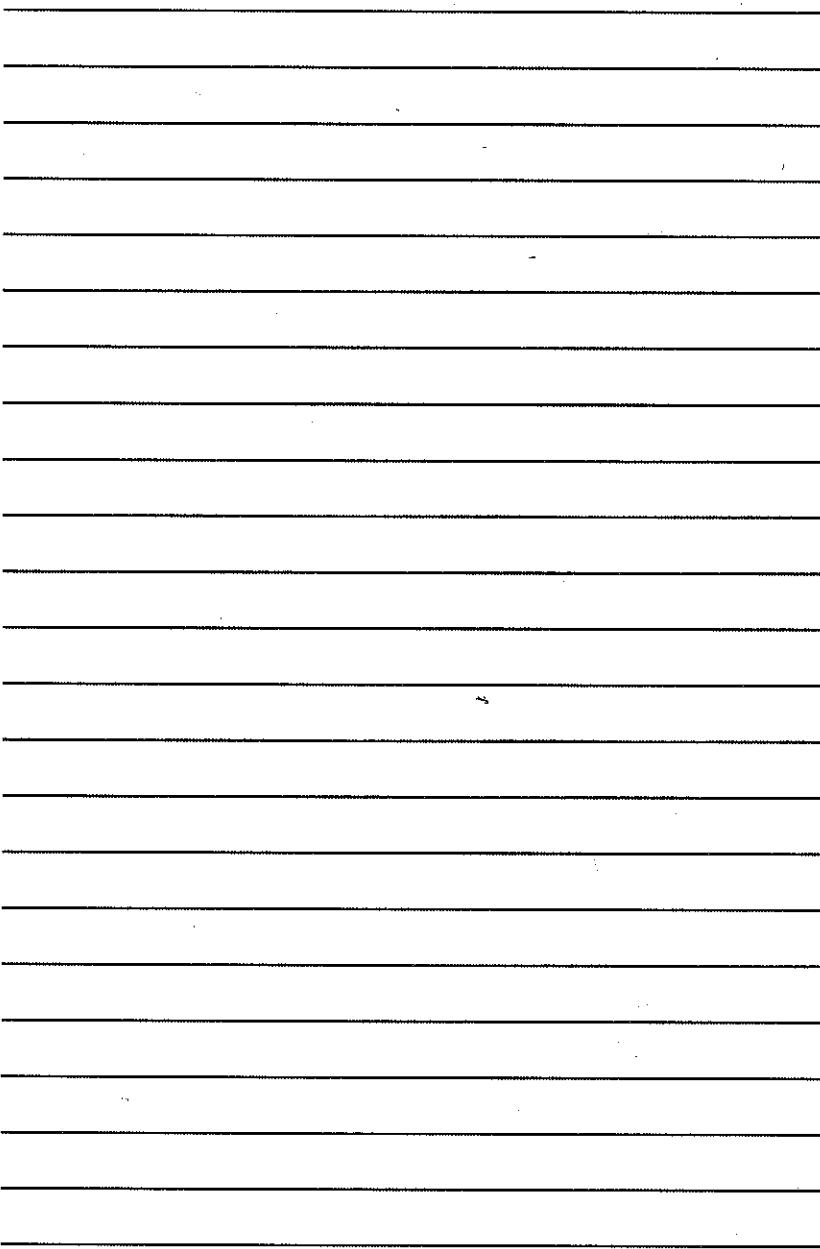
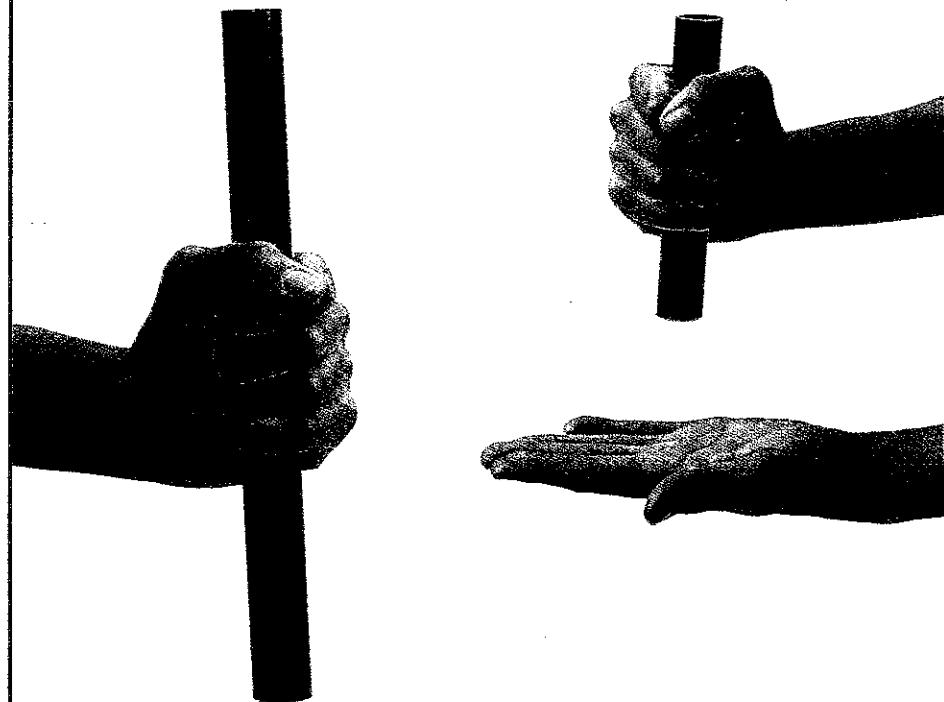




