Name _____ Lab Section_____
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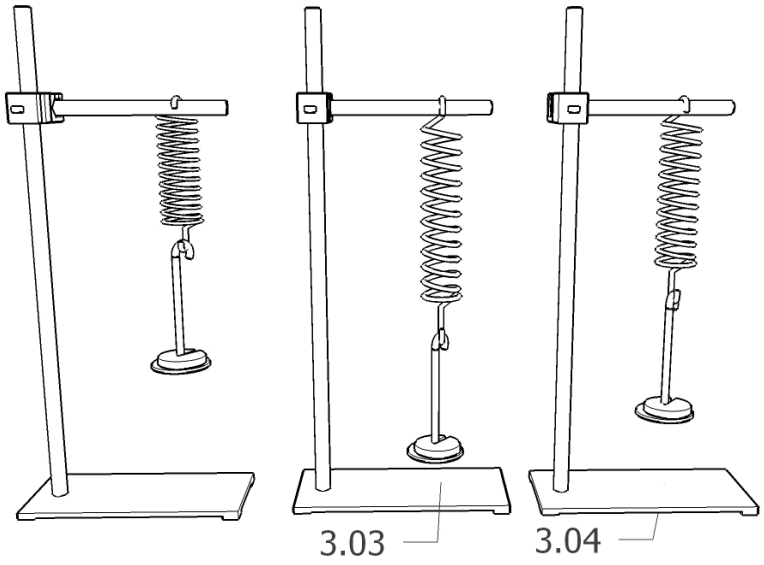
Activity 3.04 *If the amount that the spring is initially displaced downwards is a smaller distance, how will the frequency change, if at all?*



You may examine the spring and the masses without moving them.

1. Your Ideas: In the space below, jot down your ideas to this question. Include the reasons behind your answers. Do not consult with anyone else at this time

2. The Group's Ideas: Share your ideas with your group and see if the group can reach a consensus. Write the group's consensus in the space below.

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3. Making Observations

1. Count the number of vibrations made by the spring during 30 second intervals for displacements of 2 cm, 4 cm, and 6 cm. Record your data in the table below.

Initial displacement (cm)	Vibrations in 30 seconds	Frequency (f = #vib / time)
2		
3		
4		

2. Does the ***amplitude*** of the vibrations have any affect on the ***frequency*** of the vibrations?

3. Is there a difference in the number of vibrations in 30 seconds if the initial displacement is up instead of down?

4. Were you right? Give an explanation below, using what you already know, as to why you saw what you saw.

For homework, answer the following the questions on separate paper.

a. What happens to the *loudness* of guitar string if you pull the string down more?
b. What happens to the *pitch* of the guitar string if you pull the string down more?

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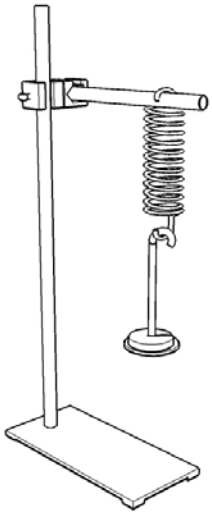
Do NOT change the set-up of the equipment in anyway until you are told to do so!

Activity 3.05 *Do all springs have the same frequency of vibration?*



You may examine the spring and the masses without moving them.

1. Your Ideas: In the space below, jot down your ideas to this question. Include the reasons behind your answers. Do not consult with anyone else at this time

2. The Group's Ideas: Share your ideas with your group and see if the group can reach a consensus. Write the group's consensus in the space below.

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3. Making Observations

Switch to a different station and repeat the last activity. Compare the results you get this time with the one from last time. Record your data and your decision below.

Describe how this spring is different than the other. Would you describe it as stiffer or less stiff, where stiffness is how hard it is to stretch?

4. Were you right? Give an explanation below, using what you already know, as to why you saw what you saw.

For homework, answer the following the questions on separate paper.

a. To play a higher note on a guitar, do you want to make the guitar string stiffer or less stiff or will it not matter? Why?
b. What happens to the stiffness of your vocal chords when you say a lower pitched note? How do you know?

