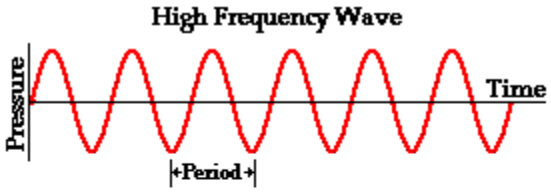
Sound Waves and Instruments Lab NAME_____

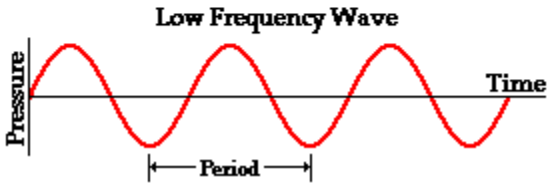
During today's lab, make observations about the different sounds you hear. Pay special attention to what seems to be causing notes to sound higher or lower. **PITCH=the highness or the lowness of a sound.** High pitch examples include a flute, a soprano singing, or the high notes on a piano. Low pitch sounds would be those made on a bass guitar, a tuba, or a big deep bass drum. Scientists call this the **frequency**, but musicians call it pitch. High frequency waves make higher pitches, low frequency waves make lower pitches.

Amplitude= the tallness of a wave. The taller a wave is, the higher the amount of energy and the louder the sound. Musicians call amplitude **volume**. If a student started shouting, the amplitude of their voice waves would be bigger. Guitarists plug their instruments into an **amp** to make the volume louder.
Medium= the substance a wave travels through (solids, liquids, gases)



Look at the picture to the right. Do high frequency waves have a longer **wavelength** (aka **period**) or a shorter wavelength?

High frequency = _____ wavelengths
Low frequency = _____ wavelengths



1] SOUNDBLASTER STATION

A For this station you will go outside because the sounds can get very loud. Put your lips firmly around the tiny hole on the side of the canister. Blow until you hear a sound. Do not break the balloon that covers the end of the blaster. If you do, your team will be DONE with today's lab.
Sound description:_____

B Now blow while inserting your thumb in and out of the large hole at the end. This makes the sound blaster act something like a trombone.
Sound description:_____

C Now change the length of the soundblaster by putting the cardboard tube over the end with the large hole
Sound description:_____

D Now (with the big tube still in place) put your palm slightly over the balloon end of the blaster.
Sound description:_____

E ***Now please wipe the sound hole with toilet paper dipped in alcohol so that it is clean for the next student.***

F Extending the length of the blaster made the pitch lower or higher (circle one)

G What medium is the sound passing through?

2] BOTTLE STATION (you will stay here for a couple of rounds)

A Put water in different bottles to make different pitches. You will be blowing into the tops of the bottles to create sound. With your team, try to make the song "Mary had a little lamb."

B How does the amount of water affect the pitch of the sound waves?

_____

_____

3] BRASS BELL STATION

A Ring the bell quietly. This has a high pitch. Draw what the wave would look like below.

B Now ring the bell louder. (Don't be obnoxious) Draw what the wave would look like below. Be sure to keep the wavelength the same as what you drew above, because this bell makes the same frequency each time.

C Hold the bell at the top then ring it, then hold it in the middle and ring it, then hold it at the bottom and ring it. What happened?

_____

D Why do you think this happened? (use the word "waves" in your answer)

_____

4] GUITAR BUILDING STATION

A Make a guitar as pictured below by stretching a rubber band from one end to the other. Be sure to make a "bridge" on one end so that the band is elevated higher at one end than the other. Try to play the tune "Mary had a little lamb."

B When you touch the band far down on the left (long length of rubber band) do you think this allows for a longer wavelength or a shorter wavelength? _____
What is the pitch like in this position? _____

C When you touch the band far up the guitar toward the right (short length of rubber band) do you think this allows for a longer wavelength or a shorter wavelength? _____
What is the pitch like in this position? _____

D Longer waves make _____ pitches
E Shorter waves make _____ pitches

5] CHIME BARS STATION

A At this station you will be tapping metal rods with unsharpened pencils and listening for ringing tones. Hold the bar with your fingertips as loosely as you can without dropping it. Holding too tightly can **dampen** (quiet down) the sound. Move your fingers up and down the bar until you find "sweet spots" that **resonate** well. Resonate means you are allowing the waves to move easily and continuously, and you are getting as many molecules as possible to "sing along."

B Look carefully at the thinnest bar when you get it to ring. What is it doing?

_____

C How does changing the position of your fingers alter the pitch of the sound?

_____

6] WHIRLY GIG STATION

A For this station you will be going outside. Whirl the plastic toy in circles above your head. Be sure to be far away from others. If your whirly gig hits someone else at any time, your lab is DONE for the day. Spin it at different speeds.

B If you put a lot of energy into it by spinning it fast, what is the pitch like? (high or low?)

C If you put a little of energy into it by spinning it slowly, what is the pitch like? (high or low?)

D What happens if you spin it too slowly?

E High energy waves make _____ pitch
Draw a high energy wave in the box to the right →

F Low energy waves make _____ pitch
Draw a low energy wave in the box to the right →

7] TUNING FORK STATION

A Tap one of the prongs on the double end of the tuning fork lightly against your hand to get it to **resonate** (to make a continued and sustained set of waves.. to make it "sing.") Make sure EVERYONE in your group gets to use the tuning fork.

B After tapping it, touch the tuning fork. What do you feel?

_____

C Put the tuning fork next to your ear in many different positions. What position seems to sound loudest?

_____

D Draw a picture of the tuning fork and draw the sound waves coming out of it.

E Tap the tuning fork again and then put the handle down on one end of the table. Have your friend put their ear on the other end of the table. What happens?

_____

F What does this table experiment prove?

_____

G Now tap the tuning fork and put the double end into a cup of water. What happens?

_____

Out of all the stations, which instrument had the greatest amplitude?
Out of all the stations, which instrument had the smallest amplitude?