## NOTES



## Really Good Stuff



## **PALM PIPES™** ACTIVITY GUIDE

## OVERVIEW:

Music from plain old PVC pipes? It's true! These eight pieces of pipe have been precisely cut to produce the faint pitches in an octave of the C major scale (C, D, E, F, G, A, B, and C). A tone is produced by tapping an open end of a pipe against the palm of a hand. Make music and explore harmony, resonance, sound waves, frequencies, standing waves, and vibrations.



a Really Good Stuff brand

AGES 3+

SKU: WPVC-100  
RGS: 800167

– Really Good Stuff 

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Adult supervision required.



## VOCABULARY

Young scientists love to learn and use scientific words and we know you will too! So here's your chance to introduce new science vocabulary as you complete the activities. Just look for these bolded words to help everyone understand the fun, scientific "magic" of the activities.

**chord** – a group of tones sounded together to form harmony

**frequency** – the number of times that something (such as a sound wave or radio wave) is repeated in a period of time

**harmony** – the combination of different musical notes played or sung at the same time to produce a pleasing sound

**music** – sounds that have rhythm, harmony, and melody

**noise** – a loud or unpleasant sound

**note** – a specific musical tone

**octave** – a series of eight notes in a musical scale

**pitch** – the highness or lowness of sound

**reflected** – returns light or sound waves from a surface

**resonance** – the quality of a sound that stays loud, clear, and deep for a long time

**sound wave** – a wave that is formed when a sound is made and moves through the air to carry the sound to your ear

**tone** – a sound of a particular pitch and vibration

**vibrate** – to move back and forth or from side to side rapidly

**vibrations** – a series of small, fast movements back and forth or from side to side



## NGSS CONNECTIONS



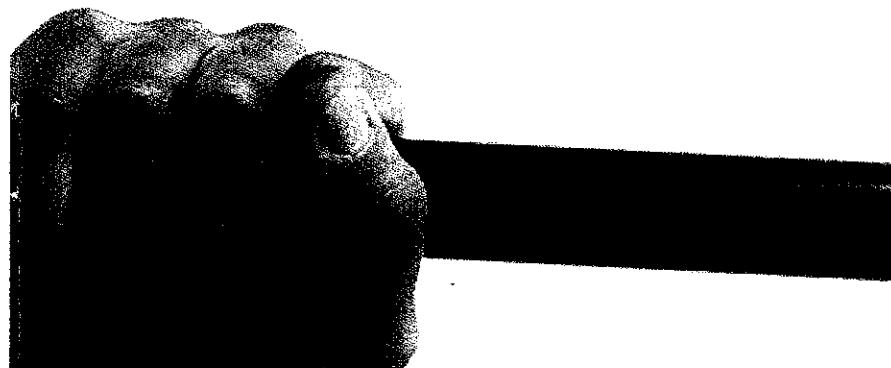
As you know, the Next Generation Science Standards (NGSS) set expectations for what science concepts students should understand. These Palm Pipes activities start young scientists on the way to meeting those standards. Take a look and see what can be accomplished!

Young scientists (grades **K-2**) who demonstrate understanding can:

- Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. (NGSS **1-PS4-1**.)
- Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (NGSS **K-2-ETS1-2**.)

Young scientists (grades **3-5**) who demonstrate understanding can:

- 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. (NGSS **3-5-ETS1-3**.)
- Generate and compare multiple solutions that use patterns to transfer information. (NGSS **4-PS4-3**.)





## ACTIVITY #1: Introducing the Palm Pipes

Consider using the Palm Pipes to facilitate a hands-on discovery session. It may be a lesson on musical instruments, sounds, **noise** vs. **music**, or sound transmission.



