Generalizing how instruments work

8/29/14

Three Important Features

1. How do instruments make sound?

2. How do instruments change pitch?

3. How do instruments amplify sound (be loud)?

Resonance

Natural Frequency: The rate something likes to vibrate at.

Resonance: When you drive (vibrate) something at its natural frequency

Resonance determines pitch

- Straw – length
- Tuning fork – tines
- Cup Instrument – string length
- Voice – complicated! Vocal cords, mouth/throat length
- Acoustic guitar – string length (and tension)
- Electric guitar – string length (and tension)

Amplification
making the sound loud

Move more air

Either by Sympathetic Vibration or Resonance.

(resonance is just a special case of sympathetic vibration)

Amplification

Straw	resonance	body of straw	moves most air
Tuning Fork	none		not loud
Cup	symp. vibration	cup	moves most air, string not loud
Voice	Both!	mouth, throat, chest, cheek bones	
Acoustic Guitar	Symp. Vibration	Body of guitar	Amplifies all notes
Electric Guitar	none		Not loud

Home Work

The Next Generation Science Standards (NGSS) identified eight practices that are essential for all students to learn:

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Home Work

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (science) and designing solutions (eng.)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Please consider the first week's activities about sound and music both in class and during lab. Describe how these map onto the above Standards. If you think any of the Standards were not addressed this week, explain.

Home Work

5. Using mathematics and computational thinking

Was this standard addressed this week?

A. Yes
B. No
C. Indirectly

Home Work

3. Planning and carrying out investigations

Was this standard addressed this week?

A. Yes
B. No
C. Indirectly

Home Work

1. Asking questions (for science) and defining problems (for engineering)

Was this standard addressed this week?

A. Yes
B. No
C. Indirectly

Home Work

6. Constructing explanations (for science) and designing solutions (for engineering)

Was this standard addressed this week?

A. Yes
B. No
C. Indirectly