**Resonance**

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

1. Consider air. Air is made of gas molecules (Oxygen, nitrogen etc…) Do you think the molecules in your mouth when you saw Aaaah make it to your friend’s ear when they hear you?
2. When you talk or make sound with your straw instrument, do the particles that you vibrated in the air, travel to the listener’s ear?
3. When you pluck a guitar string, does the metal you plucked move up and down the string or just the vibration?
4. What is moving to the listener’s ear?

1. What were the three things that the cup instrument needed to make sound and change pitch?
2. What were the three things that the straw instrument needed to make sound and change pitch?
3. Can the important features be generalized for your instruments and other musical instruments like the guitar for example?

Look at **Wave on a String –** http://www.phet.colorado.edu.

1. Turn the damping to zero and choose loose end. Wiggle the end to send a wave. What does it do after it gets to the end?
2. Now set to oscillate, turn the frequency to **13**, then hit reset to start a clean wave. What happens to the waves as you watch? Let it go for a minute and discuss what it goes through over time.
3. What do you think is happening to cause this behavior (does it help to think about pushing someone on a swing)?
4. Now set to oscillate, turn the frequency to **21**, then hit reset to start a clean wave. What happens to the waves as you watch? Let it go for a minute (not just a few seconds) and discuss what it goes through over time.

*Whole class demo w/ pasta.*

1. How is it possible for one pasta to wiggle a lot while the other two that are being held don’t do much?
2. Where is resonance happening with each of the instruments we worked with this week?
   1. Straw instrument
   2. reed instrument (comb)
   3. cup instrument
   4. your voice
   5. acoustic guitar
   6. electric guitar
3. Based on what you’ve seen today and this week, how do you think a pipe organ in a church works? Why does it have all the different pipes?