**TIME:** 30-40 minutes



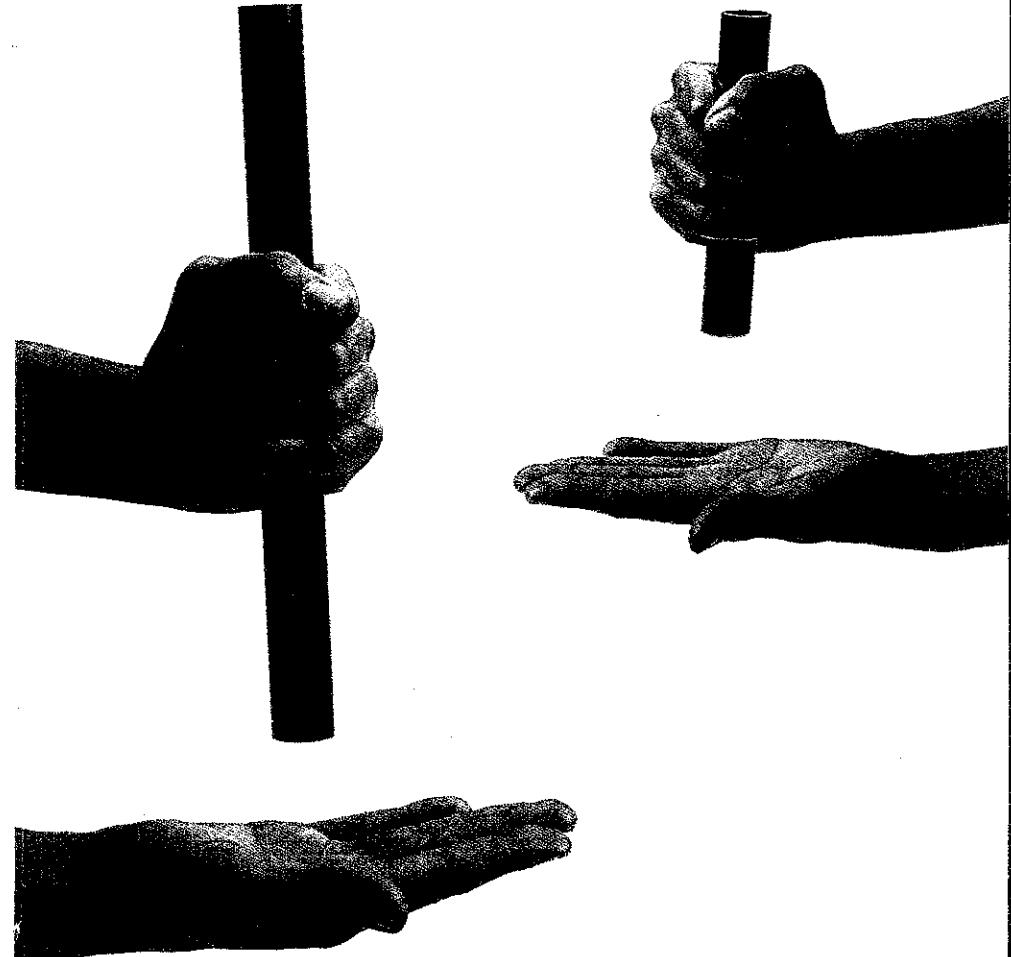
### MATERIALS

- 8 Palm Pipes™
- 8 Sets of hands
- Quiet performance area



### STEP-BY-STEP INSTRUCTIONS

1. Hand out the Palm Pipes to eight students and ask them to investigate how they might produce musical **tones** with them.
2. Allow the students some time to try different approaches. You may see students trying to blow through them or strike them with an object like a pencil or ruler. They may tap them together or use them as drum sticks. These attempts produce **noise**. This is an opportunity to help them distinguish between **music** and **noise**. Explain that when a sound is made, it means that something is vibrating and to keep that in mind as they are working to achieve a musical **tone**.
