

**Lesson Plan Title**

Music and Waves

**Grade Level**

8th Grade

**Subject Area**

Science

**MSCCRS**

P.8.6.2- Investigate research-based mechanisms for capturing and converting wave energy (Frequency, amplitude, wavelength, and speed) into electrical energy.

**Art Form**

Music

**MSCCR Creative Arts Standards**

MU:Re7.2.8a- Compare how the elements of music and expressive qualities relate to the structure within programs of music.

**Duration**

1 hour

**Materials**

Ruler

Plastic drinking straw

Scissors

Pitch and Frequency worksheets- one per student

**Objectives**

TLW define pitch and frequency.

TLW describe a sound with a high or low pitch and frequency.

TLW describe how to change the pitch of a sound.

TLW give an example of how engineers use pitch and frequency in the design of new products.

**Vocabulary**

Pitch

Frequency

Sound

**Lesson Description**

1. TTW begin the lesson by asking what is sound energy? TLs will respond, and the TTW explain that it is the energy produced when sound is created.
2. TTW explain that we will be talking about two characteristics of sound energy today; pitch and frequency.
3. TTW tell everyone to create a sound, any sound with their mouths. Can you hear higher or lower sounds around the room? This characteristic of sound is called *pitch*. What is a *frequency*? The number of *vibrations* for each sound pitch is called its frequency. High-pitched sounds have faster frequencies or more vibrations than low-pitched sounds with slow frequencies.
4. TTW play the pitch video to better explain pitch and frequency. TTW stop the video at the 2:30 mark
5. TTW ask, how do we use sound? We use sound to communicate, give warnings, talk to each other and send messages to our friends over the telephone. We also use sounds to entertain us and help us relax or get energized when we listen to music.
6. TTW divide the class into teams of two students each. One student in each team will be given a ruler, and one will be given a straw.
7. For the students with the Rulers
  - a. TTW have students hold the end of a ruler flat against a table and hit the other end, which extends beyond the edge of the table.
  - b. TTW repeat this action several times, pulling more of the ruler onto the table each time. TLs will start with the ruler 10 inches off the desk and 2 inches on the desk. TLs will complete this process 4 times, each time moving the ruler on the desk by one inch.
  - c. TTW ask the students how changing the length of the portion of the ruler that hangs past the table changes the vibrations in the ruler. How does it affect the pitch and frequency of the sound the ruler makes? (Answer: The longer the amount of the ruler beyond the table edge, the lower the pitch and frequency.)
8. For the students with the Straw Kazoo
  - a. TLW make a straw kazoo by cutting one end of a straw to a point.
  - b. TLW blow into the straw on the pointed end and then cut a bit off the other end to make it a shorter kazoo.
  - c. TLW observe the change in pitch as the straw kazoo is shortened.
  - d. TTW discuss patterns and observations: Recall that *pitch* is the highness or lowness of a sound, and *frequency* is a pitch's rate of vibrations. What type of pitch is characterized by slower vibrations? (Answer: A low pitch.) What type of pitch is characterized by faster vibrations? (Answer: A high pitch.)
9. TTW explain that pitch and frequency in music as well. To extend the activity, TLs are tasked with creating a short composition with the instruments they had (ruler and kazoo) using their knowledge of pitch and frequency. TLW when perform their compositions to the class showing their knowledge of pitch and frequency.
  - a. TTW be sure to give the learners time to practice their songs so that they are confident performing it. TTW explain that one student in each pair will count off before they start using this cue "1-2-ready-go."

### **Recommended Resources**

Pitch and Frequency Worksheet-

[https://www.teachengineering.org/content/cub\\_/activities/cub\\_energy2/cub\\_energy2\\_lesson05\\_activity3\\_worksheet.pdf](https://www.teachengineering.org/content/cub_/activities/cub_energy2/cub_energy2_lesson05_activity3_worksheet.pdf)

Pitch and Frequency Video-

<https://www.youtube.com/watch?v=ZjvuiOSo3ow>

### **Extended Learning Activities**

To add a math component, have students record on the worksheet how long the ruler vibrates at different lengths and graph the results on the worksheet

### **Sources**

[https://www.teachengineering.org/activities/view/cub\\_energy2\\_lesson05\\_activity3](https://www.teachengineering.org/activities/view/cub_energy2_lesson05_activity3)

### **Tips**

N/A

### **Author**

Teach Engineering

### **Adapted by**

Winnie Jones