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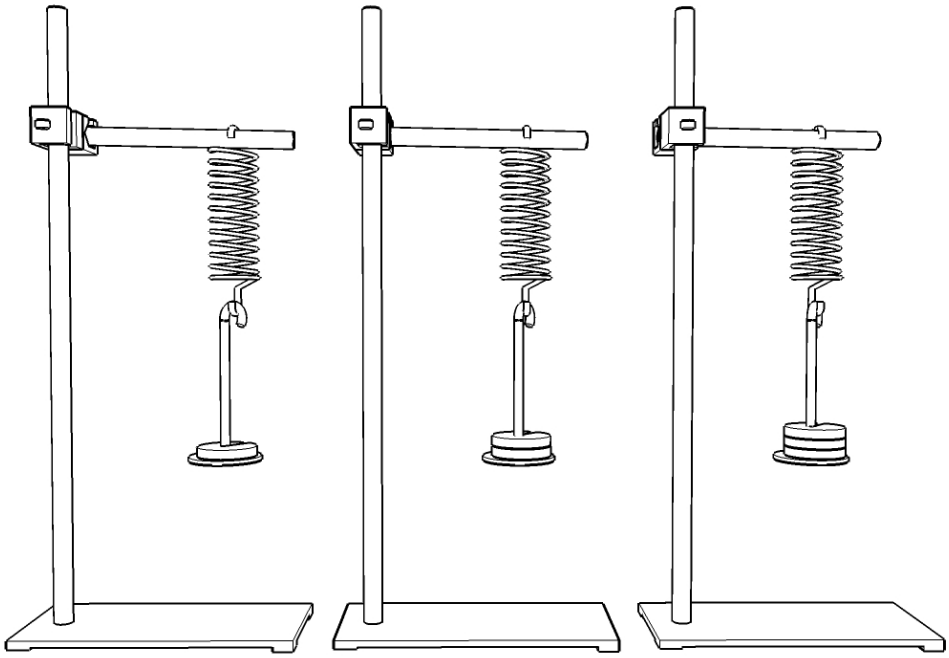
Do NOT change the set-up of the equipment in anyway until you are told to do so!

Activity 3.06 *If more mass is added to the spring, will it vibrate at the same frequency?*



You may examine the spring and the masses without moving them.

1. Your Ideas: In the space below, jot down your ideas to this question. Include the reasons behind your answers. Do not consult with anyone else at this time

2. The Group's Ideas: Share your ideas with your group and see if the group can reach a consensus. Write the group's consensus in the space below.

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3. Making Observations

Using the spring from activities 3.03 and 3.04, count the number of vibrations that occur in 30 seconds. Complete the data table below.

Hanging mass (g)	Vibrations in 30 seconds

Does the hanging mass affect the frequency of vibrations? Please summarize the relationship in a short statement.

4. Were you right? Give an explanation below, using what you already know, as to why you saw what you saw.

For homework, answer the following the question on separate paper.

a. Why are the strings on a piano that are designed for low pitches have dense copper wire wrapped around them?

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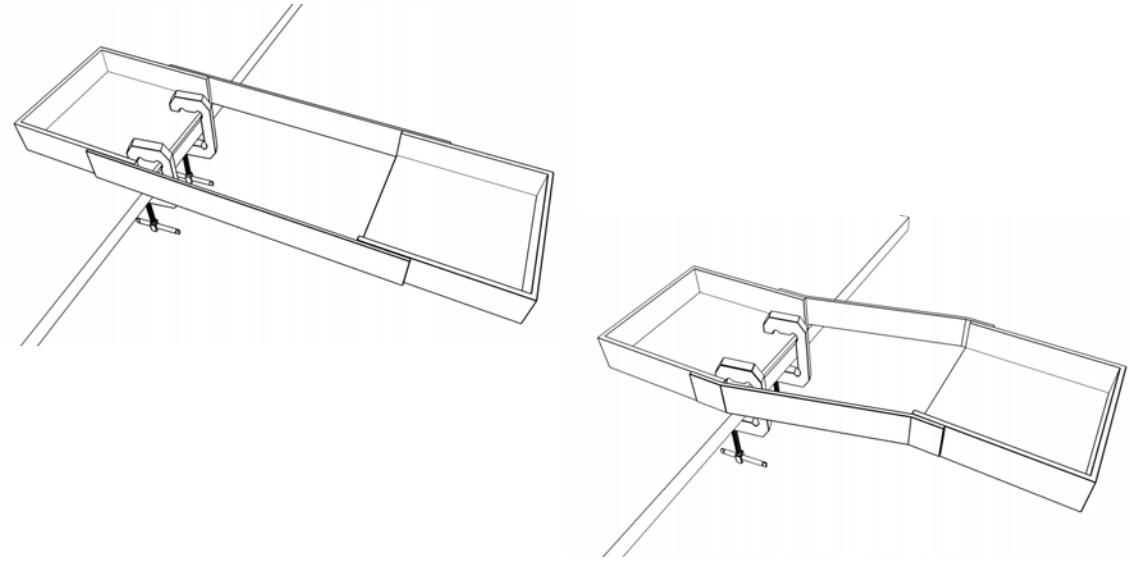
Activity 3.061 *A horizontal pendulum is set up like the one pictured below. You pull the the end sideways and let go. Will the object have a natural frequency. How will you tell?*



1. Your Ideas: In the space below, jot down your ideas to this question. Include the reasons behind your answers to this question. Do not consult with anyone else at this time. *Use what you learned from the spring activities and physics you may have learned in previous years.*

2. The Group's Ideas: Share your ideas with your group and see if the group can reach a consensus. Write the group's consensus in the space below.