3. Once a musical sound occurs (when somebody eventually taps the open end of a pipe against a palm, leg, or arm) ask everyone to stop and have that student demonstrate how he or she made the sound.
4. Have students use the same approach to create sounds with their Palm Pipes.
5. Ask them to listen to the sounds produced and talk about the differences.



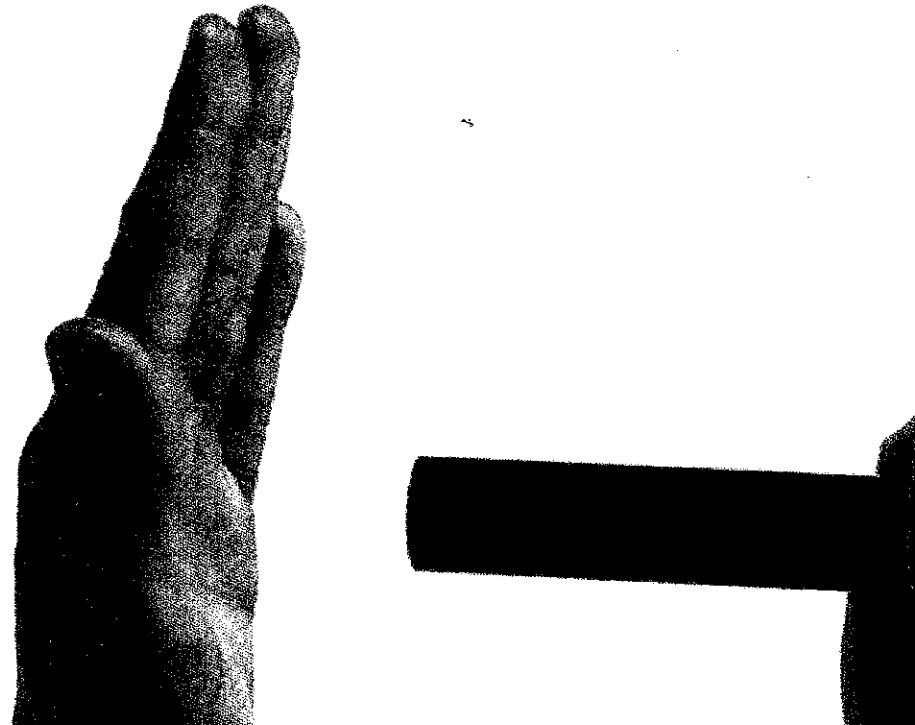


## STEM CONNECTIONS

### FOR TEACHERS, PARENTS, GRANDPARENTS, & ALL-AROUND SCIENCE ADULTS

We haven't forgotten about the new STEM and STEAM initiatives you've been hearing about in our schools, bringing Science, Technology, Engineering, (Art), and Math together to make young scientists real thinkers! Look what the young scientists integrated into the Palm Pipes activities.

