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# Sunset Science Sack

**Title:** Palm Pipes  
**Theme:** Physics  
**Skill:** Measuring

## Safety Rules of Science

1. **NEVER** put anything in your mouth
2. Listen carefully to the instructions
3. Make sure all supplies are returned to the Sack and clean up your work area!

**Key Question:** Do different length pipes create different sounds?

**For Parents' Eyes Only:** Sounds are created by vibrations. When you strike the palm pipe against your hand, you create a vibration in the pipe, which is a sound wave. The length of the pipe determines the wavelength of the sound wave. Longer pipes create longer wavelengths. The note you hear is called the pitch of the sound. In this experiment your child will measure and graph the pipe lengths, and then see that longer pipes have lower pitches. In other words, pipe length and pitch are *inversely related* (when one is big, the other is small).

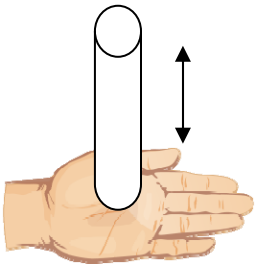
By the end of this activity, your child should understand the **big idea:** When a sound wave is created, the smaller the wavelength, the higher-pitched the note you hear. Wavelength and pitch are *inversely* related.

## Materials in the Sack:

- 7 Palm pipes, labeled with the musical note
- Music Sheet
- Ruler

## What to do:

**Step 1:** Strike the pipe against your palm – so that the circle part hits your palm and creates a noise. Play with the pipes and create some music!



**Step 2:** If you have enough people, try to use the music sheet to play a song.

**Step 3:** Use the ruler and measure each pipe to the nearest **centimeter** (the marks on the ruler that go from 0-30). Use the graph on the Palm Pipes sheet in your Lab Notebook to make a bar graph of the lengths.

(turn over)

Step 4: Now strike each pipe one at a time and listen to the sound. What do you hear? Do different pipes make different sounds?

Step 5: See if you can find a pattern of the sounds. Can you arrange the pipes in order from low pitch to high pitch? Do you see a pattern in the pipes?

Step 6: Look at your graph and at the pipes you have arranged. What is the relationship between pipe length and pitch? Say it like this... When the pipe length gets \_\_\_\_\_, the pitch gets \_\_\_\_\_.

Step 7: In your Lab Notebook, draw a picture about what you did in this experiment. Write the title and a few sentences about what you learned.

**Ask these Discussion Questions:**

1. Why do you think a guitar string changes its pitch when you place your finger on a different place? (By holding the string down, you change the length of the string that can vibrate. This changes the pitch, or the note that you hear.)
2. How do you think a flute makes different pitches? Think about how you use your fingers to play a flute. How does that change the "pipe length"? (When you fingers close certain holes in the flute, you effectively change the tube length. This changes the note played.)

**If you want to take the experiment further:**

1. Get some bottles and fill each with different amounts of water. Blow over the tops of them. What do you hear? How does the water level affect the pitch? (The smaller the column of air (more water in the bottle), the smaller the wavelength created. The smaller the wavelength, the higher the pitch.)
2. Research how musical instruments work.

**Please check materials list to be sure all materials stay with the Sack!**