

# Guided Lesson Notes

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Measuring Simple Harmonic Motion

**Directions:** Complete this study guide as you move through the lesson. By taking notes, you are more likely to remember what you are learning. The completed study guide can be used for practice activities and to prepare for quizzes and exams. Be sure to save each study guide so you can access it when you need it.

### Essential Vocabulary

As you encounter these scientific terms in the lesson, enter the meaning and an example (or two) for each. You can even draw a picture. If there are other unfamiliar words you find, enter them in the blank spaces provided.

<i>period</i>	<i>amplitude</i>
<i>frequency</i>	<i>simple harmonic motion</i>
<i>elastic potential energy</i>	<i>cycle/vibration/oscillation</i>

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### A Review

Fill in the blanks below about simple harmonic motion.

Simple harmonic motion is the special case of _____ motion where the _____ is a direct result of a _____ _____. The restoring force is _____ _____ to the _____ the object is away from its point of _____, or its " _____ " point.
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### Amplitude, Period, and Frequency

1. Define the period, frequency, and amplitude of simple harmonic motion.

Period	Frequency	Amplitude

2. Write the equation that relates period and frequency in simple harmonic motion. What are the units for frequency ( $f$ ) and period ( $T$ )?

Equation	
Frequency units	
Period unit	

**Period and Frequency Example Problems**

Select one of the problems listed and complete the table with the appropriate information. Choose from: Metronome, Child Swing, or Spring.

Problem:	
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Picture	Given/Find	Equation	Solution



## Period of a Pendulum

1. What characteristics does a mass-spring system have in common with a pendulum?

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2. Identify and define the three main attributes of simple harmonic motion.

<b>Amplitude</b>	
<b>Frequency</b>	
<b>Period</b>	

3. The equation for the period of a pendulum is  $T = 2\pi \sqrt{\frac{L}{g}}$ .  
Define each of the variables in this equation.

<b><math>T =</math></b>	
<b><math>L =</math></b>	
<b><math>g =</math></b>	

**4. Show the work required to find the answer to the following question:**

What is the period of a pendulum that is 1.44 meters long and has a 3.40 kg bob at the end?

<b>Solution:</b>	
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**Period of a Mass-Spring System**

1. The equation for the period of a mass-spring system is  $T = 2\pi\sqrt{\frac{m}{k}}$ . Define each of the variables in this equation.

$T =$	
$m =$	
$k =$	

**2. Show the work required to find the answer to the following question.**

Clara is building a mass-spring system. She only has access to one spring, and it has a stiffness coefficient of  $65.0 \frac{N}{m}$ . If Clara wants the system to have a period of motion of 1.45 seconds, how large a mass should she attach to the spring?



<b>Solution:</b>	
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**Example Period Problems**

Select one of the problems listed and complete the table with the appropriate information. Choose from: Grandfather Clock, Mass-Spring System, or Pendulum.

<b>Problem:</b>	
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Picture	Given/Find	Equation	Solution

## Bring It All Together

1. Write Hooke's law.

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2. Use the chart to write the following equations.

Relates Period and Frequency	Period of a Pendulum in SHM	Period of a Mass-Spring in SHM

3. Select one of the problems listed and complete the table with the appropriate information. Choose from: Trapeze, 0.35 kg mass, or 0.016 kg mass.

<b>Problem:</b>	
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Picture	Given/Find	Equation	Solution