- Science – sound, vibrations
- Technology – challenge young scientists to identify musical instruments that vibrate to make sound
- Engineering – expand the activity by having young scientists create an instrument that vibrates to make sound
- Math – measuring length



## LET'S GET STARTED!

The **tones** produced with Palm Pipes are faint, but if you listen, familiar tunes will emerge with a little practice. Figuring out the connection between the **tones** needed and the length of a pipe isn't hard at all. The pipes are color-coded to make following **music** easier. You'll be writing color-coded **music** in no time.



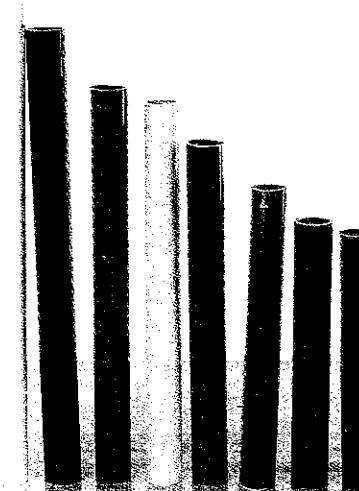
### MATERIALS | What's included

- 8 Color-coded Palm Pipes™
- 1 Palm Pipes activity guide



### MATERIALS | What you'll need to get

- Paper
- Colored pencils, crayons, or markers to match the pipe colors
- Quiet performance area
- 1 Permanent marker (optional)
- 1 Piano (optional)
- Other instruments (optional)





## TAKE IT FURTHER: Continued

- Have eight students each select a Palm Pipe and play it. Have them find the **note** produced by their pipe on a piano, keyboard, or other instrument. The **tone** of the **note** varies and depends on the instrument used to make it even though it's the same **pitch**.
- Discuss the difference between single **notes** and **chords**. The **chords** can consist of two, three, or more **notes** played together. Challenge a team to find harmonious **chords**, that is, **notes** that when played together sound pleasant. Examples of pleasant **chords** that demonstrate **harmony** include:

1	2	3	4	5	6	1	2	3	4	1
3	4	5	6	7	8	3	4	5	6	3
Two note chords						5	6	7	8	5
						Three note chords	8			

Play all of the **notes** (pipes) in each column at the same time. For example, play pipes 1 (white pipe) and 3 (orange pipe) together; then play 2 (red pipe) and 4 (yellow pipe) together. Try the **chords** that use three and four different pipes. They sound great!

Each day, form a team of eight students (the Palm Pipers), give them the set of Palm Pipes, and challenge them to learn a simple melody. Be sure to give them enough time to learn and practice their tune. Then, have a recital! Have the team come to the front of the room, announce what they will play, and perform their tune. Presentation and style are a big part of a recital!



## HOW DOES IT WORK?

**Vibrations** produce sounds. Vibrating air, metal, wood, plastic, and almost anything else can produce sounds. The plastic pipe, itself, **vibrates** when it is struck or dropped. However, when an open end of a pipe is struck on something soft like the palm of a hand or on an arm, the air inside of the pipe **vibrates** instead of the outside plastic. The strongest sounds produced by the pipe are those resulting from a standing wave. Standing waves are produced when a continuous wave traveling down the pipe is **reflected** from the closed end back upon itself causing interference. It happens very quickly and the resulting **tone** is very faint but it's in there!





## ACTIVITY #2: Palm Pipe Patterns for Making Music

Discovering the **note**-producing process using Palm Pipes is its own reward. Now it's time to put the learning into some patterns so it's easier to use.