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3. Making Observations:

1. Push the platter not attached to the table. Draw its motion below.

2. Determine its frequency.

4. Making a Model Does this object have a natural frequency?

For homework, answer the following the question on separate paper.

a. How does this relate to what we did with the spring?

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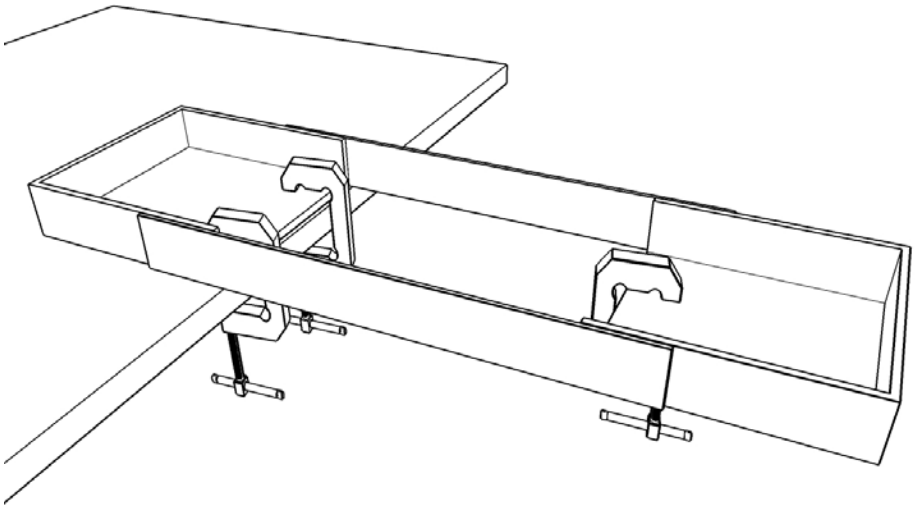
Do NOT change the set-up of the equipment in any way until you are told to do so!

Activity 3.062 *A horizontal pendulum is set up like the one pictured below with a clamp attached to the free pan. Will the natural frequency of the pendulum be higher, lower, of the same as without the clamp?*



1. Your Ideas: In the space below, jot down your ideas to this question. Include the reasons behind your answers to this question. Do not consult with anyone else at this time. *Use what you learned from the spring activities and physics you may have learned in previous years.*

2. The Group's Ideas: Share your ideas with your group and see if the group can reach a consensus. Write the group's consensus in the space below.

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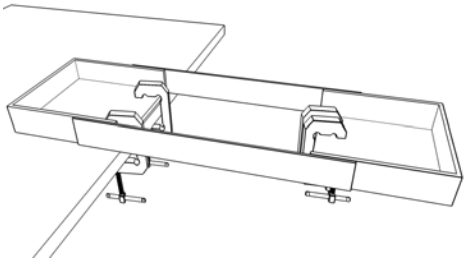
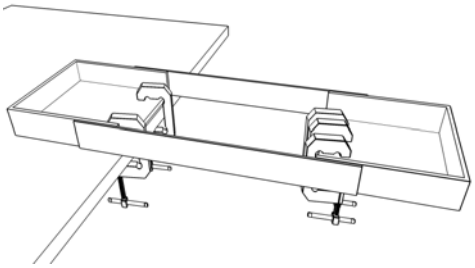
3. Making Observations:

1. Attach a clamp to the inertial pendulum. Determine the frequency. How should you do this? Oh, you've done this a bunch of times by now. You'll think of something. Write what you did as well as your answer in the space below.

2. Attach another clamp to the inertial pendulum. Determine the frequency again.



3. That was fun, let's do it one more time so that there are three total clamps attached to the inertial pendulum, like in the picture to the left. Determine the frequency.



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4. Making a Model Using a piece of graph paper in the front of the room, graph the frequency of the inertial pendulum vs. number of clamps. Determine some sort of law.

5. **Using a Model** When you feel comfortable with your model, you my ask for the strange clamp which I will attach to the pendulum. You may not remove the clamp. You may however determine the frequency of the pendulum with my strange clamp attached. Your goal is to find the mass of the strange clamp.

   You will give your best guess as to the mass of the clamp along with a range of error. When we mass the strange clamp and compare it to your guess, you will only pass if your guess is within your range of error. Then, you grade will equal

   105 – range of error – % error

   Good luck.