

Teacher Information: Musical Instrument Project

Scene Set: Students are hired to play background music for a movie using home-made instruments.

Purpose: Students will apply what they have learned about the properties of sound and acoustics to build a musical instrument that can play at least six notes on pitch. The students will play a song on their instruments to demonstrate how they can change the instrument's pitch and loudness.

Materials: Students will build their instruments with inexpensive materials such as fishing line and plastic tubes. Teacher should supply books on musical instruments borrowed from a library and the chance for students to do Internet searches for ideas for their musical instrument. If the school budget allows, the purchase of materials would help students with limited access to supplies for this project.

Information Sheet for Students: Action:

Musical Instrument Project Instruction Sheet

1. You are in charge of constructing your musical instrument. You can get help from family members especially if tools such as saws need to be used.
2. Your instrument can be a string, percussion or wind instrument.
3. Your instrument cannot use parts from other musical instruments.
4. If you play an instrument, pick another type of instrument to construct for this project.
5. You must play a scale of eight notes on your instrument: C, D, E, F, G, A, B, C.
6. You must play a song using at least six musical notes.
7. Prepare a short oral presentation to the class explaining how you built your instrument, how your instrument works to change pitch and loudness, and the problems that you had in building your musical instrument. You must also tell the class where you found the idea for your instrument.

Once More For Safety: Use protective eye gear if you are cutting materials for your project. Let family members help you with tools. This project is yours, but safety is important.

Cut, Print and Wrap: Reminders for the day of the presentation:

1. Show your instrument to the class.
2. Play at least eight musical notes to the class.
3. Play the required song that uses at least six musical notes.
4. When you are finished playing your song, answer the following questions in your oral presentation to the class. You may use a poster or computer slide show in your presentation:
 - A. How did you build your instrument?
 - B. How did you change the loudness and pitch of your instrument.
 - C. What problems did you overcome when you were making your instrument?
 - D. Where did you get the idea and instructions for building your instrument? This would include the title of the book or the Internet web site.

E. On your poster or in your slide show you should include diagrams, pictures and anything that would make your presentation interesting to the class.

Teacher notes on this project:

1. This project should take about three weeks.
2. Allow students to research ideas for their instruments using library books and the Internet. Plan to include a firm date when their ideas are due to you for approval.
3. At the end of the week, students must show you their instrument in progress.
4. Set a due date for the instrument and posters or computer slide shows.
5. PVC pipes and even bamboo make great wind instruments such as pan-pipes and flutes.
6. Fishing line can be used to make string instruments. A note of caution: Fishing line tends to stretch so students must be able to tighten or loosen the strings on the day of the presentation to tune their instruments.
7. Rubber sheeting, metal pipe, PVC pipe, and copper tubing can be used to make percussion instruments such as xylophones and drums.
8. Local stores may be willing to donate small pieces of wood and other materials for students to use.
9. After all instruments have been presented, you might want to videotape the entire class playing the required song.
10. Encourage students to play other songs in addition to the one that you required.
11. Some students may wish to build an additional musical instrument.
12. Family members should receive clear instructions that if they help their children, the student must be actively involved in the building of the instrument. Stress that the "look of the instrument" is not important. Students must understand how their instrument works and play the song as close as possible to "on pitch." Adults must supervise cutting, drilling and all activities where safe practices must be used.

Sample Checklist

Oral Presentation:

1. The musical instrument was shown to the class.
2. You played at least eight musical notes on your instrument.
3. You played a song that uses at least six musical notes.
4. Your musical notes were pretty close to correct pitch.
5. During your presentation you explained how you built your instrument.
6. During your presentation, you explained how you changed your instrument's pitch.
7. During your presentation, you explained how you changed your instrument's loudness.
8. During your presentation, you explained any problems that you encountered when you were making your instrument.
9. Your poster/computer slide show included diagrams and/or pictures of your musical instrument as you built it.
10. Your instrument played more than eight different musical notes.
11. You played a more difficult song in addition to the required song.

Elaboration with teacher information:

1. Did you hear destructive and constructive interference when instruments were played?

Students' answers will vary but the foundation for their answers must be built on the description of the vocabulary terms. Constructive interference occurs when two sounds have the same frequency and reinforce each other. The listener hears an even louder sound. Destructive Interference occurs when two sounds have different frequencies and partly or fully cancel each other out. The listener may hear a throbbing sound called beats. If the frequencies completely cancel each other out, no sound will be heard. Jackhammer operators use or wear headphones that produce sound frequencies exactly opposite in frequency to the sounds given off by the jackhammer. This destructive interference can create silence.

2. Describe how resonance is essential to building musical instruments.

Some instruments have sounding boards or resonance cavities. Louder, richer sounds can be created by increasing the vibrating surfaces or the volume of air molecules set into motion. Students may wish to investigate acoustics, harmonics, and the building of musical instruments.

3. Summarize the characteristics of sound waves based on this unit and project.

Students will have many properties to discuss. These should include the TEKS 5A, 5B and 5D.