**TIME:** 30 minutes



### MATERIALS

- 8 Palm Pipes™
- 8 Sets of hands
- 1 Permanent marker (optional)
- Quiet performance area



### STEP-BY-STEP INSTRUCTIONS

1. Identify the **tones** of the Palm Pipes. The pipes can be labeled with the name of the **notes** produced when a pipe is "played." They can also be numbered to facilitate playing **music** written using only numbers or colors. If you choose to label the pipes, use a permanent marker for durability.
2. Ask students to notice the relationship between the **tone** the pipe makes and its length. Guide them to discover that the longest pipe produces the lowest **note**; the shortest pipe produces the highest **note**.
3. Have the pipe players tap two, three, or four pipes at the same time to demonstrate how **chords** can be formed and harmonies produced as a result. Have them listen for sounds that are pleasing and for sounds that are unpleasant to hear.
4. Challenge the pipe players to produce a simple tune like "Mary Had a Little Lamb" or "Twinkle, Twinkle Little Star." Have the students use colored pencils, crayons, or markers (matching the pipe colors) to copy the number pattern for the tune on paper.



## TAKE IT FURTHER: Writing Music for the Palm Pipes

**Music** is not a hodge-podge of **notes**. A **music** composer uses specific **notes** at specific places to achieve the goal of the composition. The Palm Pipes use colors to help distinguish one **note** from another. **Music** for the pipes can be "written" using just the colors of the pipes. You can also write the **music** using the letter of the **note** produced by a pipe when it's played, or with just the numbers. The chart below offers all three options.

Note	C <sub>1</sub>	D	E	F	G	A	B	C <sub>2</sub>
Color	White	Red	Orange	Yellow	Green	Blue	Purple	Black
Number	1	2	3	4	5	6	7	8

Here are some familiar songs to play using the pipes.

- Mary Had A Little Lamb

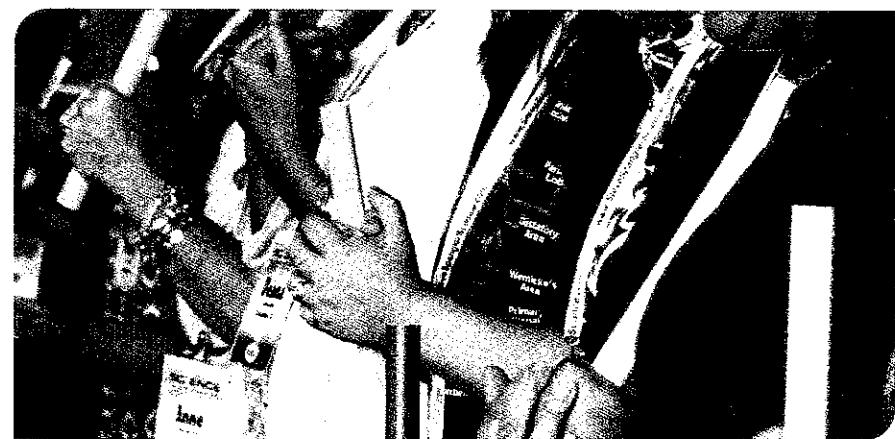
3212333 222 355 3212333 322321

- Twinkle, Twinkle Little Star

1155665 4433221 5544332 5544332 1155665 4433221

- Chop Sticks (Play the top and bottom lines together for **harmony**.)

555555 555555 777777 888876 555555 555555 777767 8888  
444444 333333 222222 333321 444444 333333 222212 1111



# THUNDER TUBE™

1. Hold the Thunder Tube™ around the middle with one hand, with spring hanging down.
2. Make the spring dance by moving the Thunder Tube, shaking from your wrist only, not your entire arm.
3. Do not whip the spring around.
4. Move the palm of your other hand on and off of the opening on the Thunder Tube. Try it slow and fast. Listen to the sound quality change.
5. Another effect is to scrape a fingernail along the spring while holding the Thunder Tube still. The creepy, creaking sound is like a door on an old closet, full of family secrets. Try tapping the spring with a pencil. Do not pull the spring.

Experiment, Enjoy and Make Just Plain Wacky Sounds.  
Great sound effect for Halloween, musicians, theaters and science demos.

MADE IN TAIWAN

