



## Make Your Own Exhibit

# From the Sound Gallery: Pipes of Pan

At Discovery Museum, we like to explore our everyday world in unique ways. Pipes of Pan, an extension of our [Sound Gallery](#), showcases how the symphony of sounds we hear all around us is actually made up of many individual notes. By listening to the sounds of the surrounding Museum through tubes of different lengths, Pipes of Pan separates out these notes so we can listen to them one at a time. Let's build a Pipes of Pan exhibit to listen to those notes! Please share your experiences with us using the email address found on the last page. We'd love to know what you discover!



## Make Your Own Pipes of Pan Exhibit

### Supplies for Building Pipes of Pan

*Be sure to ask an adult for help as you gather your supplies to create your exhibit!*

- Cardboard tubes, or paper and tape to make paper tubes
- Scissors

*Check out the "**Get Creative!**" section for ideas about other materials you can try in your exhibit.*

### Exploration

- Create your Pipes of at least three different lengths using your cardboard tubes, paper, scissors, and tape (see photo).
- Using your ears only, carefully listen to the noises around you.
- Pick up your longest listening pipe and hold it to your ear.

*What do you notice?*





## Things To Try

- Listen to your surroundings through your different Pipes.

*What do you hear?*

*What do you notice about the sounds you hear through the different Pipes?*

- Listen through your Pipes of Pan both inside and outside.

*What do you notice about the sounds in these two different environments?*

- While listening through a Pipe, make the Pipe longer by holding another Pipe onto the end of it (see photo).

*Do you notice a change in the sounds you hear?*

- If you have a bathroom with a fan, turn on the fan and listen through your Pipes of Pan tubes.

*What do you notice?*

- While listening through one end of a Pipe, cover the opposite end of it.

*What do you notice?*

- Hold Pipes of different lengths up to each ear.

*What do you hear?*

- If you have Pipes of different diameters—meaning the openings of the Pipes are different sizes—slide one inside the other and listen carefully as you slide them together and apart (see photos).



*What happens to the sound as you slide the Pipes in and out?*



## Get Creative!

Remember, experimenting is about trying new things, observing what happens, and then trying more new things. Here are some questions to help you get creative...

- What does the world sound like through tubes made from different materials? Look around your home for other tubes that can be part of your Pipes of Pan exhibit.
- Give your Pipes of Pan exhibit some pizzazz by decorating it. Can you find some art inspiration from the sounds you hear through your Pipes?
- Can you find a way to connect your Pipes together into one large listening exhibit?



## What's Going On?

What do the sounds around you sound like when you listen to them through your Pipes of Pan? Can you change what you hear by holding different Pipes to your ears?

When you place a tube up to your ear and listen, the length of the tube affects what you hear. Do you notice that when you listen through shorter tubes, the world sounds like a bunch of high notes, and when you listen through longer tubes, the world sounds full of low notes? If so, you have discovered an important concept in music and physics: shorter tubes produce higher notes, also known as higher *itches*—and longer tubes make lower sounds, or lower *itches*.



To understand this relationship between length and pitch, let's talk first about sound. *Sound* is a type of energy that can travel through solids, liquids, and gasses—like cardboard, paper, plastic, water, air, anything else you can think of—by vibrating all of the tiny pieces, also known as *particles*, in the materials. The vibrations happen in waves, meaning there is a pattern to them. If the waves of vibrations occur one after another very quickly—or at a high *frequency*—they produce a high pitch sound. If the vibrations are slow, they are called low frequency vibrations and they produce a lower pitch. Keeping this knowledge in mind, let's now explore why we hear higher pitch sounds through our shorter Pipes and lower pitch sounds through our longer Pipes.

In your Pipes of Pan exhibit, your Pipes are hollow, but they are not empty—they are full of air. The air inside of the tubes vibrates when sound waves travel through it, but within each tube, the air vibrates differently because the tubes are different lengths. When all of the sound waves enter the shorter tubes, the higher frequency waves start to build upon one another, causing the higher pitch noises to get louder. In longer tubes, only the lower frequency vibrations build in strength, causing the lower pitch noises to get louder. The length of a Pipe determines which frequency of wave will grow in strength, and the vibration frequency that grows and becomes the biggest is the note you hear the most through the tube. This same principle is why organs use pipes of all different lengths and why a trombonist moves the slide of a trombone in and out to make different notes.

*What other instruments might use length  
as a way to change their pitch?*





## Discovery Museum Pipes of Pan Challenges

### Challenge 1

You have used your tubes to listen to sounds around you. Can you now use these tubes to create sound? Remember, sound is energy and vibration, so think of all the ways you can vibrate your Pipes to make some noise! Here are some questions to help you get creative:

- Can you play notes with the Pipes using your hands (see photos)? How many ways can you do this?
- Can you play notes with the Pipes using your breath?
- Can you use other things around the house to help you play your Pipes of Pan exhibit?
- Can you create enough new Pipes to play a song?

*What do you hear?*

*Can you play high notes? Low notes?*



### Challenge 2

Can you convert your Pipes of Pan exhibit into another Discovery Museum sound exhibits that use tubes of different lengths?

- Secure your Pipes to the end of a table, chair, or anything available that allows your Pipes of Pan to hang down.
- Cut out a piece of thin cardboard from an empty cereal box, granola bar box, etc., and use it to hit the tops of your Pipes (see photo).

*What do you hear?*

*What happens when you hit a Pipe with more force? Less force?*

*If you have visited Discovery Museum before, do you recognize which exhibit you have recreated?*





## Share Your Discoveries with Us!

We want to know about your Pipes of Pan exhibit. Share your experience with us in any of the following ways:

- Record a song
- Draw a picture
- Take photos
- Write down which supplies were your favorites to use, why you liked making your own Pipes of Pan exhibit, or any other fun things you discovered

Then email us at [myhomediscoveries@discoveryacton.org](mailto:myhomediscoveries@discoveryacton.org). We can't wait to hear from you!

And next time you're at the Discovery Museum, check out our Pipes of Pan exhibit on the second floor next to Bessie's House, and show us what you learned from the exhibit you created at home. We'll see you here!

## Want even more Pipes of Pan fun?

Check out these resources!

### Activities

- Make more Sound exhibits with Discovery Museum  
[https://www.discoveryacton.org/sites/default/files/Bucket%20Radio%20Student%20Page\\_final2.pdf](https://www.discoveryacton.org/sites/default/files/Bucket%20Radio%20Student%20Page_final2.pdf)
- Explore Sound as vibration with Discovery Museum  
[https://www.discoveryacton.org/sites/default/files/TSW\\_Sound\\_Sound%20as%20Vibration-final.pdf](https://www.discoveryacton.org/sites/default/files/TSW_Sound_Sound%20as%20Vibration-final.pdf)

### Videos

- A concert of tube instruments  
<https://www.youtube.com/watch?v=cG0jprCQ6Ak>
- Exploring sound vibrations and frequency  
[https://www.youtube.com/watch?v=Pyl\\_R-njvbA](https://www.youtube.com/watch?v=Pyl_R-njvbA)
- Make your own pan pipe  
<https://www.youtube.com/watch?v=HkEUDPaP0X0>