Pitch

Lesson Plan

Season 2, Episode 3: (13:33–26:50)
bit.ly/steamcamp-s2-ep3

Learn about pitch and how instruments make music with the help of Christopher Vivas from the Las Vegas Philharmonic.

Nevada Academic Content Standards/Next Generation Science Standards:

1-PS4-1 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

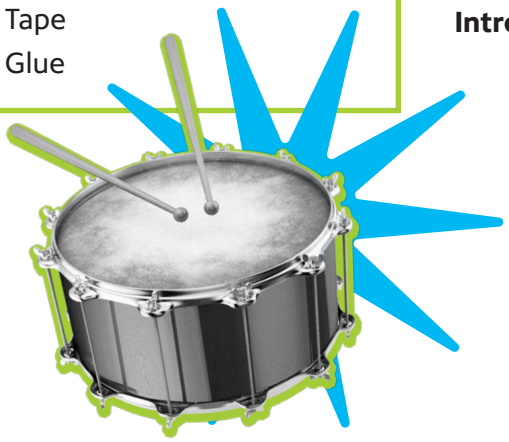
3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

Materials

- A variety of recyclable and every day materials, such as:
  - boxes
  - straws
  - rubberbands
  - paper towel rolls
  - empty cans or other containers
- Scissors
- Tape
- Glue



Engage:

Share the beginning of the program with students. After Royce asks, “How do instruments make music?” pause the program and ask your students the same question. Write this essential question down and record student responses to reveal students’ current knowledge, connections to the topic, and further questions they have.

Explain:

Introduce the words: pitch, sound wave, vibration.

- Have students guess their meaning and record their ideas.
- Ask students to listen for the words as they watch the video clip, featuring Christopher Vivas from the Las Vegas Philharmonic.
- When they hear one of words, encourage students to make a gesture, such as wiggling their fingers.

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Explain:

Pause the video after Chris addresses the questions below, to strengthen comprehension and help children make connections. Watch the "What did we learn?" segment to reinforce the concepts.

- What is pitch? (the difference between a high and low sound)
- How does pitch travel to your ear? (through an invisible sound wave)
- How are high pitch waves different from low pitch waves? (high pitches produce tighter waves and low pitches produce wider waves)
- What part of the viola vibrates to make sound? (strings)
- What part of the drum vibrates to make sound? (membrane)
- Why do the tubes on the pan flute make different pitches? (the tubes are different lengths, which causes the air to travel through them at different speeds)

Reflect on the new knowledge students have acquired.

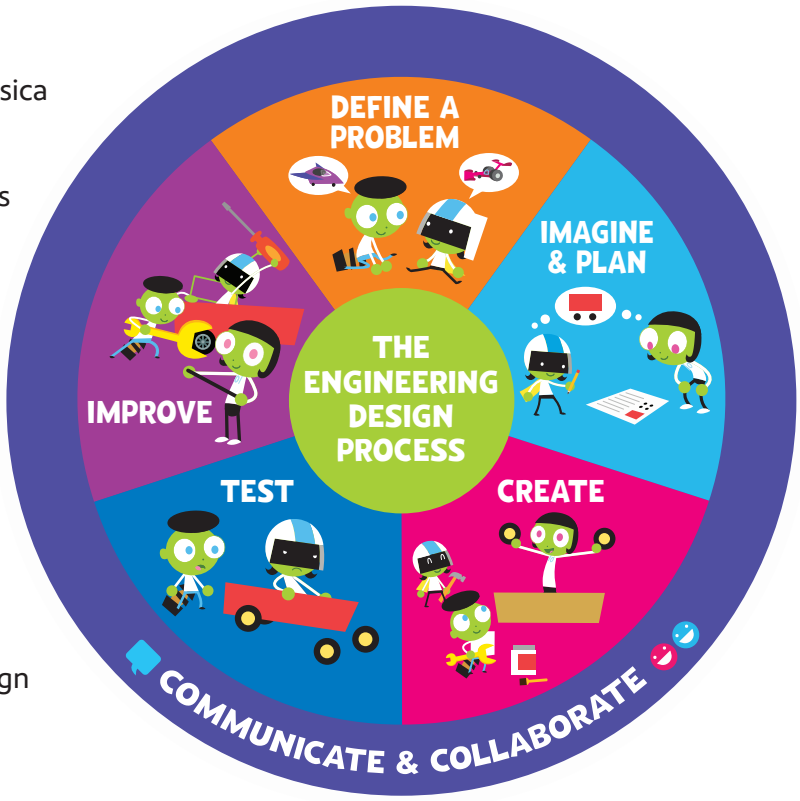
- Revisit the essential question and have children answer it by incorporating the vocabulary words; ask children to share any new information they acquired or additional questions they have.
- Create a chart of high and low sounds by asking children to name every day sounds that fall into each category (sirens, thunder, birds, etc.).

Explore:

Share the at-home activity segment in which Jessica outlines directions for creating homemade instruments using everyday items. Then, guide students through the engineering design process outlined in the segment.

Define the Problem: Design a musical instrument that plays more than one pitch.

Imagine and Plan: Gather different everyday materials, like boxes, empty containers, straws, and rubber bands. Encourage them to be creative! How are they going to use the items collected in their design? Are they going to make a string instrument, like a viola? Or, maybe a percussion instrument like a drum? Maybe they'll blow on their instrument, like the pan flute. Their instrument could even be all three! Have students draw a sketch of their design before they start.



Vegas PBS STEAM CAMP

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Explore, continued:

Create: The next step is to create their instruments. Encourage students to take their time and test the pieces as they go. Testing your project as you go is a good way to save time and fix mistakes if you realize something isn't working.

Test: Have students play their instrument and listen to the pitches it makes. Are they different? Which pitch is highest and which is lowest?

Improve: If students tested their instrument and it only made one pitch, have them improve their design and test again. Would additional materials make their design work better? If it did work, add additional pitches!

Communicate and Collaborate: Have students share their designs. Which designs played the greatest variety of pitches? What part(s) of their instruments vibrate to create sound waves? Help students make connections between anything they learned in the video and this activity. What new questions do students have? Encourage students to share photos and videos of their at-home challenges with Vegas PBS at bit.ly/steamcamp-share.

Extend:

View the book talk with Joey, a local Young People's Librarian, featuring **White Rabbit's Color Book** by Alan Baker. Have students make up a song about their favorite book, just like Joey did!

Encourage students to continue exploring pitch by accessing the following PBS KIDS resources:

- **The Cat in the Hat Knows A Lot About That!: Sound and Vibrations:** bit.ly/catinthehat-sound
- **The Cat in the Hat Knows A Lot About That!: Going, Going, Gong:** bit.ly/catinthehat-gong
- **Science Crafts for Kids: Discover Pitch with a Water Xylophone:** bit.ly/catinthehat-water-xylophone
- **PBS KIDS for Parents: TP Roll Maracas:** bit.ly/tproll-maracas
- **Let's Go Luna: Carmen's World Orchestra:** bit.ly/letsgoluna-orchestra

Share:

Visit vegaspbs.org/steamcamp to upload photos or videos of student projects, or share them with us on social media by tagging @vegaspbs.

Keep in mind, if you are submitting a video, make sure we can see what students are doing and hear what they are saying! Also, please keep videos to one minute or less.