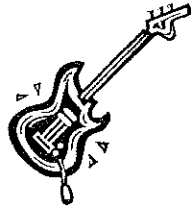


PH 305 Activity: Sounds in Strings

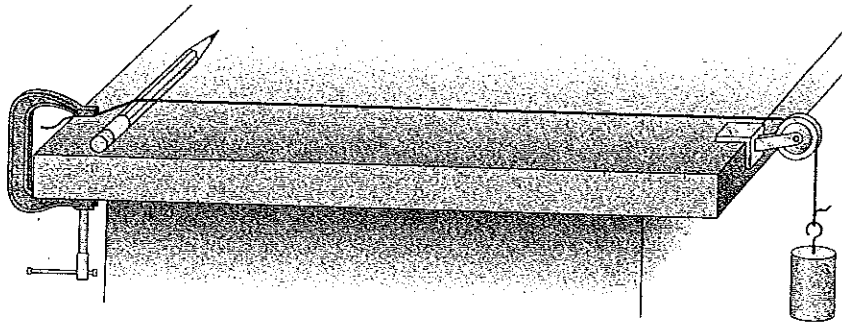


Questions to think about...

When the ancient Greeks made stringed musical instruments, they discovered that cutting the length of the string by half or two-thirds produced other pleasing sounds. *How do guitarists and violinists today make different sounds?*

Procedure...

1. Carefully mount a pulley over one end of a table. Securely clamp one end of a string to the other end of the table.
2. Tie the other end of the string around a mass hanger. Lay the string over the pulley. Place a pencil under the string near the clamp, so the string can vibrate without hitting the table, as shown below. You will not fill in all of the data immediately. Leave enough space to add as many rows as necessary through the activity.

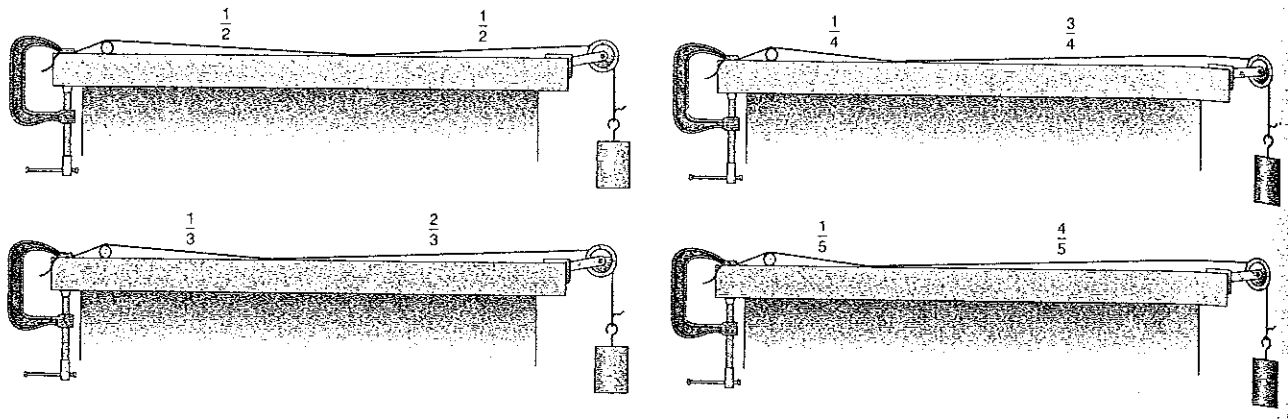


3. Hang 500 grams of mass on the mass hanger. *Make sure the area under the hanging mass is clear – no feet, legs, etc. Also monitor the string for fraying.* Pluck the string, listen to the sound, and observe the string vibrate.
 - a. Record your observations in a table in your notebooks similar to the following.

Length of Vibrating String	Load on mass hanger	Pitch (high, medium, low)	Wavelength of Vibrating String	Frequency of Vibrating String

4. Use a key or some other small metal object. Press this object down on the string right in the middle to hold the string firmly against the table. Pluck each half of the string. Record the result in the table.

5. To change the string length, press down with the key at different places shown in the diagrams below. The load should remain constant. Record your results in the table.



6. When you pluck the string, it does not move at the ends. Using this information and referring to pictures of standing waves, record the wavelengths of the waves on the string.
- Look over the data you have so far in your table. Make a general statement about what happens to the pitch you hear as you change the length of the string.
7. Remove the key so that the string is its original length. To investigate the effect of tightening the string, add 500 grams more to the mass hanger. Pluck the string, observe to the vibration, and listen to the pitch of the sound. Record this information in your table.
- Continue adding weights and observing the sound until the total added mass is 2000 g.
 - Look over your data. As the mass increases, the string becomes tighter and its tension increases. Make a general statement about what happens to the pitch you hear as you change the tension on the string.
8. Now you will measure the frequency of the sound. Set up the microphone on your computer using the Lab Pro (some directions are below). Choose six combinations of mass load and string length from above that gave you high, medium, and low pitches. Your goal is to use the data from the microphone to support your conclusions from above. Here are some questions to think about:
- What frequencies do the high, medium, and low pitches correspond to?
 - Can you support the relationships you concluded in #6 and #7?