Name: _____ Date: _____

Frequency and Period Experiment Worksheet Answers

Preliminary Questions:
We know that the equation for the period is:

$$T = 1/f$$

where T = period and f = frequency

1. What is the unit of measurement for frequency?

   Answer: Hertz (Hz)

2. If one cycle lasts two seconds, what is the frequency? Hint: Use algebra to solve for "f."

   Answer $= 1/T$, $f = 0.5$ Hz

Procedure and Materials

1. Make sure you have the materials listed below:
   - 2 helical springs
   - 2 masses
   - stopwatch
2. Designate the following jobs to people in your group:
   - spring holder
   - person to drop the mass
   - timer
   - data recorder
3. Start the experiment:
   a. Attach mass #1 to spring #1.
   b. Hold the mass in place so that the spring is not elongated.
   c. Have the mass holder count to 3 so the timer knows when to start the stopwatch.
   d. Start the stopwatch as soon as the mass is released and stop it once the mass returns to the original position.
   e. Record the time in the data table and repeat steps a-d two more times.
   f. Repeat steps a-e for the rest of the combinations:
   mass #2 and spring #1
   mass #1 and spring #2
   mass #2 and spring #2

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Data Table

	Spring #1 Mass #1	Spring #1 Mass #2	Spring #2 Mass #1	Spring #2 Mass #2
Trial 1 (sec)				
Trial 2 (sec)				
Trial 3 (sec)				
average period (sec)				
natural frequency (Hz)				

Data Analysis

1. Rank the natural frequency of the different systems from lowest to highest:

2. Did changing the stiffness of the spring change the natural frequency of the system?

   Answer: yes

3. Did changing the mass of the system change the natural frequency of the system?

   Answer: yes

Follow Up Questions

Resonance is the tendency of a system to oscillate with larger amplitude when it is excited at the natural frequency of the system.

1. Why is it important for buildings and bridges to **not** experience *resonance*?

   Resonance causes buildings and bridges to sway back and forth, and causes them to fail or fall down.

2. How can engineers stop *resonance* from occurring?

   Engineers can change the mass and stiffness of buildings and bridges to make sure that resonance will not occur.