

Periodic Motions

Name _____ ID _____ TA _____

Partners _____

Date _____ Section _____

Please exercise caution so that the swinging weight does not hit people and other fragile objects.

Pendulum Motion

Conceptual Discussion:

What is the definition of the period for a pendulum motion? In other words, how do you determine one period?

1. Length dependence of the period [Fixed mass = 0.10 kg, Fixed amplitude = 10°]

#	Length ℓ (m) The increment or decrement must be at least 0.1 m.	Period T (s)
1		
2		
3		

Question 1: Does the period of a simple pendulum depend upon its length? If so, how does it depend on?

Spring Motion

2. Hooke's law (Finding the spring constant) $g = 9.80 \text{ m/s}^2$

#	Hanging Mass (kg)	Gravitational Force $F = mg$ (N)	Displacement x (m)	Spring Constant $k = F / x$ (N/m)
1	Nothing + 0.05 kg (mass of the weight hanger) = 0.05 kg			
2	0.02 kg + 0.05 kg (mass of the weight hanger) = 0.07 kg			

3	0.04 kg + 0.05 kg (mass of the weight hanger) = 0.09 kg			
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Calculate the average spring constant.

$$k = \text{_____} \text{ (N/m)}$$

Conceptual Discussion:

What is the definition of the period for a spring motion? In other words, how do you determine one period?

3. Periodic spring motion

- Amplitude dependence

Fixed mass, $m = 0.10 \text{ kg}$ (100 g); **Just put a 50-g weight since the hanger has already 50 g.**

Fixed spring constant, $k = \text{_____} \text{ N/m}$ \Leftarrow from the previous experiment

Amplitude	Period
0.02 m	
0.04 m	
0.06 m	

- Mass dependence

Fixed amplitude, $A = 0.06 \text{ m}$ (6 cm);

Fixed spring constant, $k = \text{_____} \text{ N/m}$ \Leftarrow from the previous experiment

Mass	Period
Calculate the total mass	
Nothing + 0.05 kg (mass of the weight hanger) = 0.05 kg	
0.02 kg + 0.05 kg (mass of the weight hanger) = 0.07 kg	
0.04 kg + 0.05 kg (mass of the weight hanger) = 0.09 kg	

Question 2: Does the period of a spring motion depend upon its amplitude of motion? If so, how? How about the mass dependence?

Notes for the periodic pendulum & spring motions

For the 1st part of experiment

