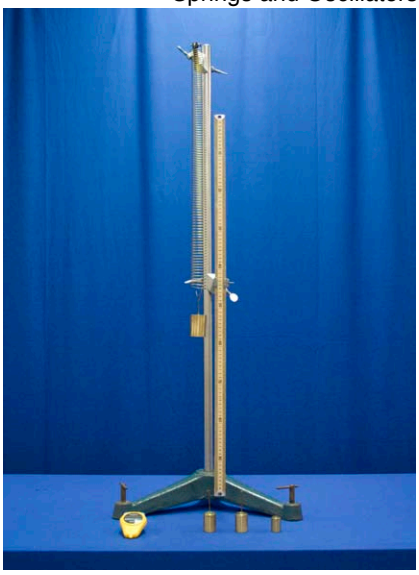
MASS ON A SPRING 3A20.10

Oscillations and Waves | Oscillations | Springs and Oscillators



Concept:

This apparatus allows the spring constant, k, of a spring to be determined using Hooke's Law, $F = -kx$, where F is the force on the spring and x is its displacement from equilibrium. Once the spring constant has been determined, it can be used to predict the period of oscillation, T, of a given mass m via:

$$T = 2\pi\sqrt{\frac{m}{k}}$$

Equipment:

- Large Rod Stand
- (2) Large Rod Clamps
- Slotted End Clamp
- 2 Pronged Clamp
- Meter Stick
- 100g, (2) 200g, 500g Masses
- Timer
- Harmonic Motion Spring

Procedure:

1. Verify that the spring is oriented such that its smaller diameter end is connected to the slotted end clamp. (This assures that the spring's mass does not need to be accounted for in determining its spring constant.)
2. Hang the 500g mass and use the meter stick to measure the displacement of the spring's end.
3. Use the measured displacement to calculate the spring constant using Hooke's Law.
4. Use the spring constant to calculate the period of oscillation.
5. Lift the 500g mass and let it go to set it oscillating. Use the timer to measure the time it takes for the mass to complete 10 full oscillations. Find the average period of oscillation.
6. Compare the measured period of oscillation with that predicted by the formula.
7. Experiment with different masses as desired.